

LIBRARY
OF THE
UNIVERSITY
OF ILLINOIS

622.05
CO
v.5
cop.2

ALTGELD HALL STACKS

The person charging this material is responsible for its return to the library from which it was withdrawn on or before the **Latest Date** stamped below.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

FEB 2 8 RECD

MAR 9 1983 IRR

MAR 1 5 RECD

APR 1 1 1985 IRR

APR 2 2 1985

FEB 1 6 1995

APR 1 9 1995

UIC AUG 1 8 2005

UIC Re... SEP 0 2 2005

L161—O-1096

This volume is bound without #8, 9

which ~~is~~/are unavailable.

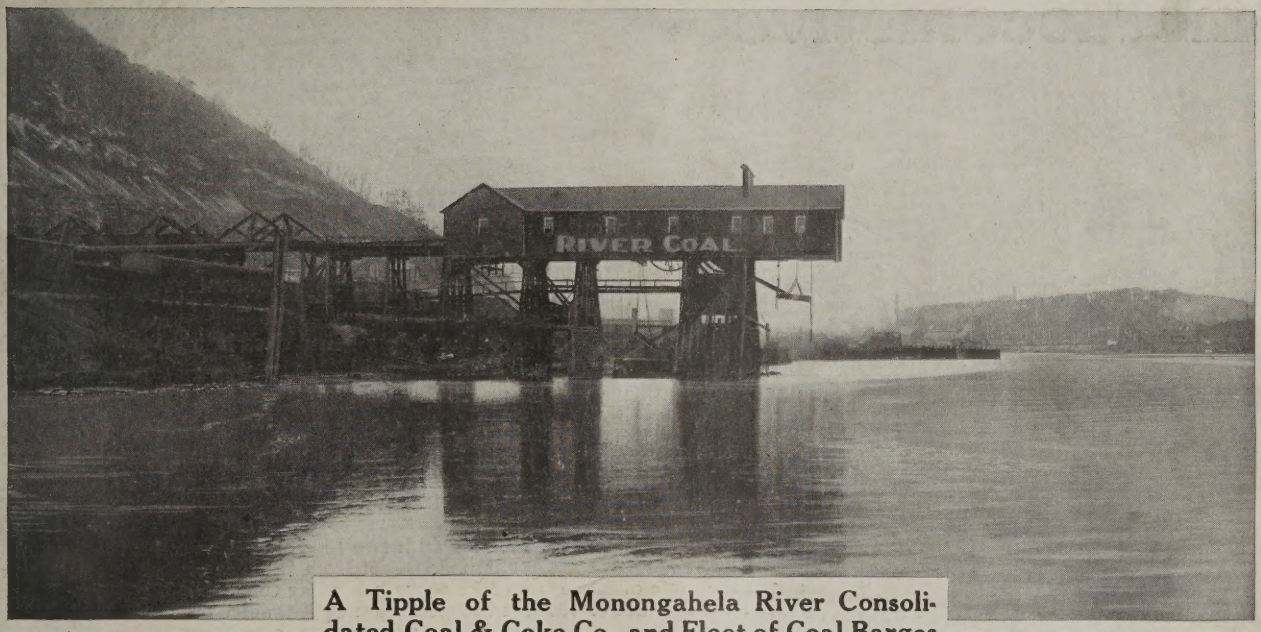
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 1
Issued Every Saturday
Hill Publishing Company

NEW YORK, JANUARY 3, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page





A Tipple of the Monongahela River Consolidated Coal & Coke Co., and Fleet of Coal Barges on Monongahela River at Pittsburgh, Penn.

18 Fifty-Ton Railroad Cars Loaded In a Day With One Baldwin-Westinghouse BARSTEEL Electric Mine Locomotive



understood the business ground up.

MOTORMAN ESTABLISHES RECORD AT SCALP LEVEL

SPECIAL TO JOHNSTOWN DEMOCRAT.

SCALP LEVEL, Sept. 19—What is believed to be the highest record ever made in any section was made today in No. 1 mine of the Scalp Level Coal Mining company, one of the John Lochrie operations, when 18 steel cars were loaded by one motorman. The motorman who made the record output was Victor Gustasson. The foreman at No. 1 is William B. Wilson.

Eighteen steel cars of coal loaded in a single day with but one motorman is the highest run that has ever been made in this vicinity and it is believed that it has never been equalled anywhere.

Pure [illegible] stamps needed by

On this particular day they worked exactly nine hours and forty-five minutes. The only haulage equipment used was an eight-ton Baldwin-Westinghouse **Barsteel** Electric Locomotive, equipped with commutating-pole motors.

This locomotive, except for a few mine cars hauled from a dip from a point in the heading by a mule, did all the work, gathering the coal cars and hauling the same to the tipple.

When they stopped work in the evening the locomotive was inspected and found to be in first-class condition, in spite of the heavy work it performed. The motors were nearly as cool as when started in the morning.

Twelve mine cars, each loaded with two tons of coal, were hauled on each trip. The longest haul was made about 2500 feet from the face of first left to tipple and about the same distance from face of main heading to tipple. At two points in the mine for a distance of 400 feet the grades are 1½% against the loads.

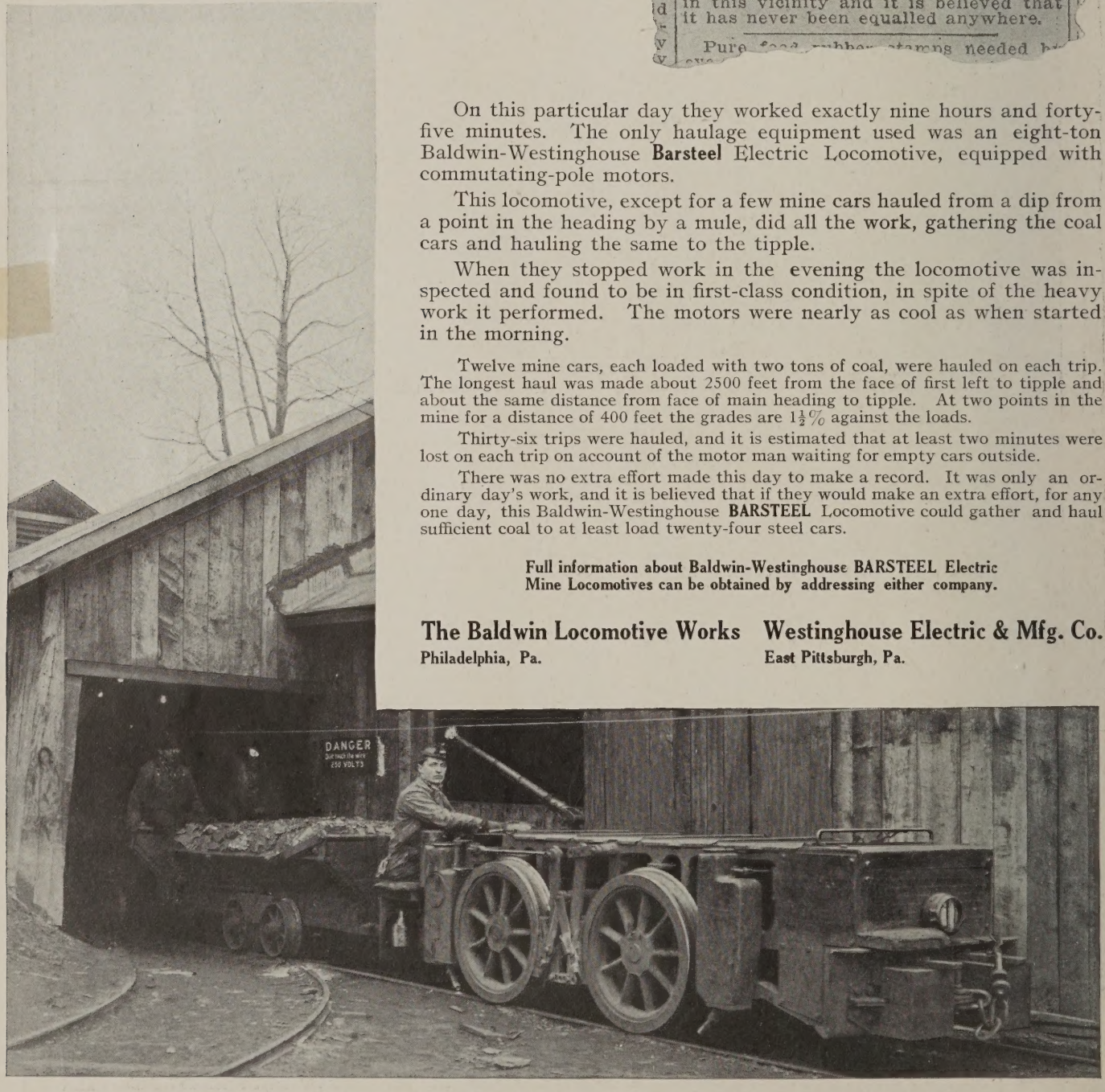
Thirty-six trips were hauled, and it is estimated that at least two minutes were lost on each trip on account of the motor man waiting for empty cars outside.

There was no extra effort made this day to make a record. It was only an ordinary day's work, and it is believed that if they would make an extra effort, for any one day, this Baldwin-Westinghouse **BARSTEEL** Locomotive could gather and haul sufficient coal to at least load twenty-four steel cars.

Full information about Baldwin-Westinghouse BARSTEEL Electric Mine Locomotives can be obtained by addressing either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.



A view of the Mines, the Motorman, and the Baldwin-Westinghouse BARSTEEL Locomotive which made this record.

TS
.5

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JANUARY 3, 1914 NUMBER 1

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 1

Allowance must be made for the fact that "man is a social being," and if we wish to suppress the saloon and consequent payday celebrations, we must substitute some means that will permit the miner to satisfy his craving for companionship. COAL AGE, Vol. 5.

IDEAS AND SUGGESTIONS: *Pages* 2-3

Striking at the Root of Trouble—One Reason Why Workmen are Dissatisfied.

*SOME NOTES ON INTERIOR WATER MOVEMENT: *Pages* 4-5

Nearly 10 million tons of coal a year are shipped down the Ohio River. Due to low-water stages, navigation is only open a portion of the time. The Government contemplates an expenditure of 100 million dollars in order to make water shipping possible the year through. COAL AGE, Vol. 5.

WAGES AND PRICES IN THE PITTSBURGH DISTRICT: *Pages* 5-6

The coal-mining industry in the Pittsburgh district has raised wages between 62 and 92 per cent. since 1897, and the cost to the purchaser has only increased 54 per cent. The cost of operation of the Pennsylvania R.R. absorbs only about 79 per cent. of the total receipts, but in coal mining, the operating expenses involve almost all the gross income. Jesse K. Johnston. COAL AGE, Vol. 5.

*WORKING A STEEP COAL SEAM: *Pages* 7-9

Details of methods employed in mining coal from several seams which lie on a dip of 60 degrees. Notes on drawing pillars and timbering. As much as 90 per cent. of the coal is recovered. Simon H. Ash. COAL AGE, Vol. 5.

COAL-MINING HISTORY OF MUHLENBERG COUNTY, KY.: *Pages* 10-11

The west Kentucky coal field was one of the earliest developed in the United States. For years the coal was won without powder. Reminiscences of early mining history. Otto A. Rothert. COAL AGE, Vol. 5.

THE DAWSON MINE EXPLOSION: *Pages* 11-12

*EFFICIENCY OF PORTABLE ELECTRIC MINE LAMPS: *Pages* 12-14

Formulates a specification for portable electric mine lamps. These lamps must give at all times no less light than a Wolf lamp in perfect order with a 1-in. flame. The bulbs must last for 300 hr. and the batteries a full working year of 12-hr. days. H. H. Clark. COAL AGE, Vol. 5.

COAL AND COKE NEWS: *Pages* 32-35

COAL TRADE REVIEWS: *Pages* 36-40

SECRETARY F. K. LANE ON PUBLIC COAL LANDS: *Pages* 15-16

The report of Franklin K. Lane, Secretary of the Interior, to the President on the public coal lands and immediately allied subjects. He declares that Alaskan affairs should be administered by a board of appointed officials, that coal lands should be leased, not sold, in both the West and in Alaska, and that the present system of selling is inoperative and based on mere guess work. COAL AGE, Vol. 5.

*A WATER SPRAY FOR DRILLS: *Pages* 16-17

COAL FREIGHT RATES FROM THE HOCKING DISTRICT: *Page* 17

*EMERGENCY UNHITCHING DEVICE: *Page* 17

WHO'S WHO—IN COAL MINING: *Pages* 18-19

A sketch of the life and work of John P. Reese. COAL AGE, Vol. 5.

*CONCUSSION AS A CAUSE OF EXPLOSIONS: *Pages* 19-21

A big blower of gas will not raise a dust cloud, but projected into such a cloud 150 ft. long, it will propagate with low pressures and will probably, under favoring conditions develop a most violent explosion. COAL AGE, Vol. 5.

*POWDER IN OPEN-CUT MINING: *Pages* 21-22

THE SACRIFICE: *Page* 22

Poem by Berton Braley.

EDITORIALS: *Pages* 23-24

The Legality of Unions—The Report of the Secretary of the Interior.

LEGAL DEPARTMENT: *Page* 25

WHEN IS A COAL YARD A NUISANCE:
Location or manner of operation will not be interferred with unless it constitutes an unreasonable interference with residential rights. A. L. H. Street. COAL AGE, Vol. 5.

RECENT DEVELOPMENTS IN THE COLORADO STRIKE: *Page* 26

DISCUSSION BY READERS: *Pages* 27-29

The Certificate Law. Letter No. 9—Extraction of Pillars—Handling Fine Dust in Washing Coal—Grand Jury Investigates Strike Situation—How to Buy Coal.

STUDY COURSE IN COAL MINING: *Page* 29

INQUIRIES OF GENERAL INTEREST: *Page* 30

*Working Coal under Watery Strata—Weathering of Coal.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 31

INDEX OF COAL LITERATURE: *Pages* 41-42

ADVERTISING INDEX: *Page* 22

CIRCULATION OF THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers

Does Advertising Pay—*the Reader?*

The Weekly Ad-Talk Page

That is not the angle from which it is customary to view this "grandold" question.

In the orthodox concept of advertising it is the *advertiser* who is pictured as eternally mulling over the question—"Does advertising pay?"

But how about the *reader*?

Does it pay? Is it worth your while to make a practice, each week, of thumbing through the selling section of COAL AGE? Or is it time wasted?

You have got your own answer—and if you are reading this, we have pretty good proof as to the nature of your answer.

Perhaps the answer of the Ad Manager—who doubtless sees much more advertising and knows many more COAL AGE advertisers than you, although he lacks your buyers' viewpoint—will be of interest to you. At any rate, here goes:

First, advertising *does* pay the reader—and pays him big. Just imagine this world *without* advertising; to focus down to our immediate question, imagine a world of coal mining newspapers sans advertising section. You wouldn't begin to be the *well educated buyer* that you are now.

You'd know one, or perhaps two products, in this line and that. You'd not know them *all* as you do now. *You'd not know enough to make a really wise buy.*

But—secondly—I'm compelled to admit that it doesn't pay the reader as well as it should pay or as it will next year and the year after.

Every good ad is the product of a man with a "nose for news"—as they say in newspaperdom. And the man with a "nose for news" is simply a man with the faculty of picking out and presenting, in an attractive manner, facts and ideas that interest the reader.

In many ads there is not the news interest that there should be or could be. Ads are still all too frequently blatant reiterations of alleged superiority, loud proclaimings of statements that are not proved and that cannot even hope to interest the reader. But ads of this type are growing fewer and fewer in number.

Advertisements in your technical papers are today very much more attractive in appearance than ever before. They are more informative and better written. Hence they are interesting and worth reading.

And what has already been accomplished in this direction is just the beginning. Each year sees the percentage of dead ads decreasing and the number of live, interesting ads on the increase.

What do *you* think? Does advertising pay the reader? Take a half hour some evening and put your ideas on paper. Send them along to the Ad Manager. I'll wager that they will make a very interesting ad-talk page.

COAL AGE

Vol. 5 NEW YORK, JANUARY 3, 1914 No. 1

"Treat men as pawns and nine-pins and you shall suffer as well as they. If you leave out their heart, you shall lose your own." We doubt if we should have had the courage to print this quotation from Emerson, at any other season, but at the beginning of a new year, we, in common with all mankind, are bubbling over with courage.

Emerson was of the opinion that the normal man is a social being; we doubt if any sensible person would disagree with him on this point, however, there are many normal men who lose sight of this fact when they are called upon to deal with others.

Saloons, labor unions, national holidays, pay-day celebrations, all give testimony to "man the social being." Attempts to arbitrarily suppress them altogether give evidence of some one's stupidity.

The miner at work in his room, loading coal, is almost an isolated creature. Compare his surroundings with those of the clerk, the brick layer, the machinist, or most any other laborer. Do you wonder then that he craves companionship when his day's work is completed?

We know of a camp that does not boast of a saloon nor a labor organization, but every afternoon, during the summer months, the men congregate in front of the commissary and play marbles—don't laugh, we are in earnest; name furnished on request. A happier lot of men we have never observed. If all men were possessed of such simple tastes, mining camps as residences could be put in the same class as the Y. M. C. A. Annex.

Between the two extremes—the saloon and the marble club—there are many possibilities, all of them time tested and approved; for example, first-aid teams, prize gardens, reading rooms and night schools, school advancement committees, moving picture shows, old-fashioned picnics, etc., etc.

Oh, yes, remarks the pessimist, you left out "blind tigers." The blind tiger proprietor is at best an outlaw, he never trusts his customers and they seldom trust him. At pay day, while the men are flush, his glasses may ring, but the daily gatherings characteristic of the saloon are wanting.

"Man is a social being." We have never met a person who questioned the truth of that statement. We have met hundreds of men, however, who have never given the matter a moment's consideration, and they are the ones who invariably howl, "down with the saloon," the moment such an establishment interferes with their employees' working capacity; likewise, when the lodge or a labor organization seems to interfere with the output of their mine, they are "agin" them To all such we would point out, as a New Year's suggestion, the possibilities for social activity that lie somewhere (in every camp) between the saloon and the marble club.

If you have reached the stage where you are in doubt as to which substitute for the saloon would be most effective in your camp, you may consider yourself out of danger; it's only the fellow who hasn't realized that there is a substitute, who needs attention.

Some Notes on Interior Water Movement of Coal

SYNOPSIS—Nearly 10 million tons of coal a year is shipped down the Ohio River. Due to low-water stages, navigation is only open a portion of the time. Government contemplates an expenditure of 100 million dollars in order to make water shipping possible the year through.

To those who live along the Ohio and Mississippi Rivers, the passing of a boat down (south) with a coal tow is of little interest. When these boats plod their way up-stream (north) still less interest is manifested by those who are not directly interested. But, to the coal operator, the shipper and the receiver, such items mean much. That a coal tow has passed a certain point on its Southern journey is the best news the shipper can receive, excepting, only, the brief wire from the captain that the fleet has been landed safely at Louisville, Memphis or New Orleans.



Boats Working in Ohio River Pool No. 1 to Get Tows Ready to Start South

It is only at certain seasons of the year now that coal is sent from the upper Ohio and Monongahela pools to the Southern markets. The cause of this is simply that a navigable stage of water does not remain in the Ohio River from Merrill, Penn., south, throughout the twelve months. It is just possible that river shipping of coal on the upper Ohio prevails only from seven to nine months during year. This, of course, is because the system of locks the Federal Government is building in the Ohio River is not complete.

From Pittsburgh, the distance down the Ohio to Cairo, Ill., where the Mississippi is touched, is approximately one thousand miles. The Ohio River drains a quarter of the greatest states in the Union, and this importance of the river is one of the reasons that Congress has been so liberal in appropriating millions of dollars annually for the river and harbor improvements. The projects now under way, or the completion of the series of locks and dams will cost upward of $100,000,000. The greatest burden of freight now carried on the Ohio is coal, all coming from Pennsylvania, Ohio, West Virginia and Kentucky.

Importance of the Project

To have a navigable stage of water in the Ohio River during twelve months of the year would mean that the coal shipping tonnage would be more than doubled. Each lock or dam costs upward of $2,000,000 and there will be fifty or more of these between Pittsburgh and Cairo. This will permit a 9-ft. stage of water throughout the entire year, and, it is said, the constant stirring up of the water by coal and passenger boats will prevent the formation of the customary "ice bridge."

Effects of the Opening of the Panama Canal

Time is now drawing near when shipping will be permitted through the Panama Canal. This means that New Orleans will be made a great reloading point for coal consigned to receivers along the Pacific Coast. In turn, it also means that more coal will be shipped out of the western Pennsylvania, eastern Ohio and Kanawha fields for Southern reloading. If the Panama Canal was now open for traffic, it would be impossible to ship coal from the Pittsburgh harbors to New Orleans throughout the year unless the system of locks and dams was completed. Shipping could and would be done at certain seasons of the year, when navigable water would permit, but the completion of the river-improvement program would insure shipping during every week in the year.

Specifications have only recently been presented to Congress asking for an appropriation of about $10,000,000 for work in the Ohio River during the coming fiscal year. All such appropriations are generally agreed to with little if any argument, for the fact is realized that the completion of the 50 or more locks and dams will make the Ohio Valley and its tributary country a beehive of industry, insofar as river coal shipping is concerned.

Basing future shipments of coal by river to Southern points on the records for the fiscal year ending June 30, 1910, when 8,366,786 tons were floated down stream, this volume will be increased 50 per cent. or more when the improvement program is finally completed.

Wages and Prices in the Pittsburgh District

By Jesse K. Johnston*

SYNOPSIS—The coal-mining industry in the Pittsburgh district has raised wages between 62 and 92 per cent. since 1897, and the cost to the purchaser has only increased 54 per cent. The cost of operation of the Pennsylvania R.R. absorbs only about 79 per cent. of the total receipts, but in coal mining, operating expenses involve almost all the gross income.

In view of the fact that the present wage scale for mining bituminous coal in the competitive states expires Apr. 1, 1914, I thought it might be interesting to make a study of the wages and selling prices of coal in the Pittsburgh district for the last 16 years, and to set forth some facts which are misunderstood by the public.

If the coal business could have some assurance during the next two years that actual conditions would be as favorable as today, then there would be no necessity for writing this paper. But in the absence of such assurance if we can know just whither we are drifting in this period of readjustment, reconstruction and legislation, we can better determine what to do, and how to do it.

As one has said very truthfully, "As a whole the coal business is the most indispensable, the most unprofitable, the most maligned, and misunderstood of all the mediums through which the welfare of the people is secured. It is the most important, and most helpless, having in it the power to command, and yet having a nonresistant mass, accepting only with a feeble protest the criticisms of a misinformed public." The public thinks it can cheapen this essential product by destroying that machinery by which it is now being produced at a lower price than anywhere in the world.

Why is it that the great coal industry in the thickly populated industrial districts of Pittsburgh, an industry producing sixty-six million tons of coal in the year 1912 in Allegheny, Washington and Westmoreland counties, is not on a more solid business foundation? On analysis, the answer is, that the cost of production leaves a very small margin of profit for such a large investment, for we must remember that the labor charge is only 75 per cent. of the whole cost of production, there being in addition "overhead costs" and the cost of selling in competitive markets.

One of the statements you hear frequently is that the wages have not advanced in proportion to the selling price of coal, so it is well to nail that statement at once with actual facts.

The Wage Scales in 1897 and 1912 Compared

Referring to the chart and going back to the year 1897, the mining rate in the Pittsburgh district is found to have been 55c. for pick mining lump coal in the thin-vein district; $1.78½ was the maximum rate for day labor and 5c. a ton was a fair cost for materials and supplies. These were deplorable times in the mining industry, and just three years previous to this time. Coxey's Army made its memorable march through southwestern Pennsylvania on its way to Washington.

COMPARISON OF WAGES AND SELLING PRICES

	Wages per Ton		Wages per Day			Average Selling Price		
Year	Lump Coal	Run-of-Mine	Max.	Min.	Supplies	Allegheny	Washington	Westmoreland
1897	$0.55	$0.3558	$1.78½	$1.52½	$0.05	$0.67	$0.55	$0.85
1898	0.66	0.4272	1.90	1.75		0.71	0.58	0.71
1899	0.66	0.4272	1.90	1.75		0.74	0.74	0.88
1900	0.80	0.5171	2.28	2.10		1.01	0.97	1.04
1901	0.80	0.5171	2.28	2.10		1.00	0.87	1.01
1902	0.80	0.5171	2.28	2.10		1.04	1.03	1.04
1903	0.90	0.5817	2.56	2.36		1.22	1.15	1.18†
1904	0.85	0.5494	2.42	2.23		1.02	0.94	0.95
1905	0.85	0.5494	2.42	2.23		0.96	0.91	0.96
1906	0.90	0.5817	2.56	2.36		1.03	1.02	0.97
1907	0.90	0.5817	2.56	2.36		1.10	1.07	0.99
1908	0.90	0.5817	2.56	2.36		1.05	1.03	0.97
1909	0.90	0.5817	2.56	2.36		1.00	1.00	0.87
1910	0.95	0.6140	2.80	2.49		1.08	1.06	0.98
1911	0.95	0.6140	2.80	2.49		1.06	1.05	0.97
1912	1.00	0.6464	2.95	2.62	0.10	1.09	1.08	1.01
Per cent. advance	81.89	81.69	65.25	71.80	100		53.62	

† Year of anthracite strike.

It was in this year that the 55c. rate was made by the action of the late Patrick Dolan, president District No. 5, United Mine Workers of America, who reduced the wage rate so that the union mines could compete with those of the New York & Cleveland Gas Coal Co. This led to a strike on July 4, 1897, culminating in the interstate convention later, Sept. 13, 1897. The eight-hour day was adopted in Chicago, January, 1898.

Now looking at the record of the year 1912, the last of which we have any data, the rate is found to be in the Pittsburgh thin-vein district $1 per ton for pick mining lump coal. The maximum rate for day labor is $2.95, and 10c. per ton is the cost for material and supplies.

These figures mean an advance of 81.89 per cent. for pick mining. Machine mining has also advanced so that the wage rate for cutting has risen 65.85 per cent., and that for loading after machines 92.29 per cent. The maximum wage for day labor has risen 65.25 per cent., the minimum day-labor wage has increased 71.80 per cent., while supplies now cost twice as much as in 1897. In that year the selling price in Allegheny, Washington and Westmoreland counties averaged 69c. for run-of-mine

*General mining superintendent, Pittsburgh Plate Glass Co., Creighton, Penn.

Note—An article entitled, "A Study of Wages and Selling Prices of Coal in the Pittsburgh District," read before the Coal Mining Institute of America at its winter session in Pittsburgh.

coal, while in the year 1912 this price amounted to $1.06. Thus the average increase was 53.62 per cent.

The Coal Man's Dollar

Loosely speaking, let us call the $1.06 received in 1912 the coal man's dollar, and see how far it goes. A misdirected public opinion is demanding high wages, high taxes, good preparation, safety, compensation, conservation and yet there are not enough of cents in the coal man's dollar to meet all these demands, and allow a fair profit for the investment.

Let us make some comparisons. The cost of operating the Pennsylvania R.R. in 1912, was 78.69c. for every dollar received, and in 1912 that corporation paid only 37.1 per cent. higher wages than in 1900.

On the other hand, the wage rate of mining in the Pittsburgh district increased 51.51 per cent. in that period of time and during parts of 1910 and 1911 a group of mines in the Pittsburgh region, part in the thin-vein district and part in the thick vein, some well situated, some with less favorable conditions, expended for mining, labor, fuel, general office expenses, taxes, depreciation and royalty 99.09c. per ton. Note that this expenditure did not cover interest on bonds.

The average selling price received was $1.09 per ton, leaving a difference of 10c. per ton to take care of dividends and bonded interest, so you see there is not enough left for safety, conservation, compensation and a fair return on the investment.

Is this true of the coal industry? Let me quote you Edward W. Parker, United States Geological Survey, from his excellent paper read before the American Mining Congress, Philadelphia, Penn.:

"Pennsylvania by long odds the most important producer of bituminous coal with an output of 137,300,000 tons in 1909, showed a total expense of $117,440,000, and a value of product of $129,550,000, leaving a balance on the profit side of little over $12,000,000, or about 3⅓ per cent. on the capital invested, which was $358,600,000."

The Consumer Pays for Freight and Thinks He Is Paying for Coal

If you told the consumers of domestic coal that the operators of the Pittsburgh district only received an average of $1.06 per ton for their coal at the mines, or about 4c. a bushel, he would place you in the Ananias Club immediately, for in the mind of the average consumer there is a firm conviction that the coal operators are a lot of robber barons who fix the price of coal at their pleasure.

Now let us analyze the situation, by taking an example during the year 1912. The consumer purchased a car of run-of-mine coal in the Pittsburgh district at $1.10 per ton at the mine. The freight bill would cost him 35c. per ton and the cost of hauling and unloading would cost him $1 or a total of $2.45 per ton. The retail dealer quoted him 10c. per bushel delivered in his cellar or $2.60 per ton. On examination he finds he has paid 15c. per ton for the retailer's profit and also that this profit and the transportation are large items in his coal bill.

The representatives of labor say to the operators of the Pittsburgh district, "If you have not enough business sagacity to get a better price for your coal, it is no fault of ours." The steel manufacturer sells his steel at profit; the butcher demands fair payment for his meat; the shoe merchant gets a good price for his shoes; and the clothier secures a profit for his clothes. Why does not the coal operator get a good price for his coal? What is the remedy?

The Only Efficient Price Raiser

The operators might make a secret agreement to raise the price of coal, but they cannot do this without fear of the law. The railroads have been trying for 5 years to raise freight rates and they have failed because public opinion and the Interstate Commerce Commission have been against them. Who, then, does raise the price of coal? The United Mine Workers of America, who by their compact organization, have been able to secure a large advance in wages during the last 16 years. The question is whether the operators cannot profit by taking some lessons in organization from that aggressive body and by giving the actual conditions of the coal industry more publicity.

We may well question whether the cost of labor in the production of coal has not reached an apex, beyond which we should not allow it to pass until the consumer understands that in the end he must pay for the value of the coal in the ground, and wages of the miner, the cost of safety appliances, compensation, conservation, new laws of taxation and a reasonable profit to the operators.

There is a tremendous waste of investment in coal-mining property, due partly to the antagonistic attitude of the public and partly to the unorganized condition of the industry, and it seems that the business of mining can only be improved by better organization, some efficiency engineering on the selling force, and more general knowledge of the actual conditions under which the coal industry is operating. This publicity might well help to secure some changes in the federal laws.

An American Invention Is Introduced into Great Britain

N. K. Bowman, general manager of the American Mine Door Co., Canton, Ohio, has just returned to this country from a visit through England and Scotland, where he installed a number of automatic ventilating doors for coal mines. Mr. Bowman took occasion to visit a number of his Majesty's inspectors in England and Scotland and found these men especially pleased with the general design of the mine door manufactured by his company. It was found that the "American" mine door fully meets the requirements of the recent British mine law, which provides among other things that trap doors must be so constructed that they will not blow open when the air is reversed. The object of this law is to make it possible to reverse the air in a mine where an accident has happened. It frequently occurs that fire is an element of coal-mine catastrophes, and in such a case, every possible precaution must be taken to carry the poisonous gases away from the main exit, so that the men may have a safe means of escape.

Lignites may be profitably used in (1) Gas producers. (2) Specially constructed boilers. (3) Briquettes. The U. S. Reclamation Service has a boiler at Williston, N. D., that burns lignite untreated, shortly after it is taken from the mine. When lignite is to be used for briquetting it should be thoroughly crushed, then dried until it contains not more than from 5 to 10 per cent. of moisture, then compressed while still warm.

Working a Steep Coal Seam

By Simon H. Ash*

SYNOPSIS—Details of methods employed in mining coal from several seams which lie on a dip of 60 deg. Notes on drawing pillars and timbering. As much as 90 per cent. of the coal is recovered.

The following method of working steep seams is practiced with slight modifications in the different beds of the Pierce County coal measures. At the mines of the American Coal Co., Spiketon, Wash., the beds dip from 60 to 65 deg. Four seams are being worked, Nos. 6, 8, 9 and 10, and the prospects are good for substantially increasing the output in the course of the next year. At present about 500 tons are being produced each day.



Fig. 1. Yards and Trestle at No. 8 Mine. Also Shows Power House and Washery

The product of the mines is a sub-bituminous coal, which is prepared in three sizes, lump, nut and steam. This coal finds a ready market for domestic and steam purposes in and about the Puget Sound cities. The No. 10 bed, also called the "Lady Wellington," is the best seam now being worked. A slope has been driven across the dip on a grade of 32 deg. to the second level. No. 8 bed was opened in a similar manner, while No. 6 bed has been reached by a rock tunnel driven westerly 670 ft. from the second level in No. 8 seam.

These three beds are of the Burnett series and are on the east slope of the Wilkeson anticline dipping from North 76¾ deg. East to North 67½ deg. East. The average strike is North 15 deg. West. The Eastern measures in this section have never heretofore had an authentic correlation and reliable data for these seams is still lacking. The coal beds in this section are a subdivision of the Eocene period and the coal measures as shown in the columnar section have been determined by survey and tunnel driving for an interval of 2000 ft. Detailed sections of the different coal beds are shown on the columnar section sheet.

The present company has had charge of the property since February, 1912, and much credit is due General Manager D. R. Swem, and Superintendent John Hutchinson, for their consistent efforts to modernize and render safe the company's collieries.

Method of Mining

The coal of the No. 10 bed is 3½ to 4½ ft. thick between walls, a detailed section of which is shown in Fig 5. The coal is mined by the chute-and-pillar system, for the character of the walls is such that mining by wide breasts is impracticable. The coal does not fire spontaneously. With the exception of a few small jumps, the bed has been regular for the entire length of all gangways so far driven. A diabase dike was passed through by a short rock tunnel in the south end of the field, however, beyond this dike, the coal was found in place and regular.

The gangway, which is the intake airway, and the counter gangway, which is the main return airway, are driven parallel. The counter gangway is up the pitch from the gangway and the stumps are from 20 to 25 ft. thick. Chutes are driven 6 ft. wide from the gangway to the counter on 50-ft. centers, from which point they are driven 8 ft. wide up the pitch to the boundary.

The entire mine is driven by contract, same being between the company and the United Mine Workers of

*Mining engineer, American Coal Co., Spiketon, Wash.

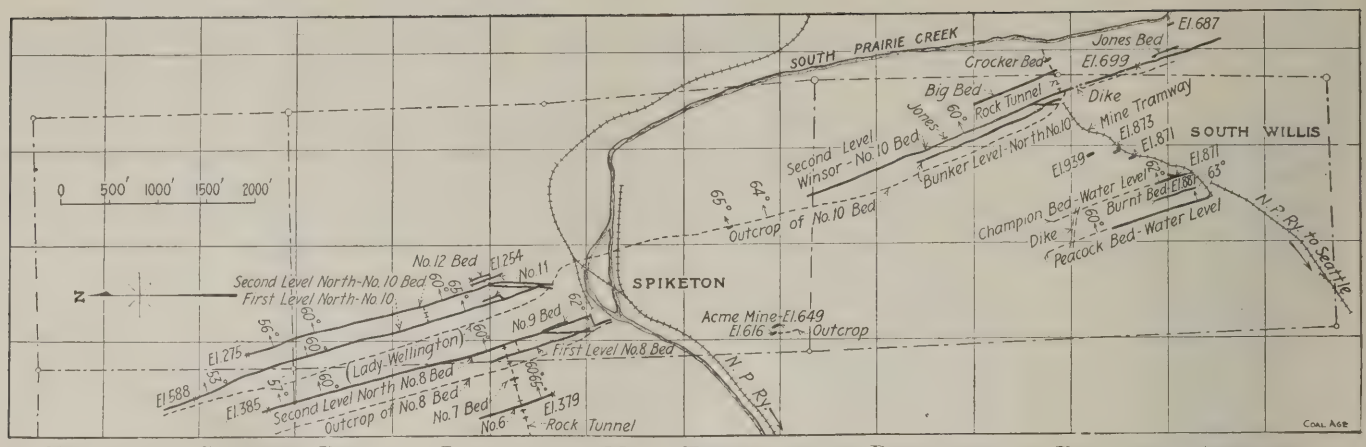


Fig. 2. Map Showing Relative Location of Main Entries with Reference to Principal Surface Features

America. The distance apart of the crosscuts on the pitch is agreed in the contract to be such that the blocks will not exceed 50 ft. in length, and will be 6 ft. wide. Between every other chute, what is termed a half-chute is driven 6 ft. wide from the gangway to the counter. Where much gas is encountered or conditions warrant such action, half-chutes are driven between all the chutes. Each half-chute is a traveling way between the gangway and the counter, and from it access at all times can be made to two chutes. Hirsch electric lamps are used by the miners in all gangways.

A Brattice Is Carried Up to Face

As shown in Fig. 3, a board brattice is carried from the counter in the center of the chute to the face. The inby compartment is used for the manway. The boards are nailed on the coal side to a line of props up the center

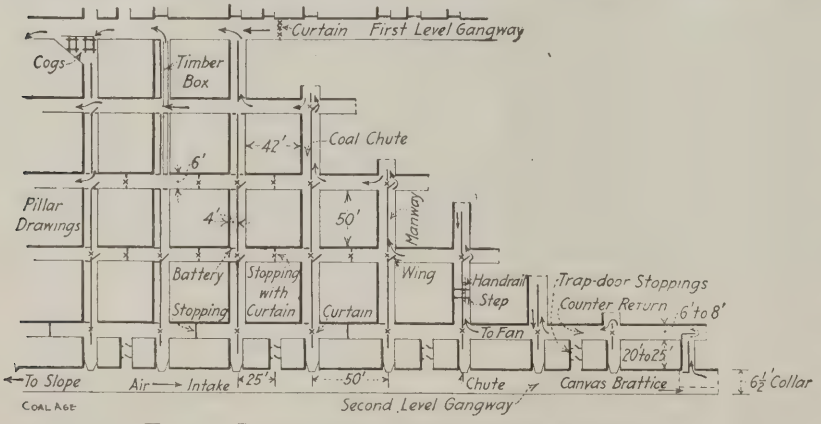


Fig. 3. Details of Ventilating System

the canvas curtain and extending to the wing post set in the center and slightly back in the crosscut. This wing not only deflects the air into the crosscut, but prevents any coal from passing below the crosscut as same runs into the coal side through the canvas curtain. There is also no danger to men who may happen to be coming up the chute.

Batteries are built at every other crosscut and, if necessary, at every crosscut, and the chutes are worked full. This not only arrests the coal and reduces breakage, but aids the ventilation and makes it safe to pass from one chute to another through the crosscuts. A chute starter runs coal from the batteries when necessary.

All shooting is done on the solid. Holes are drilled with the ordinary hand machines and the blasting is done with 20 per cent. Dupont stumping dynamite, a shot lighter firing the holes. Only one miner works in each

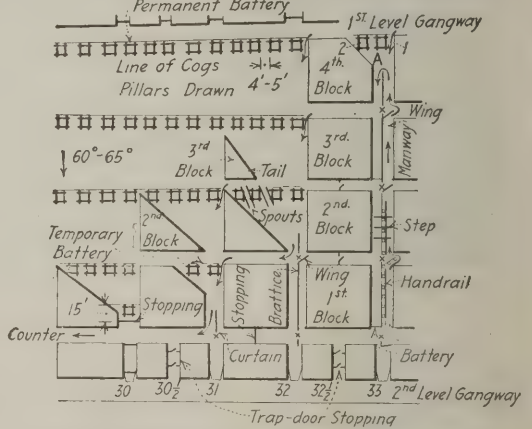


Fig. 4. Method of Pillar Drawing

of the chute. These props are set from 2 to 4 ft. apart, depending upon the character of the walls. Hand rails are fastened to the props on the manway side and steps on the bottom are made by placing a prop above the brattice props and placing one end of same in a notch in the rib.

The chute between the low side of the gangway and the counter is always kept full, thus preventing any leakages of air from this source. At every crosscut and on the counter, canvas curtains 2x2 ft. are hung in the brattice; access across the chutes can be made through these openings at all times. At each crosscut, wings are built of boards from the bottom to the roof on the manway side of the chute, the same starting at the chute brattice below chute. The average rate of advance in the chutes is 8 ft. per shift.

Because of the heavy pitch, nothing can be gobbed and everything between walls must be taken out and separated at the cleaning plant. Timber is brought down from the surface to the top gangway, to which the chutes from the second level are driven. One of these chutes is used as a timber-way from which props are taken to all parts on the pitch.

Drawing the Pillars

In Fig. 4 is shown the method of pillar drawing. Four chutes are usually driven to the boundary in advance of the pillars, three of which are usually working at one

time. The pillars are drawn on the outby side of the chute as follows: Referring to Fig. 4, No. 30 pillar is finished. When a pillar is to be drawn, the crosscuts of the chute are well timbered and a cog as 1 in 33 pillar is built on the low side of the top lift or crosscut as the case may be.

This cog is placed as closely as possible to the inside rib of the chute. The corner of the block as *A* in the fourth block is then worked off, and as soon as room permits, a second cog as 2 is placed 4 to 5 ft. from the first as shown in drawing. A temporary battery of props is built above this latter cog, to aid traveling across the face and prevent anything from coming down from above and injuring the men below or knocking out the props.

Attacking the block in this manner is called taking off the angles. This is continued until the half of the block is worked off as shown in block 2 of pillar 31, leaving what is called the tail. The same course is pursued on the next block below, as shown in block 1 of pillar 31, after which the tail or half of the block above is worked and run out. When a tail is to be run out as shown in block 3 of pillar 32, part of which has been run out, the temporary battery above the cogs is replaced by the spouts or wooden chutes as the tail is worked off. The coal is then run out between the cogs through the spouts, after which a permanent battery is placed above the cogs.

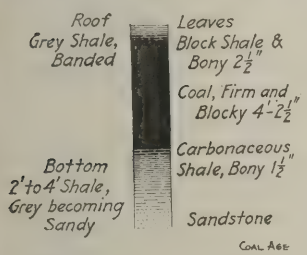


FIG. 5. A DETAILED SECTION OF SEAM

The cogs and the batteries are built of 6-ft. props. In this way the pillars are drawn to the first block from which only an angle is taken off as shown in pillar 30, and a cog and permanent stopping are placed in the chute neck. The arrows show the direction of the air current. Under favorable conditions 2250 sq.ft. of this ground has been taken out in 10 shifts of eight hours each, and as much as 90 per cent. of the coal has been recovered. The roof stands well and the breaks occur above the cog lines and are held up by the cogs. As the coal is being drawn, none of the timbers are knocked out by the shots. Other props are set as the angle face advances.

NOTES ON TIMBERING

The timbers are all cut at the mines, but the lagging used is 1-in. sawed lumber in the chutes and split lagging in the gangway, heavy ground, and in the chute batteries or bulkheads. The gangway sets are made of heavy pole trees, set 6 ft. apart and consist of two legs and a collar above which split lagging or props must be placed to safeguard against the coal roof.

Props are set 3 ft. or more apart, depending on the walls, above which cap pieces are placed if the roof is bad, otherwise they are set in a hitch. They are slightly underset, and if the bottom is bad, sills are used; if not, they are set in a hitch in the bottom.

As the cars are loaded from the chutes on the gangway and the coal spills more or less over both sides of the car, it was considered more economical to depart from the usual custom and place the ditch on the hanging-wall side of the gangway.

Mules are used for hauling the cars on the gangway as the hauls are still short, but these will be replaced soon by mine locomotives. Trips of three or four cars are hauled up the slope. These weigh loaded about one ton.

The agreement with the United Mine Workers of America specifies that all miners not on a contract rate shall receive $3.80 per day. In No. 10 mine, the men receive $3.25 per yd. for chutes, $2.50 per yd. for cross cuts, $5.25 per 90 sq.ft. of pillar removed, $1.25 per cog and $14 per yd. for gangway work. They buy their own powder, fuse, caps, tools, etc. Powder is sold to them at the mines at the rate of $3 per box of 25 lb. of 20 per cent.



FIG. 6. KICKBACK AT NO. 8 MINE

dynamite, fuse at 60c. per 100 ft., and 5X caps at $1 per 100.

Improvements in the way of preparing and handling the coal are under way, all of which when completed will make a safer and more profitable mine.

An Early Gasoline Engine

BY NEWELL G. ALFORD*

One of the first gasoline locomotives was that furnished by W. F. Prouty to the St. Bernard Mining Co.'s No. 9 mine in the year 1898. It was built either at Newark, N. J., or Philadelphia, Penn., and was installed by Mr. Prouty himself who made a trip to Earlington for that purpose.

It had a 20-hp. engine, which was set upright in the truck and had only a single cylinder and single-chain drive from the engine to the axle. The transmission was very delicate and the motor stalled on reversing. Moreover, the locomotive lacked weight and gave off quantities of smoke, which was, of course, very objectionable. Finally a magneto was put on the engine and when this failed to give the desired result, the locomotive was consigned to the scrap heap. It was used in the mine for about one year, but was never able to pull a full trip of loaded cars.

Erratum

In our issue of Dec. 6, p. 846, the statement was made that the boilers in the Hauto power plant are of the Maxim type. This should have read of the Stirling type.

*Earlington, Ky.

Coal Mining History of Muhlenberg County, Ky.

By Otto A. Rothert*

SYNOPSIS—The west Kentucky coal field was one of the earliest developed in the United States. For years the coal was won without powder. Reminiscences of early mining history.

Coal is Kentucky's greatest natural resource, and the mining of it is rapidly becoming a greater factor in the commercial history of the state. About 30,000 men are now employed in the various coal mines. At present, however, there are three times that number employed by the various manufacturing establishments in the state and nine times 30,000 are connected with farms as operators, managers and tenants. Twenty years ago the number of miners was comparatively insignificant.

Social Conditions in Muhlenberg County

To show the bearing of coal mining on local history I have selected Muhlenberg County in the West Kentucky field as an example. There are now 26 commercial coal mines in Muhlenberg with payrolls amounting to about $2,000,000 a year. This is almost double the amount of the county's agricultural products; tobacco, the leading crop, seldom exceeds $300,000. The county has a population of about 30,000 of which 3500 men are employed in and around the mines. About 95 per cent. of the miners were born in America, of whom one fourth are native Muhlenbergers. About 5 per cent. are foreigners and 25 per cent. are negroes.

Ground for home sites near mines is cheap in Muhlenberg, and, as a result, about 15 per cent. of the miners own the houses in which they live. The percentage of home owners is increasing. This is especially true in and near Central City which is now the largest town in the county and maintains good schools and churches. That the mine owners are interested in the welfare of their people is shown by the fact that at Graham and Luzerne they offer cash prices to their miners for the best kept home premises, whether these belong to the company or not.

Kentucky Was in the Market before 1830

Tradition has it that about one hundred years ago Alney McLean, who later became a member of Congress, accidentally discovered that the "black rock" found on his farm near Green River would burn. However, wood being plentiful and more convenient, his discovery was regarded as a matter of little consequence. About 1820, his son, William D. McLean, opened up what was known as the McLean drift bank. It is said he was one of the first men to report the existence of coal in western Kentucky.

As early as 1830 a few barges of coal were mined at the McLean drift bank and sent down Green River to Evansville. About that time coal was taken from the Mud River mine and hauled to Russellville in ox wagons, a distance of 30 miles. It usually required three days to make the trip over what is still called the "Old Coal Road." This coal was used by the early blacksmiths who called it "rock coal," thus distinguishing it from charcoal, which, for many years, was the only coal burned in their forges.

The great extent and probable value of the deposits of coal in Muhlenberg was given very little thought by local people before 1854 when David Dale Owen, America's greatest geologist, published the First Report of the Geological Survey of Kentucky. In this book he calls attention to the existence of thick beds of coal in about 25 different places in the county and points out, in a general way, the territory underlaid with coal. The many observations made since his day have added very little to his discoveries, but have merely verified his statements regarding the extent of the field.

Later Developments

By 1875, or a few years after the railroad, which is now the Illinois Central, was built, no less than a dozen mines were in operation in the county along that line, and when, in 1882, the Owensboro branch of the Louisville & Nashville R.R. was completed, more were opened along its tracks. As years rolled on other and larger mines were opened and now the output has placed Muhlenberg at the head of the coal-producing counties in Kentucky. In the meantime, coal lands have advanced from $4 and $5 per acre to $50 and $100.

In 1900, when commercial mines were still comparatively small, producing about 400,000 tons a year, the population of Muhlenberg was 20,000. In 1910 the output reached almost 3,000,000 tons and the population was 29,000, an increase of 45 per cent. over the population of ten years before. Most of this increase was due to mining. During this same period, the increase of population for the United States was 21 per cent. and for Kentucky about 7 per cent.

Hoskinson's Reminiscences

William H. Hoskinson, who all his life long has lived near Mud River mine, speaking of the methods employed there some forty years ago, says:

"Those who are familiar with none but the present methods of mining coal cannot easily realize on how diminutive a scale the old Mud River mine, or any other old coal mine, was formerly worked. In 1871-72, when my father, Jackson Hoskinson, operated this mine under a contract with Hall & Ryan, he put out more coal than had ever before been produced at this place in the same length of time. But there are mines in Muhlenberg county now that produce more coal in one week than did old Mud River during the entire two years of my father's contract.

"Modern methods, as we know them today, were never in use at Mud River. Much coal has been produced here by the light of candles and the old 'Dutch lamps,' but these were displaced long ago by the more convenient de-

---

*Louisville, Ky.

Note—Article entitled "Coal Mining and Its Bearing on Local History," read before the Kentucky Mining Institute, Dec. 9, 1913.

vices from which have evolved the present oil and carbide lamps. The drill, needle, and scraper were never seen here until about 1869. Before that time all coal was wedged down.

Slack Separated by Rake and Wasted

A good steel sledge and 5 or 6 steel wedges were among the essentials of a collier's kit; he also had a heavy iron rake, with which he separated his coal, being careful to load nothing that would pass through the teeth. His car was supposed to hold 10 bushels. When it was filled a homemade wooden ticket was attached to it and a 'pusher' pushed it out of the room into the 'lie-way,' where it was coupled to one or two other cars and pulled by a mule to the tipple. Only one mule was used in the mine, and he never went any farther than the 'lie-way.' In fact, small as he was, it was necessary in many places to remove some of the roof or bottom to make it possible for him to reach the 'lie-way.' The track throughout the mine was of wood. For a long time car wheels without flanges were used, the flange, or guard rail, being part of the wooden track. In the course of time these smooth-faced old wheels and the wooden track were superseded by flanged wheels and iron rails.

Early Squib Making

"Blasting powder, it is said, was first used here about 1869. This was the beginning of a new epoch at Mud River, for the churn-drill, needle and scraper soon began to take the place of the sledge and wedges. All the coal was mined 'on the clear' and 4 or 5 in. of powder was considered a good shot.

The little squib now so common was then unknown. In its stead the miners used a joint of wheat-straw filled with gunpowder, which was set off by means of an oiled paper placed under the straw and attached to the coal by a small lump of clay. When I was a boy I made many of these squibs, leaving the joint in one end of the straw and stopping the other end with soap to keep the powder from running out."

Muhlenberg County has an area of about four hundred square miles, all of which is underlaid with coal. However, only about two-thirds of this area, or 270 square miles, is, it is said, underlaid with the coal beds Nos. 9 and 11, which are the thickest seams and practically the only ones now being worked. Each foot of thickness of a bed of this coal is estimated to produce 1000 tons to the acre, and since No. 9 and No. 11 have a combined average thickness of from 10 to 11 ft., these two beds will run, according to this estimate, about 10,000 tons to the acre, or 6,400,000 tons to the square mile, and 1,728,000,000 tons to the 270 square miles. Thus, assuming that the coal is uniform and estimating the output at three million tons per year, these two beds alone could be worked, according to these figures, for about six centuries, or until about the year 2500 A. D.

From experience gained with dust explosions in gaseous mines it appears that undercast air crossings are the best in the more gaseous operations. The distance between the floor of an undercast and the roof of the road it crosses, should be at least 10 ft., though the character and strength of the rock may at times increase or modify this estimate. It is not necessary, as a rule, to line the road above with masonry, though the undercast itself must be carefully lined. The road above acts as a relieving arch to the undercast and takes care of most of the weight of the over-lying strata.

The Dawson Mine Explosion

We called attention some time ago to the fact that electric shot firing has its disadvantages because it creates a sense of security which is not justified in practice. There is always the possibility that a shot may be fired accidentally by a stray current or intentionally by some man who violates the rules. The evidence obtained at the Dawson mine shows the latter has been the cause of at least one disastrous explosion.

Mine No. 2 which was the scene of the disaster was ventilated by an exhausting Jeffrey fan having a capacity of 200,000 cu.ft. of air per min. for a 2-in. water gage or twice that for a 5-in. gage. It was not, the general manager assures us, a gaseous mine though occasionally some gas was found. It was worked with open lights. The chemist took samples of mine air in remote parts of the workings and gobs, and made determinations of their chemical constituents and of the quantity of dust in suspension. The fire bosses made daily tests for gas with the Wolf safety lamp and were under the immediate supervision of the mine inspector.

Electric Shot Firing of Undercut Coal with Permissible Explosives

The coal was all undercut and was shot by permissible explosives only, Monobel Nos. 2 and 5 being employed. About two-thirds of the undercutting was done by hand and one-third by Sullivan and Goodman machines. Electricity was used for haulage, for operating mining machines and lighting main entries.

At 3 p.m., the shot inspectors were accustomed to enter the mine and distribute detonating caps to the men and later they connected the shooting wires. Each entry was provided with a separate switch which was enclosed in a box. This switch was kept locked open until all the men were checked out of the mine. The shot inspectors closed all division switches on their way out as they proceeded to the surface. Finally when it was certain that all the men were out of the mine, the main switch at the entrance was closed. This completed the entire circuit and all the shots were thus fired instantaneously.

The shot inspectors then proceeded into the mine with Wolf safety lamps and noted if there was any fire, missed holes, broken timber or caves. The findings were reported to the mine foreman and any needed action was taken. Water pipes and a complete system for humidifying the mine air were in use.

About 270 men are usually employed in the mine, but 284 were underground when the explosion occurred on Oct. 22, at 2:55 p.m. The men employed were mostly Italians. The explosion killed most of the 261 victims by its direct violence. Few were killed by falls of rock and only 10 to 14 by afterdamp.

The Rescue Work.

The helmets were brought to the mine immediately after the explosion and the rescuers started into the working and had already explored the seventh west entry of the Highline and proceeded to the air shaft before the fan had commenced running. The explosion doors were blown off and the air course leading to the fan was damaged, so that it took one hour and thirty minutes to make the necessary repairs. The fan started at 4:25

p.m. The rescue car of the Bureau of Mines arrived 18 hours after the explosion. The coal companies of New Mexico and Colorado rendered valuable service for which the Stag Cañon Fuel Co. desires to express its thanks and appreciation.

Two helmet men were killed but the exact circumstances under which they were overcome is not known. A small fire was discovered immediately after the explosion which was easily extinguished with water. Another was found later and was put out by fire extinguishers and water. The only places where men were found alive was in the 13th and 14th east entries of the High-line.

The verdict of the coroner's inquest placed the blame on an unidentified miner. Seldom has the cause of an explosion been so certainly determined. The miners were not allowed to fire shots, and it will be noted from the report of R. H. Beddow, state mine inspector that this rule was violated by the man whose carelessness caused the disaster. The remarks follow:

The explosion was caused by an overcharged shot, which was fired in room No. 27 off the ninth west entry in mine No. 2. This shot blew the coal into the gob for a distance of 40 ft., creating much compression and stirring up and igniting the coal dust. The explosion spread from this point all over the mine. The shot-firing wires were traced from the shot back to the first crosscut between rooms Nos. 26 and 27. It then turned into room 26 and was traced to within 50 ft. of the ninth west entry, where it was attached to a cut-in.

The wire then led out of room No. 26 into the ninth west entry and was traced along that heading to room No. 24 where it was connected to the switch convenient to the trolley wire. This switch was also cut in. A piece of copper wire was found wrapped around the trolley wire opposite this switch and a piece of shooting wire, the right length to connect the switch with the trolley wire, was found on the top of a loaded car which stood between the switch and the wire which was wrapped around the trolley wire. An electric detonator was also found on the floor near this switch. It was thus clear that the shot had been fired from the trolley wire.

Efficiency of Portable Electric Mine Lamps

By H. H. Clark*

SYNOPSIS—Formulates a specification for portable electric mine lamps. These lamps must give at all times no less light than a Wolf lamp in perfect order with a one-inch flame. The bulbs must last for 300 hr. and the batteries a full working year of 12-hr. days. The costs of purchase and maintenance and the weight are not considered.

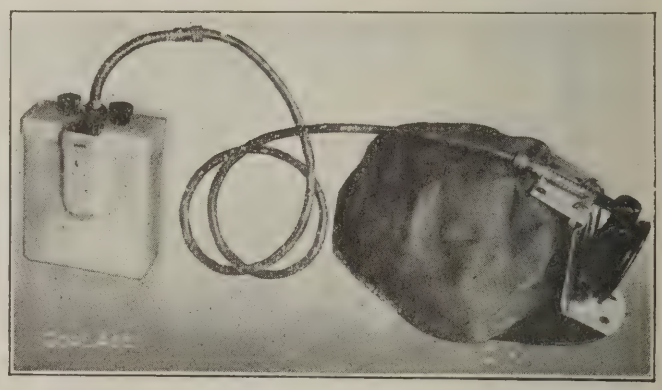
The first requisite of a lamp is the production of light, and for mining service it should burn steadily and with undimmed brilliancy for a certain number of hours of every day in the year. The next requisite is lightness, that is, a lamp should not weigh so much that it hampers a man's movements or becomes a burden to him. The next requirement is that the cost of operation and maintenance shall be consistent with the work done and the benefits received. Another requisite which does not require discussion is that the electrolyte shall not spill or leak while the lamps are in use.

Weight, Cost and Capacity

If we assume that this last mentioned requirement does not need further consideration, we can group the qualifications of portable electric lamps under three main heads as follows: Weight, cost and capacity.

The weight of a lamp can be easily ascertained and each prospective user of a lamp must decide for himself whether or not its weight is excessive. Under the head of cost would be included the first cost of the equipment, as well as all proper charges for operating and maintaining the lamp. Some of these charges will vary with each installation and whether or not the cost is excessive will depend somewhat upon the conditions which surround each case.

The capacity of the lamp is taken to mean its ability to produce a certain amount of light for a definite number of hours per day, every day in the year if need be. A lamp that can do this with the fewest interruptions has the greatest capacity for performing the duty for which it is intended. The capacity of a lamp as thus defined takes into consideration not only the ampere-hour



The Wico Cap Lamp

capacity of the battery and the efficiency of the lamp bulb, but also the life of battery plates, the mechanical strength of parts and the resistance to wear and tear.

We need to define (1) what is the proper amount of light for a lamp to give; (2) the proper time it should burn each day, and (3) what are reasonable interruptions of service and how often they may occur.

The Proper Amount of Light in Lumens

To measure truly the illuminating power of a portable

*Engineer-in-charge of electrical investigations, Bureau of Mines, Pittsburgh, Penn.

Note—Final part of paper read Dec. 5, 1913, at the winter meeting of the Coal Mining Institute of America.

electric lamp, we must consider not only the intensity of light (or candlepower), but also the solid angle over which the intensity is maintained. A lamp which gives an intensity of light of one candlepower all around gives twice as much light as one which gives a light of equal intensity half way round it. The term "flux" is used by illuminating engineers to designate the product of intensity and the angle over which it is exhibited, since this product most truly represents the light which flows from the lamp. The unit of flux is called a lumen and is about $^{8}/_{100}$ of the total flux of light produced by a source of one spherical candlepower.

The term candlepower used without qualification is not only confusing but really meaningless. If all sources of light distributed light equally in all directions, then a single measurement of their candlepower would suffice to compare them. Practically, however, sources of light differ a great deal in the way they distribute light, and this is especially true if reflectors are used.

The Average Candlepower

Therefore, if a lamp is stated to give two candlepower, the statement should also explain whether "head-on" candlepower is meant, or average candlepower over the stream of light, or average candlepower in a given plane —such as, for instance, the horizontal. A lamp that uses a reflector may have a "head-on" candlepower 3 to 10 times the average candlepower over its entire stream of light. Generally it is best to state the average candlepower of a lamp instead of the candlepower at a single point or group of points.

A statement of the candlepower of a lamp does not sufficiently define its light-giving capacity. A 100-cp. lamp is seemingly 33 times as desirable as a 3-cp. lamp and yet a 100-cp. lamp shining through a hole ½ in. in diameter gives less actual light and much less useful light than a 3-cp. lamp shining through a hole 3 in. in diameter. Therefore, in order to define properly the light-giving capacity of a lamp, a statement must be made regarding both the candlepower and the total flux of light (or lumens) produced by the lamp.

The selection of proper lower limits for intensity of light and its flux is, aside from safety, the most important consideration in selecting portable electric lamps. Without these standards of reference accurate and intelligent comparison of lamps is not possible. In an attempt to establish such lower limits the bureau searched for some time for standards which should be fair, not too low in value, not arbitrarily selected, and which should bear an easily recognized relation to something already in use.

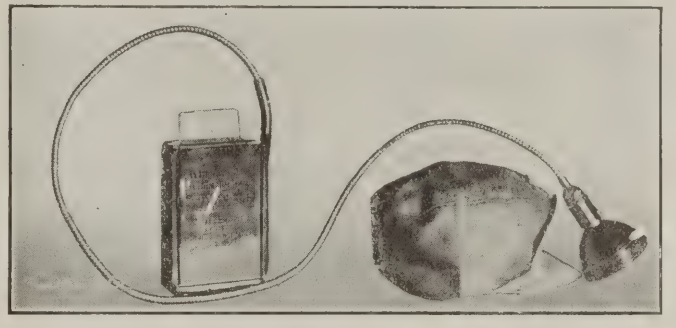
The Specifications Require Lamps Must Give at Least as Much Light as Wolf Safety Lamps with a Clean One-Inch Flame

It was finally decided to prepare a standard Wolf safety lamp to give its best performance and, after adjusting the flame height to 1 in., measure the average intensity of the stream of light and also the total flux of light in the stream. This was accordingly done at two different times, using different lamps, prepared by different men, and tested with different instruments of different types. The first measurements were made by Dr. L. O. Grondahl, of the Carnegie Institute of Technology, and the second measurements I made myself. The results of the two tests checked within a very few per cent.

The lamp used was a Wolf miner's safety lamp, 1907 model, round burner, burning 70-72° naphtha, and prepared and trimmed in accordance with the standard practice of the Bureau of Mines. The average intensity of light stream, as determined by these tests, was a trifle under 0.4 cp. and the total flux of light was found to be not quite 3 lumens.

Lower Limit of Cap Lamps Half That of Hand Lamps

The bureau therefore concluded that a satisfactory lower limit of flux of light for hand lamps would be 3.0 lumens and a satisfactory lower limit of average intensity would be 0.4 candlepower.



The Hirsch Cap Lamp

The bureau suggests that lamps designed to be worn upon the cap should give the same intensity of light as that required for hand lamps, but that the minimum flux of light required from cap lamps should be not more than half the minimum demanded from hand lamps, because when a lamp is worn upon the head any light that is thrown to the rear is wasted. If the equivalent of a safety lamp were mounted upon a man's head, one-half of its light would fall behind the man and thus could not be used. Therefore the bureau concluded that 1.5 lumens would be a satisfactory lower limit for the flux of light produced by a cap lamp.

Proper Time of Burning per Day

Twelve hours was selected by the bureau as a reasonable time of burning. This length of time was chosen after consultation with several people outside of the bureau, who were competent to express an opinion in regard to the subject.

The necessary daily time of burning of a lamp will not be everywhere the same, but when everything is considered, 12 hr. does not seem to be unduly long. A lamp should be able to give the required light up to the time when the exhausted condition of its battery requires that the discharge be stopped lest the battery be impaired. Therefore, at least an hour of burning should be allowed over and above the usual requirements of the miner in order not to push the battery too hard in an emergency and to allow for possible incomplete charging.

Deterioration of Electrolyte, Lamp Bulbs and Battery Plates

The only interruptions of service that can be regarded as reasonable are those incident to the renewal of such parts of the equipment as have an admittedly limited life, such as electrolyte, lamp bulbs and battery plates. The interruptions incident to changes of electrolyte need not

seriously interfere with the service of the lamp and it hardly seems necessary or desirable to place a limit on the frequency of such interruptions. The failure of lamp bulbs will not cause an appreciable interruption of service if the bulbs are changed when they grow dim and are not allowed to burn out altogether. The bureau believes that it is not unreasonable to require 300 hr. of actual service from each lamp bulb.

The most serious of the allowable interruptions of service will be caused by the failure of the battery plates. The bureau believes that it is not unreasonable to require of each battery plate the equivalent of 3600 hr. of actual service in 12-hr. shifts, when the service is completed within one year from the date of beginning.

Failure of Lamp Cord and Other Attachments

Interruptions in the service of cap lamps are also to be expected from the failure of the cord which connects the battery with the head piece. Although a reasonable time-of-service requirement can be placed upon this part of the equipment, there is no way other than actual service to determine whether or not a cord complies with the specifications. Any tests which might be suggested would be arbitrary in character and might be too severe, or too lenient.

Interruptions of service other than those just mentioned may be regarded as unreasonable and as reflecting upon the design and construction of the lamp equipment. Among such interruptions may be mentioned those resulting from failures of terminals and leads, battery jars, battery casings, contacts, etc., as well as any failures of bulbs or plates that occur before their specified time of service has expired.

It is manifest that every time a lamp bulb, a battery plate, or a cord is renewed, the cost of maintenance is increased. Therefore, from the standpoint of cost as well as from that of service, it is desirable that even reasonable renewals should be as few as possible.

The following specifications for the minimum performance of portable electric mine lamps are offered by the bureau for discussion and criticism:

BUREAU OF MINES SPECIFICATIONS FOR PORTABLE ELECTRIC MINE LAMPS

The values stated are suggested minima for the items against which they are written

1.	Safety	100 per cent.
2.	Intensity of light at all times	0.4 cp.
3.	Flux of light at all times: For hand lamps	3.0 lumens
	For cap lamps	1.5 lumens
4.	Time of burning per charge	12 hr.
5.	Average life of bulbs	300 hr.
	(Not more than 5 per cent. to have less than 250 hr. life)	
6.	Average life of batteries	3600 hr.
7.	Variation in current consumption of bulbs,	10 per cent. from average
8.	Distribution of light	not here stated
9.	Angle of reflector	100 deg.
10.	Mechanical and electrical construction	first class

Further Explanation of the Specifications

The safety requirement is intended to cover freedom from gas ignition and from premature extinction. The bureau believes that lamps that have passed its tests and have been approved as permissible for use in gaseous mines will satisfy the requirements of safety. Where cap lamps are employed, the light stream, from which, occupies a solid angle of more than 180°, the flux of light shall be increased in proportion to the increase in the cross-section of the light stream.

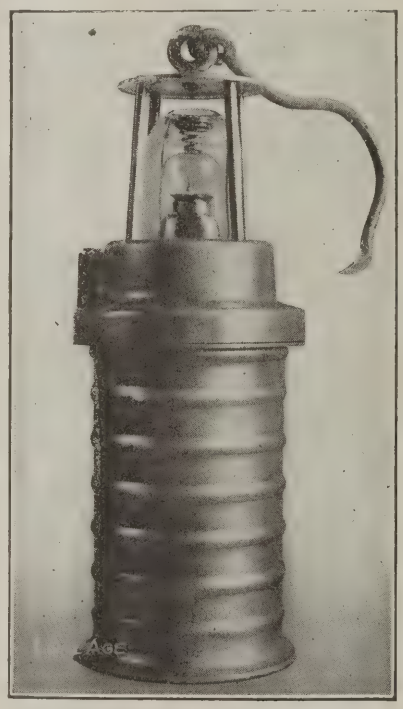
Time of Burning

The time of burning, as stated here, is taken to mean the time during which the discharge voltage exceeds the lower limit established by the manufacturers, and the lamp is producing not less than the specified flux of light at a mean intensity of light not less than 0.4 cp.

Distribution of Light

Any requirement as to the distribution of light will, of course, apply only to lamps that use reflectors of some kind. No value is given in the table to this qualification because an intelligible statement requires considerable space. It is clearly desirable to have a uniform distribution of light and yet to make this requirement too rigid would entail unwarranted expense. The following is suggested as a reasonable specification which will preclude uneven distribution of an annoying or inefficient character:

The distribution of light shall be determined both by observation and by photometric measurement. The lamp shall be placed 3 ft. away from a plane surface which is perpendicular to the axis of the light stream of the lamp. When so placed the lamp shall illuminate a circular area not less than 7 ft. in diameter. All observations and measurements of distribution shall be referred to this 7-ft. circle, regardless of how large an area the lamp may illuminate.



The Ceag Hand Lamp

As observed with the eye there shall be no "black spots" within that circle nor any sharply contrasting areas of bright and faint illumination anywhere. As measured photometrically the distribution of light diametrically across the circle shall fulfill the following requirements:

The average illumination (in foot-candles) on the best illuminated $\frac{1}{10}$ of the diameter shall be not more than twice the average illumination throughout the diameter and, for at least 50 per cent. of the diameter, the illumination shall be not less than the average.

Reflector Angle

This refers, of course, to the solid angle of the stream of light. A reflector whose cone of light has an angle of 100 deg., will illuminate a circle about 7 ft. in diameter if placed 3 ft. away from the surface so illuminated.

Mechanical and Electrical Construction

It is not necessary to suggest to mining men that anything should be well made if it is to be used underground. Under this head should be considered simplicity of design, strength of parts and fastenings, design of moving and removable parts, and the design and construction of electrical circuits and contacts.

Secretary F. K. Lane on Public Coal Lands

SYNOPSIS—The report of Franklin K. Lane, Secretary of the Interior, to the President on the public coal lands and immediately allied subjects. He declares that Alaskan affairs should be administered by a board of appointed officials, that coal lands should be leased, not sold, in both the West and in Alaska, and that the present system of selling is inoperative and based on mere guesswork.

The largest body of unused and neglected land in the United States is Alaska. It is now nearly half a century since we purchased this territory, and it contains today less than 40,000 white inhabitants, less than 1000 for each year it has been in our possession. The purchase was made as a means of protection against the possible aggression of a foreign nation and without the hope that it would be even self-supporting. In the intervening 46 years we have given it little more than the most casual concern, yet its mines, fisheries and furs alone have added to our wealth the grand sum of $500,000,000.

We have withdrawn Alaska from the too aggressive and self-serving exploiter. What have we to substitute as a safer servant of public interest? To this question I have given much thought, and my conclusion is that if we are to bring Alaska into the early and full realization of her possibilities we must create a new piece of governmental machinery for the purpose. We should undertake the work in the spirit and after the method of a great corporation wishing to develop a large territory. In my judgment the way to deal with the problem of Alaskan resources is to establish a board of directors to have this work in charge.

POWERS OF BOARD OF MANAGEMENT

Into the hands of this board or commission I would give all the national assets in that territory, to be used primarily for her improvement—her lands, fisheries, Indians, Eskimos, seals, forests, mines, waterways, railroads—all that the nation owns, cares for, controls or regulates. Congress should determine in broad outline the policies which this board with liberal discretion should elaborate and administer; the board having powers similar to those enjoyed by that in the Philippines. This board would, of course, have nothing whatsoever to do with the internal affairs of the organized territory of Alaska, for it would exercise no powers save such as Congress granted over the property of the United States in Alaska.

There are several reasons which appeal to me as supporting this suggestion:

1. Such a board could advise Congress as to what should be done, without prejudice, out of a deep national interest and with firsthand knowledge of conditions.

2. Such a board would coördinate the present enterprises of the Government in Alaska. As it is now, the control of lands is in one department, of forests in another, of roads in another, of fisheries in a fourth, of railroads in still another. The care of black bear is in one department and of brown bear in another.

ABSENTEE GOVERNMENT

3. There can be no satisfactory administration of land laws nor any other laws at a distance of 5000 miles from the point of action. Much less is this possible where the two sections of the country are separated by an ocean and the land calling for attention is closed to the world one-half of the year. The eye that sees the need should be near the voice that gives the order.

4. Alaska's opening and improvement should be treated as one problem. Each step in such an administration should be part of a plan, not an isolated act. We should have a unified and consecutive program, based on immediate knowledge, governing this work. Each line of activity within the territory should be correlated with all other activities. The opening of lands and the building of railroads or wagon roads, for instance, should be part of one scheme.

RIGHT TO ITS OWN REVENUES

5. Alaska should be developed so far as possible out of her own revenues and resources. She should have a Federal budget of her own. Her revenues and expenditures should be presented to Congress on a single sheet. The funds raised from her lands and fisheries, her furs, her forests, and her mines should be used for the construction of her roads, railroads, telegraph and telephone lines, or for any other purpose which would make her resources more quickly available to the world. I believe it could be shown that Alaska is self-supporting today, or, what is more to the point, that by proper taxes and charges imposed upon those who are deriving large return from their enterprise in the territory, such revenue could be derived as would support a large policy of expansion and improvement.

The members of such a board appointed by the President would be selected presumably with reference to their fitness for the work to be done. Each one could be made the administrative and residentiary head of a department or division, so that there might be a commissioner of the Alaskan land office, another commissioner of highways, another, perhaps, commissioner of Indian affairs and fisheries, and so on. All would sit together, as in the commission form of municipal government, and would work for a common end, the upbuilding of Alaska as an integral and contributing part of the Union.

I apprehend the fear that with such a commission there would be danger of corruption or indifference creeping into its work. This, however, is incident to the bestowal of all authority. The commission would not go unchecked, of course, for it must report to the head of some department at Washington, and through that head to Congress, and would be always subject to investigation. Moreover, no method has yet been invented by which dishonesty or poor judgment can be guarded against in public or in private life. In the end the character and wisdom of the men appointed is the only insurance that can be given against conduct that is foolish or worse.

Alaska should not, in my judgment, be regarded as a mere storehouse of resources upon which the people of the States may draw. She has the potentialities of a state. And whatever policy may be adopted should look toward an Alaska of homes, of industries, and of an extended commerce.

Strongly as I would urge this method of management—for it offers a rare opportunity to exhibit the efficiency of a Republic—I would not have Alaska wait for needed legislation until the merits of such a plan could be passed upon by Congress. Those things which appeal to me as of immediate necessity upon which independent action may be taken are (1) the construction of railroads in the territory and (2) the opening of her coal lands.

ALASKAN RAILROADS

I have already expressed to the Congress my belief that it was wise for the Government itself to undertake the construction and operation of a system of trunk-line railroads in Alaska. And I am led to this view irrespective of the possibility of private enterprise undertaking such work, although my belief is that no railroads would be privately constructed in Alaska for many years to come excepting as adjuncts to some private enterprise. Be that as it may, it would seem wise for the Government to undertake this task upon grounds of state. The rates and the service of such railroads should be fixed with reference to Alaskan development—not with regard to immediate returns. The charges fixed should be lower for years to come than would justify private investment. I would build and operate these highways in the same spirit that the countries or the States build wagon roads—not for revenue, but for the general good.

ALASKAN COAL LAND

It is not necessary to set forth here the extent or character of the coal fields of Alaska. Neither could I add to your knowledge or that of Congress as to the need for this coal both by the Navy and by the industries and the people of the Pacific coast generally. There are almost unlimited quantities of a high grade of lignite in the interior which may not stand extended storage or transportation. This could be converted into electricity at the mouth of the mines and widely distributed for lighting, heat and power. Toward the southern coast of the peninsula there are two well known fields of a high-grade bituminous coal and some anthracite. These are the fields which have given rise to the troubles with which all are familiar.

These coal fields should be opened not to speculation, but to operators. Those should have these lands who will use them. None should be opened as a basis for a gamble in future values. If these premises express a sound public policy, there appears to me but one conclusion that can be

reached as to the manner in which they may safely be turned over to the public—under a leasing and royalty system similar to that under which the state of Minnesota leases its ore lands and the states of Montana and Colorado their coal territory.

EACH LEASEHOLD 2600 ACRES

The tracts opened should be disposed of to those who within a certain time would develop mines and make their product commercially available. This means that where a railroad is necessary to the operating of a mine the applicant should take a lease so conditioned for a limited period. Sufficient land should be leased as a body to justify long-continued and economical operation. As the average of all operations in the United States is 2600 acres, including many small holdings, this might be taken as a maximum unit.

There has been much dispute between those who favor making a lease for an indeterminate period, dependent alone upon continued operation, and those who believe it wisest to fix a term for the lease, 20, 30 or more years. This dispute seems to me of much more academic than practical interest. There should be no disposition to change the lessee. If a fixed term of leases is decided upon, the original lease should have an assured preferential right to a renewal until the mine is worked out. So that in the end the fixed term is a reservation of the right on the part of the Government to make new terms at the end of a number of years, a reservation which could be fixed in an indeterminate lease.

A fixed minimum annual royalty would conduce to operation and prevent the holding of lands out of use. These are matters, however, of regulation upon which much thought should be expended, and the experience of other lands will be found helpful. If the principle of the homestead law is adopted, and one lease only permitted to any one person or group of persons, and all leases made nontransferable, excepting with the consent of a designated authority, it would seem that monopoly could be prevented. I would, however, add one other precaution—that in each field a large body of the coal land be reserved, so that the public and the Navy might be rendered independent of private supplies if that should become necessary.

ADVANTAGES OF LEASEHOLDS

The attraction of a leasing system is that it enables an operator to put all of his capital into the promotion of his enterprise, no investment being needed for the purchase of the land. This makes it possible for the man of comparatively small means to become a coal-mine operator. The lessee is pleased to pay the Government a royalty in lieu of tying up a large amount of capital in the land itself.

There is this further consideration, which those interested in Alaska's future might well consider. The royalties arising from these mines (as well as from oil) would for a long time be a source of revenue to the Government. To stimulate the opening of mines, all royalty might well be waived for a brief period; later, however, these royalties would be a not inconsiderable addition to the resources available for Alaskan development, for I would think it the wisest policy to give to this new land the full return from her properties to be used in her improvement, at least for many years.

There are many isolated places in Alaska where small mines may be opened to supply a local and restricted need. A license to mine a small acreage without any charge whatever on the part of the Government would meet this demand.

WESTERN COAL LANDS ARE NOT SELLING

It might be well at this point to consider the coal-land situation in the Western States. For the policy I have suggested as advisable to apply in Alaska I think the sensible policy to adopt throughout the rest of the country. We have tried two experiments in the United States as to coal lands. We allowed our coal lands to slip from us under the old land-is-land policy until we came into the presence of a coal monopoly or a series of such monopolies in various parts of the country. If this is questioned we may at least say, with exactness, that we realized that we had been putting priceless assets into the hands of a comparatively few far-sighted men for an inconsiderable consideration. Then we tried the other plan of appraising such properties on a scientific estimate of contents upon which the land is sold. This is the present plan, and it is really nothing more than a demand for a full but discounted royalty in advance. It has against it, in my opinion, at least two objections. Our coal land is not being used under this plan save under exceptional conditions of local and immediate demand, and the purchaser, when there is one, is speculating on the best guess that an honest geologist can make as to the amount of coal in the ground.

The outstanding withdrawals of public lands valuable for mineral fuels and fertilizers or in connection with the water resources of the public domain now aggregate 66,000,000 acres. The coal-land withdrawals awaiting classification constitute the larger part of this acreage, being 56,316,410 acres on Dec. 4, not including the blanket withdrawal of coal lands in Alaska. It is noteworthy that a larger area than this has been restored within the past five years, and nearly 20,000,000 acres have been classified as coal lands and are open to entry at appraised prices. The lands classified and restored by Executive order to appropriate entry since Mar. 4 last, total 10,000,000 acres, every restoration being based upon careful consideration within this department. About 400,000 acres of mineral lands in the same nine months have been withdrawn.

COMPETITION INVOLVES WASTE

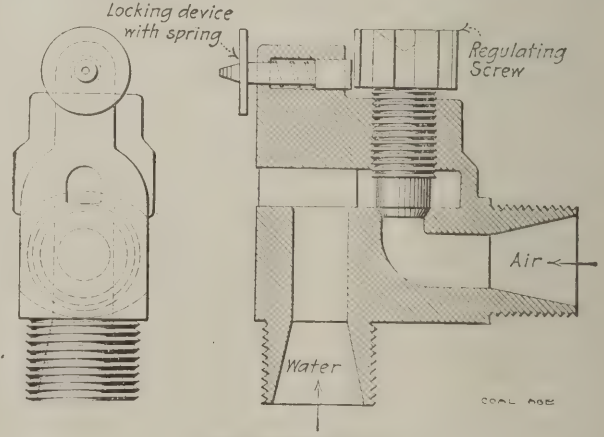
It is certainly not for the public interest that our coal deposits shall be opened rapidly and ruthlessly. We may reforest lands that have been devastated, or feed again into fruitfulness a soil that is starved, but we cannot replace the carbon deposits underground once they are removed. I cannot, however, feel that we should sacrifice any present need for fuel or willingly surrender ourselves to a demand for exorbitant prices because of a fear that some day the coal supply may be exhausted. Already there has been developed a substitute for coal in the flowing stream. The turbine converts melted snow into heat and light, which can be distributed over a constantly widening area.

I think we have now arrived at that point in scientific achievement which justifies the belief that the wheels of industry will not cease, nor our houses go unlighted or unheated, so long as dams may be built upon our streams. Water will be, indeed already is, the greatest conservator of coal. We must seek to make use of our coal, the fullest use that society requires. This principle seems a truism. But here lies the difficulty. We wish cheap coal and at the same time a minimum of waste. We wish society to take the lion's share of the profit and yield no more to the operator than will make his work sufficiently attractive to keep him at it. In short, we desire competition without waste, a frank impossibility.

Other countries have wrestled with this problem. Some have gone into Government operation. But those who are nearest to us in institutions and tendencies have found that in a new country where there must be large development and higher rewards for enterprise, the safest practicable method is to lease the land, the Government taking a modest royalty and retaining some measure of control over operation.

A Water Spray for Drills

Considerable attention has been paid recently to the danger to which a miner is exposed in breathing in air laden with stone dust when engaged in drilling through hard rock. Such inhalation of stone dust may cause serious lung trouble. It is interesting, therefore, to learn that the Hardy Patent Pick Co., Ltd., of Sheffield, England, is fitting on some of its drills an ingenious form of water spray which avoids the danger of the dust-laden air.



THE SPRAY NOZZLE

This arrangement is both simple and efficient. It is attached to the air pipe of the drill, and the escape of air through a minute independent outlet sucks up and atom-

izes a small stream of water, projecting the latter as a fine spray into or across the hole being drilled. In this way practically all the dust formed by the drill is successfully allayed.

Water under pressure is not required and hence an ordinary bucket is all that is needed in the way of a receptacle. One pail of water is found sufficient for 8 to 10 holes in ordinary material. By a regulating screw and spring-locking device, the amount of spray can be easily adjusted to meet all requirements.

Coal Freight Rates from the Hocking District

While the Ohio legislature, ably seconded by the Govenor has been busily engaged on drastic legislation, adverse to the operating interests in the state, we are pleased to note that the state officials are as vigorously championing the cause of the local trade against foreign intrusion. Thus we note that alleged discrimination by the Hocking Valley R.R. against Ohio coal shippers, in competition with West Virginia operators has been taken in hand by Governor Cox. He has ordered the public-utilities commission to take immediate action in fixing a rate which will, if possible, enable operators of the Hocking Valley district to compete with the West Virginia mines.

According to Senator J. B. Dollison, of Logan, who conferred with the Governor, many mines in the Hocking district have been closed down because they are unable to compete with West Virginia, by reason of discriminatory freight rates. The rate per ton from Nelsonville to the docks at Toledo is 80c. according to Senator Dollison. West Virginia coal, delivered to the Hocking Valley by the Kanawha & Michigan R.R. at Armitage (a 12 miles further haul than from Nelsonville) is carried to the Toledo docks for 40c. a ton. Thus for a 12 miles shorter haul, the Hocking Valley charges the operators 40c. more per ton than the West Virginia companies.

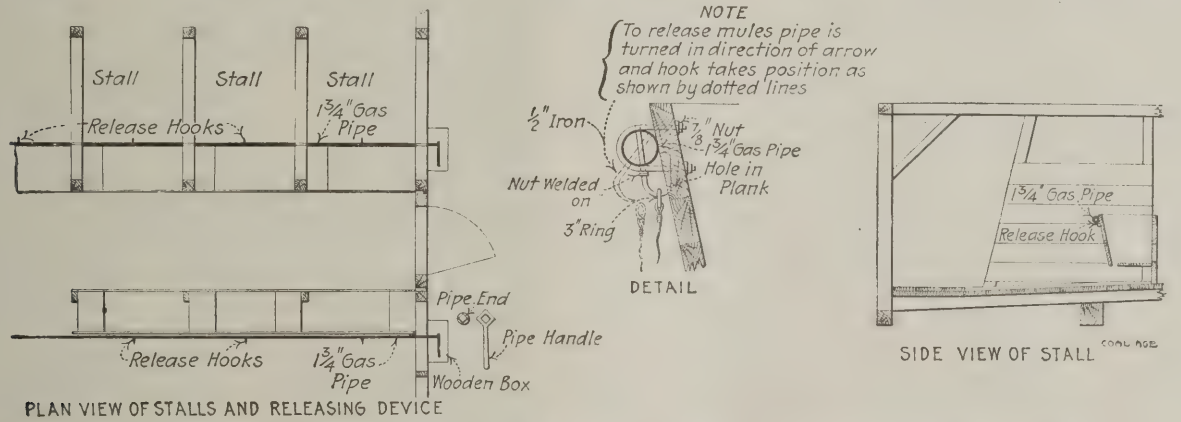
The railroad company is said to demand the higher rate from Ohio operators because it has to assemble the cars for the Ohio shippers, while this is not necessary for the coal that is delivered to it from the Kanawha & Michigan at Armitage. The full train already "made up" is turned over to the Hocking Valley, and all the latter has to do is to haul it to the Toledo docks.

Hocking Valley coal operators say they can compete successfully with the West Virginia operators if a reduction in the Nelsonville rate to 67c. per ton is fixed. At this rate, it is alleged the railroad company would be making an extra profit of 17c. per ton off the Ohio operators, as the utilities commission has fixed a rate of 10c. a ton for assembling or "making up" a train of coal cars.

Emergency Unhitching Device

The *Employee's Magazine* of the Lehigh Valley Coal Co. describes a device which released all the 43 mules from their stalls by a single turn of a handle in the old barn of the Centralia colliery early Sunday morning, Sept. 21, when the building caught fire. A mere turn of a handle at either end of the barn releases simultaneously all the chains attached to the animals, and thus enables them to be driven from their stalls with the least possible delay.

The accompanying sketch shows the arrangement and operation of this device. It consists of a long wrought-iron gas-pipe 1¾ in. in diameter, extending from end to end of the building, and passing through all the stalls. The pipe is held firmly in place against the front of the mangers by ⅞-in. iron rods, secured with ⅞-in. nuts and washers. In each stall and passing through the middle of the pipe is a ⅞-in. iron rod fastened with a lug and welded nut and bent like a hook, with its point resting in a slight depression in the plank. On this hook is placed a 3-in. ring that holds the clip or cross piece fixed on the end of the halter chain attached to the animal.



A Device for Unhitching All the Mules in a Row of Stalls at One Operation

It is a simple matter to remove the clip or cross-piece from the ring when only one animal at a time is to be released. In case of emergency, however, when it is extremely urgent to unhitch or release all the animals at once in order to remove them as quickly as possible from the stable, the end of the pipe is given about a quarter of a turn, and all the hooks turning with the pipe will move back, thereby permitting the rings to slip off and thus release all the animals at the same time.

At least 100 cubic feet of air per minute should be allowed for each man in the mine and 500 feet per minute for each animal. In the anthracite district of Pennsylvania 200 cubic feet per minute is required. If the mine makes inflammable gas, there should always be allowed at least 150 cu.ft. of air per minute for each person. There should be a separate split of air for every 50 to 100 men, depending on the laws in force in the state where the mine is located. By this provision, air is supplied without excessive velocity and the products of an explosion in one section may not invade another.

Who's Who--In Coal Mining

Every movement centers around some personality, for there is no such thing as impersonal development in human affairs. Every new mental attitude, humanitarian, intellectual, financial or what not, clothes itself in a man for without such a visible presentation, the movement seems too abstract for acceptance. There are a few people who declare themselves for principles and decry persons, but in the end the principles of the persons are more important and more forceful than either.

The American Mine Safety Association has come to the point where it needs and must have a leader. Hitherto, it has been ably fostered by the Bureau of Mines, in the person of H. M. Wilson, but whether it does or does not do in the future what is expected of it, depends on whether it finds, somewhere, a man around whom its activities can in the future be developed.

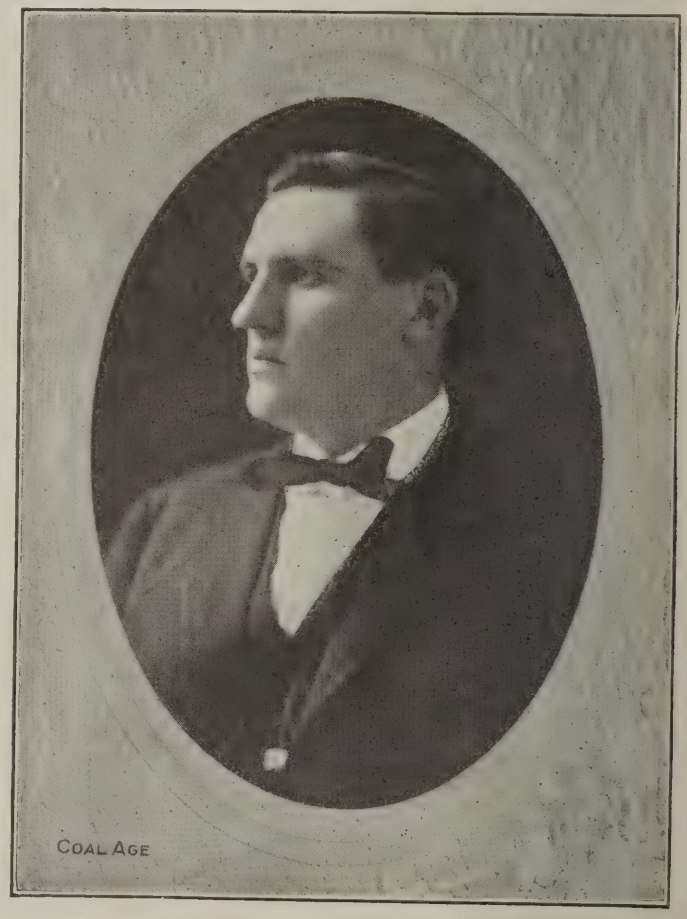
And that man it trusts it has found in John P. Reese of Gillespie, Ill., its second president. It will be difficult to make this movement a success, for the heterogeny of elements entering into membership makes its progress difficult. The medical men who must debate the subject of first-aid methods, the rescue experts who must decide on the right manner of mine recovery, the managers and superintendents who must discuss accident prevention, and the miners whose interest must be stimulated by contests, together combine to make the problem of the chair, most varied and difficult. But if the work be accomplished at all it will be by reason of its appeal to every element in the industry.

Mr. Reese is not a professional philanthropist full of statistics and sighs whose business is to lament that other people do not live as justly as he would if placed under like conditions. In fact, he does not lay claim to any such superiority and would be slow to acknowledge, doubtless, what is undoubtedly true and that is that he has, as a result of his experience, a broader comprehension than others of the needs of men less fortunately circumstanced than himself. Large of frame, cheerful in mind, buoyant in spirits, he impresses you as a philosopher despite himself, and the work he will do will be as virile in character as suits a man thus constituted.

In fact, the work to be performed is hardly sentimental for the liability laws have transformed safety prevention in most states from a philanthropy into an economy, and have put life conservation on a plain "bread-and-butter" basis. The operator is not only admonished to see that he does not offend but also compelled to make sure that the employee himself does not break the rules of safety, for in either case he must pay and usually heavily.

John P. Reese was born of Welsh parents, at Sodom, Trumble County, Ohio, Jan. 14, 1877. His father, who was a coal miner in his native land, came to Ohio from Wales in 1872. The family moved to Shawnee in the same state when John was two years old. His father died in 1883, leaving a large family of small children with no visible means of support; but the mother, a hard-working, honest, Christian woman, succeeded in giving them good training, though much schooling was out of the question.

John started to work at the mines in Shawnee, Ohio, when he was 9½ years old, and with the exception of 2½ years (between 16½ and 19 years of age) when he worked as a brakeman, he has remained in the industry ever since. Despite 10 hr. of mine service every day, he attended night school for several winters. At the age of 13 yr. he was the sole support of his widowed mother and three younger children, and so continued till he reached 21 yr. of age when he married a school teacher at Hiteman by the name of Blanche Ghrist.



JOHN P. REESE

He was then employed as checkweighman and held at different times the office of local president and state vice-president of the United Mine Workers of America. He does not hesitate to credit his wife and mother with whatever success he has had in life. His sympathies have always been with the "union," to which he has belonged from a boy. He joined the Brotherhood of Railroad Trainmen when engaged as a brakeman and kept up his dues till the Iowa miners were organized into the U. M. W. of A. in 1898 with his active assistance.

Since that time he has been vice-president and president of the Iowa district and a member of the National

Executive Board of the U. M. W. of A. He resigned his Iowa presidency in 1902 and ran for congressman on the Democratic ticket in the sixth Iowa district and was naturally defeated in that stronghold of Republicanism.

So renouncing his congressional ambitions, he served for several years as commissioner and secretary for the Iowa Coal Operators Association resigning in 1908 to become assistant superintendent of the Consolidation Coal Co., at Buxton, Iowa. In 1909, he became president and general manager of the Ogden Coal Co., at Ogden, Iowa, and in January, 1910, he returned to the Iowa Coal Operators' Association as president and chief commissioner, but he resigned on Oct. 1 of the same year to accept his present position as general superintendent of the Superior Coal Co., of Gillespie, Ill.

On Sept. 1, 1912, his jurisdiction was extended over the Consolidation Coal Co.'s mines at Buxton, Iowa, and his title is now general superintendent of the coal properties of the Chicago & Northwestern Ry. Co. Their mines are the largest producers in Illinois and Iowa.

Mr. Reese has been elected president of the Mining Institute of Illinois. He has, of course, several business connections being vice-president of the Coyne-Reese Drill Co., of Des Moines, Iowa, director of the Home Savings Bank of that city, and of the Ogden Coal Co. Happiest when in company, he belongs to several fraternal organizations and clubs, but his greatest delight is in his Gillespie home with his daughter of 14 years and his son of 12.

If the American Mine Safety Association is to find a man who has a broader sympathy with all concerned in the mine-safety movement, it will have to look far afield. A good talker and *raconteur,* a cheerful whole-souled fellow, a man with knowledge of both pick and pay roll, he should be able to arouse the necessary interest and enthusiasm and put the association on a firm working basis.

Concussion as a Cause of Explosions

SYNOPSIS—Inflammations of coal dust and air are propagated by burning gas but in explosions the coal is burned as a whole and not merely distilled. A big blower of gas will not raise a dust cloud but projected into such a cloud 150 ft. long, it will propagate with low pressures and will probably under favoring conditions develop a most violent explosion.

In the combustion of gaseous mixtures, there is no well defined border line between inflammation and explosion, the two terms being employed merely to indicate differences in the rapidity of combustion. But in the burning of mixtures of coal dust and air, it appears possible, and indeed necessary, to draw a line of distinction between inflammation and explosive combustion.

The "explosion-wave" in gases—the most rapid form of combustion—is, however, of a different character from ordinary combustion. The rate of travel of the explosion-wave is a definite physical constant for any particular mixture of gases in which it can be set up. Fortunately, it does not appear possible to produce the explosion-wave in mixtures of firedamp and air, or of coal dust and air.

Inflammation and Explosion of Coal Dust Defined

Put briefly, our view is that during an inflammation of coal dust (at all events from bituminous coals) the flame is propagated largely by the burning of gases distilled from the dust; whereas during explosive combustion the portion of each dust particle which aids in propagating the flame is burned as a whole, both the volatile matter and the fixed carbon being consumed.

Fundamentally there appears to be no reason why the inflammation of mixtures of combustible dust and air should not produce results of the same nature as those observed during the inflammation of gaseous mixtures, for in both cases the phenomena are the results of rapid combustion.

The more finely divided the combustible dust, the more nearly does it approach to the condition of a gas or vapor, and, if of sufficient lightness to remain in suspension in the air and thus form an intimate mixture with it, there seems to be no reason why a flame once started in such a mixture should not be propagated throughout its extent—it being presumed that the dust can be inflamed readily.

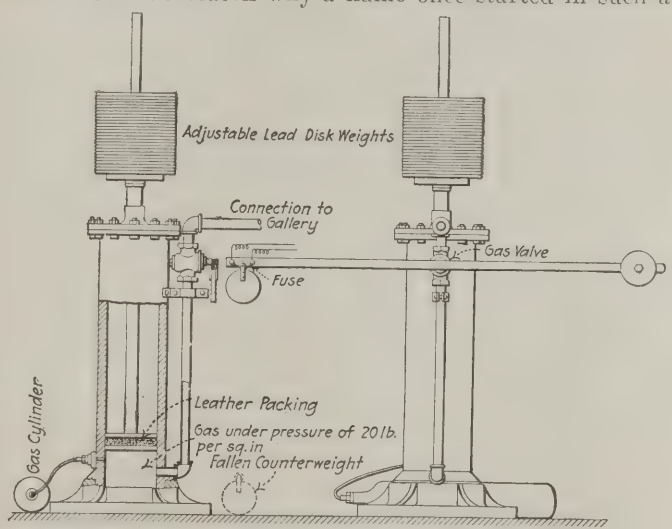


Fig. 1. Device for Regulating Gas Emission

Difference between Gas and Inflammable Dust

In making comparison, however, between the combustion of a gas, such as methane, and that of particles of coal dust, the great difference in size of gaseous molecules compared with that of dust particles must be borne in mind.

If it be assumed, for example, that a coal-dust particle has a diameter of $\frac{1}{1000}$ mm., about $\frac{1}{25000}$ of an inch, this is over 3000 times the computed diameter of a molecule of oxygen. Moreover, gas molecules are always in

Note—An abstract from the fourth report of the British Explosions in Mines Committee, signed by Sir Henry Cunyghame, R. A. S. Redmayne, A. P. H. Desborough, H. B. Dixon, and W. C. Blackett.

very rapid motion, the mean speed of oxygen molecules at ordinary temperature and pressure being about 425 m. or about 1394 ft. per sec. Compared with this speed, that of the floating dust particle is inappreciable. Such a dust mote floating among oxygen molecules might, perhaps, be compared to a balloon lashed by a storm of hailstones.

Similarities in Explosive Characteristics of Gas and Coal Dust

Despite the difference in size of the reacting bodies, however, there are several analogies which may be drawn between explosions of gaseous mixtures and of mixtures of a combustible dust and air.

As in the case of gaseous mixtures, there will be a definite ignition temperature for each kind of dust and air mixture, and inflammation will not be propagated unless and until each successive "layer" of the mixture has been raised to that ignition temperature.

Similarly, there will be a "lower limit" as regards the quantity of any given dust which must be in suspension in the air to enable self-propagation of flame to take place.

How an Inflammation Is Propagated

When considering the question of the *propagation* of the initial inflammation of coal dust the nature of the means of ignition must not be overlooked.

If a previously formed dust cloud in the air be presumed, it can be taken for granted, on *a priori* grounds, that, once ignition of a sufficient volume of the cloud has been effected, no matter by what means, propagation of the flame will take place throughout the cloud if the fineness of the dust, the quantity of dust in suspension, and its ignition temperature are suitable.

In a mine explosion, however, a dust cloud does not necessarily exist ready formed; but the cause of inflammation has, in most cases, to produce the dust cloud simultaneously by disturbance of the air. In such cases, therefore, where the dust is not already in suspension, both flame and *concussion* are necessary for the initiation of more than a purely local inflammation.

For the propagation of flame in a mine, therefore, it appears to be essential that (1) a ready formed dense cloud should be present for a considerable distance along the roadway; or that (2) the source of heat which causes ignition should also create a disturbance of the air and thus raise in suspension deposited dust.

The Effect of Eddies on an Explosion

When the inflammation occurs and the flame proceeds along a gallery, the expansion of the gaseous products of combustion causes a movement of a column of air which is pushed forward in front of the flame. The opposition to this movement may be approximately calculated for a smooth gallery, since it depends on the inertia of the air to be moved, or the velocity of the air pushed forward, and on the size of the tube.

But in the roadway of a mine this opposition may be enormously increased by the irregularities and obstructions which cause waves and eddies in the air. A cloud of dust so compressed and disturbed burns with greater rapidity than in still air. The effect on the intensity of the advancing flame is thus cumulative. It may therefore be true that after the flame has proceeded a certain distance in the ready formed dust cloud, the column of air driven in front of the flame is capable of raising the dust lying on the floor and other surfaces, and so creating an inflammable cloud, independently of any other source of disturbance.

The Pioneering Dust Cloud

This conception of the manner in which an inflammation of coal dust and air is capable of increasing in intensity and of propagating itself throughout any length of roadway containing at the outset dust, merely deposited and not suspended is due, we believe, to W. C.

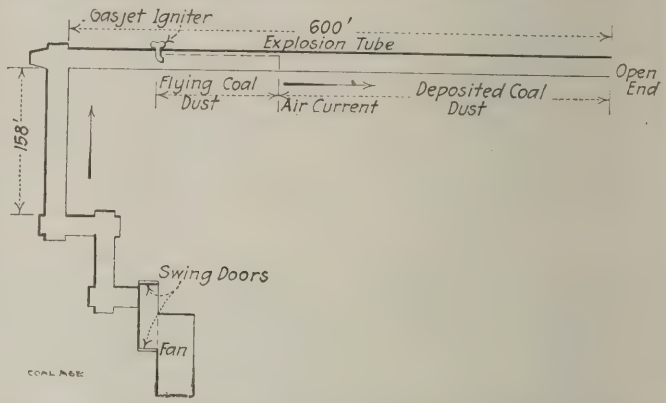


Fig. 2. Arrangement of Gallery to Show under What Conditions an Explosion Can Be Started by Flame in a Dusty Atmosphere

Blackett, who, from a study of the conditions existing in the Seaham, Tudhoe, Trimdon Grange and Usworth collieries, after the disastrous explosions which occurred there formulated his theory of a "pioneering cloud."*

This theory was founded, as aforesaid, on practical experience obtained during the course of investigations made *after* colliery "explosions." It remained to be seen how far it was borne out by what takes place *during* experimental inflammations on a large scale.

Explosions without Initial Concussion

A number of experiments for the purpose of obtaining information on this question were made by Doctor Wheeler for the Mining Association in the Altofts gallery. The results, which are given below, have not hitherto been published.

Arrangements were made by which dust clouds of different extent could be ignited by a large gas flame, unaccompanied by any concussion. The general arrangement for these experiments is shown in Fig. 2. The gallery (the Altofts gallery) consisted of a wrought-iron tube 7½ ft. in diameter and 600 ft. long. One end was open to the air and the other was joined, by means of a series of right-angle bends, to a fan. For a more detailed description of this gallery the "Record" of the Mining Association should be consulted.

The igniting arrangement is shown in Fig. 1. It consisted of a vertical cylinder, of about 2 cu.ft. capacity, fitted with a weighted piston. This cylinder was filled with coal gas under a pressure of 20 lb. per square inch, the pressure being obtained by weighting the piston with lead disks placed on a platform carried by the piston rod.

An outlet tube from the bottom of the cylinder was bent upward at right angles and closed at the top by an

*Vide "The Combustion of Oxygen and Coal Dust in Mines," Transactions Federated Mining Engineers, Vol. 7, p. 54, 1894. See also Proceedings of the National Association of Colliery Managers, March, 1891.

electrically controlled valve. Beyond the valve, the outlet tube was continued through the side of the gallery (as indicated in Fig. 2), and ended in a 2-in. nozzle fixed centrally in the gallery and directed toward its open end.

A Blower of Gas Fails to Cause Explosion

Just before an experiment, sparks from an induction coil were passed across the nozzle of the tube inside the gallery. When the valve on the cylinder was released, the weighted piston fell and forced out the coal gas which was then ignited by the induction-coil sparks at the nozzle. A large jet of flame was thus produced, from 10 to 14 ft. long and about 1 ft. in diameter at its widest part, resembling an ignited "blower" of firedamp. No unburnt gas escaped into the gallery.

After numerous trials it was found that with a 2-in. nozzle, and with the gas under a pressure in the cylinder of 20 lb. per sq.in., immediate ignition by the induction-coil sparks was obtained when the valve was released. A smaller nozzle gave a longer flame but ignition of the gas was uncertain.

Adding Coal Dust to Blower

A large flame of this nature (unaccompanied by concussion) was found capable of igniting a ready formed cloud of coal dust, but was unable to propagate flame for any considerable distance when the coal dust was simply placed in a heap in its path. It was, therefore, necessary to create beforehand a dust cloud over a certain distance, into which the flame from the igniter could be projected.

This was done by spreading the dust on thin horizontal boards, 6 in. wide and 12 ft. long, suspended from the roof of the gallery and extending end to end over a distance of 150 ft. from the igniter toward the open end of the gallery. These boards, which hung about 8 in. below the roof, were caused to fall simultaneously, at the same instant as the gas flame was produced, by the release of electrically controlled catches; and, after falling 6 in., still in a horizontal position, were suddenly jerked over sideways, so that the dust resting on them was projected into the air. In this manner a ready formed dust cloud was produced extending 150 ft.

The Dust and Gas Raise a Pioneering Cloud

Beyond this 150 ft. of previously formed cloud, the coal dust was simply deposited on the floor of the gallery over the distance remaining to its open end, namely, 350 ft. The coal dust, which was obtained by pulverizing Altofts silkstone nut coal, was present throughout in quantity corresponding to 0.4 oz. per cubic foot of air space.

A current of air, of insufficient velocity to disturb the dust deposited on the boards, was forced toward the open end of the gallery during each experiment.

Three tests were made in this manner. In one of them the flame traveled only 200 ft. from the point of ignition; that is to say, only 50 ft. beyond the distance over which the ready formed dust cloud extended. In the other two experiments the flame traveled the whole length of the gallery, and issued 115 ft. out of the open end into the air, the average velocity over successive distances of 100 ft. slightly increasing.

The Absence of Preliminary Concussion Makes Explosion Feeble

It is thus apparent that if an inflammation which is initiated without concussion takes place in a gallery along which for a certain distance a ready formed dust cloud extends, sufficient force is developed at the end of this cloud to raise in suspension deposited dust, in advance of the flame, so that the propagation of inflammation is continued.

Very little pressure, less than 2 lb. per square inch, was produced by the inflammation in any of the three experiments; and there was a temporary slackening in the rate of progress of the flame along the gallery where it came to the end of the ready formed dust cloud. Perhaps 150 ft. is about the minimum length, with the quantity of dust employed, of a ready formed dust cloud which will insure self-propagation of flame; just sufficient force being then developed, or rather, a just sufficiently *rapid* disturbance of the air being then produced, to raise dormant dust in advance of the flame. Three experiments in which the ready formed dust cloud was in existence over only 100 ft. from the point of ignition all failed to propagate flame beyond that 100 ft.

However, Concussion Is Not Needed to Produce an Explosion

These results appear to establish the fact that for a propagating inflammation to take place in a mine, the concussion of a blown-out or overcharged shot, or of a firedamp explosion, is not essential. Given a ready formed dust cloud of a certain extent, a flame, without any concussion, can ignite the dust and the resulting inflammation will spread through the cloud, the rapidity of combustion increasing as it travels. Ultimately, if the conditions remain favorable to the "pioneering phenomena," the "inflammation" will give place to "explosive combustion" in the manner explained in the ensuing section of this report. These conclusions are supported by further experiments now in progress, the results of which will shortly be reported.

Powder in Open-Cut Mining

Open-cut mining in the Pittsburg coal field of southeastern Kansas was first done by scrapers and horses. Three years and a half ago Miller and Durkee introduced a steam shovel for the purpose. It has proved a success, but in the last few weeks the shovel operators have learned to use blasting powder to help the shovels.

C. H. Markham is the only steam shoveler using powder up to the present date in stripping. Others have held back because of the inconvenience of boring the holes for the powder. These must usually be 18 to 30 ft. deep, and a drill for this purpose is bunglesome and difficult to handle. However, Markham is perfecting a drilling apparatus that will probably make the sinking of holes a one-man job.

Markham has found the use of blasting powder valuable in expediting the work of the steam shovel and for saving the hardest wear and tear on the ponderous machinery. This means that the cost of production is reduced. He is one of those who are making money. The overburden in the stripping field contains a couple of feet or so of hard shale. Many miners affirm having seen blue smoke from the friction of shovel-dipper and shale. The big machines rock terrifically in cutting through this material. The steel beams of their underwork have been known to crystallize from the vibrations and break, which naturally adds materially to the operating cost.



LOADING THE HOLES WITH 2500 LB. OF POWDER

Markham's blasting has been similar to that done extensively by Edward Evans, of Cherokee County, Kan., and by J. J. Lavery, near Liberal, Mo., not far from Pittsburg. The latter recently made a blast with 2500 lb. of powder at a single time.

ONE HUNDRED KEGS OF POWDER USED IN ONE PIT

He had a pit 18 ft. deep which he had been working with horses and scrapers. It was 500 ft. long, or in other words, the face was of that measurement. Fifteen feet



THE SHOT

back from the face he sank 18 holes, which were 24 ft. apart and 15 ft. deep. These were sprung, first with two sticks, then four sticks and at last with six sticks of dynamite, making 12 sticks in all. This work required about two or three hours. Exactly 100 kegs of Hercules 4F blasting powder were used, and Charles B. Spicer, Pittsburg, agent for this explosive, used an electric firing apparatus with which to discharge the shot. Workmen began springing the holes when Spicer reached the pit at 9 o'clock in the morning, and he left the work completed, at 3 p.m. He said that were he directing another shot of this kind he would recommend that the holes be 20 ft. apart only, when circumstances are as above described.

The shot made a pit 30 ft. wide, or a little more, as the blast broke the shale covering a little more than 15 ft. on the inner side of the face. A fair percentage of the dirt was thrown far enough to one side to make it unnecessary to move it further. Mr. Lavery says: "The cost of getting coal out of a strip pit with teams and scrapers probably isn't as cheap as with steam shovels, but the blasting as I did it will save a lot of labor and reduce the cost of production."

If this is true with teams and scrapers it is argued that it must be true with steam shovels, as such machines could probably work twice as fast with the overlay loosened up. Besides, the cost of maintenance of a better treated shovel would not be so high.

The Lavery pit works from 20 to 40 teams, with wages for man and horses at $3 a day and up, depending on the work done. Expenses per day are $100 up. The cost of the shot was $118.



THE RESULT OF THE BLAST

The Sacrifice!

BY BERTON BRALEY

Written expressly for Coal Age

Here are two men dead in a barroom brawl,
Two men who shouldn't have died at all,
Two husky miners we shouldn't lose,
Who lie here, lifeless, because of booze.
And their kids can cry and their wives can wail;
Yet here they huddle, two good, strong men,
And never a sound or a friendly hail
Can bring these miners to life again!

They were bosom pals when they came tonight,
Who drank together in all good will,
Till the whiskey put their brains to flight
And roused them to quarrel and row and fight
And drove them, at last, to kill!

So the knives came out as the drink poured in,
Burning each man with the fires of sin,
Searing them deep with wrath and hate
And all the passions fresh-come from Hell,
Till the knives flashed free and the blades struck straight
And one man stumbled—the other fell
In a pool of blood on the barroom floor
And neither one stirred when the fight was o'er.

Now it wasn't hate or a bloody feud
But a deadly madness the whiskey brewed,
And we've lost two men in a drunken strife,
Two brave, strong men in the prime of life,
Each with his children and home and wife!
They never will drill a hole again,
They never will joke with the other men,
They never will come through the deepening gloam
To greet their kiddies and wives at home!

They're dead and done for because of drink
—But still we hark to the glasses' clink,
As the barkeep says, with a smile so free
"Speak up now, gentlemen, what'll it be?"

Editorials

The Legality of Unions

The United States Circuit Court of Appeals has affirmed the judgment of the Connecticut District Court in the famous Danbury hatters case, but those who hope that unions will be declared illegal will gain but little comfort from the decision. It appears that the commodity, labor, can be made the subject of trust regulation without anyone being responsible before the law. This decision would not trouble us much, if we did not think that this viewpoint arose in the courts from fear of the danger which would accompany a contrary decision, and from the fact that in most, if not every county, the lawyers have a union of their own which somewhat effectually sets a minimum price for legal services.

Judge Coxe states in the decision to which we have referred that: "No one disputes the proposition that labor unions are lawful. All must admit that they are not only lawful, but highly beneficial when legally and fairly conducted, but like other combinations, irrespective of their objects and purposes, they must obey the law."

We conceive, therefore, that working men may combine to raise wages, improve working conditions, or to restrict hours of work, and so forth, and can, in this way, legally influence the price of products on the market. We conclude, therefore, that the objection of the judge is to such boycotting as that of which the United Hatters of North America have been guilty.

The declaration of the judge that "no one disputes the proposition that labor unions are lawful," is amazing. It has been quite generally disputed, and we have always been surprised that judges will permit the rules of lawyers, doctors and others to be produced in court as evidence that certain charges to clients are reasonable. For such rules are like union scales in restraint of the freedom of trade.

But those operators who are in union states are to be congratulated that the judges seem to take the view that labor is not a commodity of commerce coming under the Sherman act. Such operators are engaged in a criminal conspiracy to regulate the price of labor if the miners are engaged in a like conspiracy. If the law is once declared and affirmed to apply to labor unions in their regulation of the price of labor, it may be applied to organizations of operators for the same purpose. As the members of the latter have money, they can be made to pay damages. The miners having little or none cannot. So it is like a game of poker, where one man has money and another has not. The poor man cannot lose and the rich man may.

There is some cheer in the following words of Judge Coxe:

> That the anti-trust act is applicable to such combinations (unions) is no longer debatable. The law makes no distinction between the classes, employers or employees, corporations or individuals. Rich and poor alike are included under its terms. The Supreme Court particularly points out that, although Congress was frequently importuned to exempt farmers' organizations and labor unions from its provisions, these efforts all failed and the act still remains.

We have yet to determine, of course, by several cases in the courts just what labor unions may and may not do. But it seems clear that as far as that United States Circuit Court of Appeals is concerned, the workingmen may legally form unions to raise wages.

The Report of the Secretary of the Interior

It is sometimes unfortunate to be only a citizen and not in the official class. We have to take such information as is vouchsafed us and endeavor to make it meet our ends.

Some time ago, the Director of the Geological Survey and his able lieutenant on the Land Classification Board, wrote us complaining of a statement we had made. We made a retraction but we were not able then to determine definitely whether we accepted in lieu of ours, the figures submitted. So very frankly, we admitted that we could not say whether we accepted them or not.

When recently we met a representative of the Geological Survey, he declared this noncommital statement, a shameless innuendo, and advised us to apply to the Survey for more figures whereby we might frame a retraction or an indictment. We have written to the Survey and we are still in the dark.

Let us, therefore, lay down in black and white our manner of reasoning and leave to our readers to judge whether we truly lined out the fact in writing the innuendo to which reference was made.

As a preliminary, to make the facts clear to the general reader, we quote George H. Ashley, in his bulletin on the "Valuation of Coal Lands," who says:

> Prior to July, 1906, it was the practice to dispose of coal lands at the minimum prices fixed by the law, viz.: $20 per acre for lands within 15 miles of a completed railroad and $10 per acre beyond the 15-mile limit. Since that date, lands which have been classified and valued have been disposed of at fixed prices based upon the value of the coal in the land.

On the strength of this change, George Otis Smith ventures, on p. 332, of his report for 1912, to give the following table:

SALES OF COAL LANDS AT ALL PRICES IN THE UNITED STATES EXCLUSIVE OF ALASKA FROM 1903 TO 1911

Fiscal Year	Entries	Acres	Receipts	Average Price per Acre
1903–4	190	28,827.42	$395,209.90	$13.74
1904–5	158	20,456.35	277,402.40	13.56
1905–6	244	42,143.39	538,083.70	12.54
1906–7	157	20,387.02	303,255.60	14.80
	749	111,814.18	$1514,551.60	$13.54
Fiscal Year	Entries	Acres	Receipts	Average Price per Acre
1907–8	299	58,047.10	$647,584.55	$11.15
1908–9	182	26,590.68	502,743.65	18.90
1909–10	189	26,074.16	657,175.80	25.20
1910–11	83	15,284.89	251,323.03	16.44
1911–12	76	7,951.05	402,521.78	50.62
	829	133,947.88	$2461,348.81	$18.30

Now, these facts seem cunningly arranged to mislead, for though they are intended like those in Mr. Smith's letter to us, published Nov. 22, 1913, to prove that classified lands have been selling, it appears to include all

lands, some of which were not sold at classification prices at all, because they had not been withdrawn from classification before sale or had been filed on, before withdrawal. To show that such lands exist, we quote the report of the Commissioner of the General Land Office for the fiscal year ended June 30, 1907:

> In the case of coal lands withdrawn for classification and valuation, persons who had prior to withdrawal initiated valid possessory claims are permitted to perfect same, notwithstanding the withdrawal.

It is interesting to note the fact that the entries in 1907-1908 were 299, the acreage 58,047 acres, and the average price a trifle over $11 per acre, while in 1911-12 the entries were only 76 in number, the acreage only 7951 acres and the average price had risen to over $50. Do not all these facts tend to show that in the first of these years, several plots were sold at the minimum under the law of 1873?

It is interesting to note in the report of the Geological Survey for the fiscal year ended June 30, 1912, out of 829, no less than 628 entries were for $10 or $20, the exact amounts named in the act of March 3, 1873, leaving only 201 entries sold at other prices, mostly higher than $20 but nineteen lower than that figure. Of course, the Geological Survey has chosen the two prices, $10 and $20, for some inferior lands, but doubtless most were not sold at the Survey's prices at all.

A well posted Westerner writes us:

> I confirm your conclusions that the sales in 1907-08 were largely on unclassified lands and where the lands had been filed upon, prior to withdrawal and valuation. These lands were sold, of course, at the minimum prices, although the Government, in some cases, contested these filings, asserting that the parties were not actually in possession. There is no doubt in the world that locators took advantage of their knowledge of the Government's intention to revalue and classify coal lands and therefore in 1906, on some unsurveyed land, upon which there were squatters under the law of 1873, giving a man the first right to purchase by paying the minimum price, this right was exercised by many people and filings made in the latter part of 1906 were paid for in 1907 at the minimum prices which, no doubt, swelled the acreage.

Mr. Ashley himself in a letter of Dec. 26, 1913, says:

> Of course, it is obvious that all prices except $10 and $20 are those fixed by the Geological Survey. Since the greater part of the coal lands classified within the past six years have been valued at the minimum of $10 and $20 it is probable that a large proportion of the tracts listed as sold at those prices are of such character as have been or would have been if classified, when sold, appraised at those prices.

This opinion we cannot indorse and we only quote the statement to evidence that coal lands have passed at unclassified figures.

As a further reason for our belief, that coal is not selling freely, we quote from the report of the Secretary of the Interior to the President, Dec. 10, 1913:

> Our coal land is not being used under this plan (the classification of land and its vending at the price appraised) save under exceptional conditions of local and immediate demands and the purchaser, where there is one, is speculating on the best guess that an honest geologist can make as to the amount of coal in the ground.

So far we have said nothing about the fact that the prices for coal land were, when first appraised, more reasonable than they now are. Despite the fact that the government withdrew first, those plots which were most valuable, the appraisements given in the report of the Commissioner of the General Land Office for the fiscal year ending June 30, 1907, show the following figures: Non-coal, 1,269,720 acres; land to be sold at legal minimum, 24,950,120 acres; $20 per acre, 94,400; $25 per acre, 212,200; $30 per acre, 8000; $40 per acre, 2720, and $50 per acre, 85,880. These prices, it will be seen, are well below $510 per acre, which is now the maximum.

It is true higher prices were then in contemplation for the Commissioner says in the same report, "A considerable amount is being scheduled as coal lands of great value ranging as high as $75 per acre." Confiding commissioner, how could he gage the avarice of the land-holding class, be it bond holder or bureaucracy!

There is another line of misrepresentation which consists in urging that sales are as satisfactory now as they were before prices of coal land were raised. The Survey urges that increases in price have not retarded sales. We have seen how evident it appears that the figures showing sales at higher prices are not really representative of true conditions. They probably include all three types of abnormal transfers: Sales not made at present ratings, sales made at lower prices than now rule and sales of coal land made for their value as town sites.

But even if we assume that the sales since June 30, 1907, show all that is alleged, we cannot see that the Geological Survey proves its case. Let us quote other enlightening utterances of the Commissioner of the Land Office, for he, like the Secretary of the Interior, inconsiderately at times lets the whole truth become manifest. He says in his report for the fiscal year ending June 30, 1907:

> The futility of the Land Act of Mar. 3, 1873, is shown in the fact that since its enactment less than 500,000 acres of coal lands have been patented under it, while millions of acres of coal lands have been taken under other forms of entry, some of it unwittingly, but large areas in order to avoid the terms of the coal-land act, coal lands being the highest priced lands offered by this government.

So there *was* a marked tendency to obtain coal lands before 1907, but people believed that the evasion of the law provided a better way and the sales were not made of such lands under their proper title, but as if their real value was for farming purposes. It is true this was a mistake; the Land Office has been rounding up offenders and making them pay the larger prices. But we are not concerned with the error in judgment, but with its effect on sales, and as the Commissioner shows, it restricted these most measurably. Perhaps in many cases this also accounts for recent sales, for when developments have been made it is better to pay well for the land than to throw improvements away.

All in all, the report made year after year to the President is misleading in the extreme. The public have been deluded. The high cost of living is being raised in the West by the restriction of competition in that section. It is generally acknowledged that prices of coal at the mine in the public-land states are higher than in the East. Let us quote the Commissioner of the General Land Office in his report of June 30, 1910:

> The progress of advancement in the West is being retarded under present conditions by the difficulty in the successful operation of new mines under legislation as it exists today. Competition has been checked. The consumer is having to pay therefore, a greater price than it would be reasonable to expect he would have to pay if it were possible to open mines under legislation which would encourage the development of mines.

Therefore, it is with hope that we hail F. K. Lane's report, and the statement of G. O. Smith before the American Mining Congress. It is none too soon that a new system should be inaugurated. We are thoroughly in accord with the Geological Survey in believing that the royalty system is by far to be preferred to one based on outright sale.

Legal Department

When Is a Coalyard a Nuisance?

By A. L. H. Street*

SYNOPSIS—Location or manner of operation will not be interfered with unless it constitutes an unreasonable interference with residential rights.—Nature of neighborhood a controlling circumstance.—Amount of investment no defense.—What American and Canadian courts have held.

A coal yard, being a part of a lawful business, is held by the courts to become an abatable nuisance only when it is so located or so conducted as to become obnoxious to the general run of citizens.

The Alabama Supreme Court has sustained the right of an owner of property in a residence district to maintain a suit to enjoin the maintenance of a yard and coal bins so near his dwelling-house as to render habitation thereof undesirable, unpleasant and burdensome, on account of the emission into the air of coal dust. (Johnson vs. First Avenue Coal & Lumber Co., 54 Southern Reporter 598.)

It is true, however, that the complaint in this case was coupled with a protest against the operation of a planing mill in connection with the coal business, which increased plaintiff's discomfort, because of the noise and vibration produced by the mill. But the decision of the court recognizes the emission of coal dust as constituting a nuisance independently of the planing mill. The court sustained the right of the legislature to define abatable nuisances, in the proper exercise of the state's police power to protect the public health and safety; but, on the other hand, upholds the right of owners of coal yards to be protected in the enjoyment of their property, under the guaranty of the Federal constitution that no person shall be deprived of his liberty or property, unreasonably, arbitrarily or without due process of law. This constitutional right, the court says, "cannot be destroyed under the guise of police regulations. The legislature cannot, therefore, by its mere *ipse dixit,* make that a nuisance which is not in fact a nuisance or akin thereto."

The principle that a private citizen cannot maintain a suit in his own name, as distinguished from an action brought by public authorities, to enjoin continuance of a claimed nuisance, unless he suffers loss or inconvenience different in kind and degree from that suffered by the public at large, was applied in this case. The court holds that an individual must show the existence of a continuing nuisance or a real danger of serious and irreparable damage. "In determining whether an alleged nuisance should be abated, everything should be looked at from a reasonable point of view. The law does not regard trifles or very small inconveniences, but only those that are sensibly so—those which diminish the comfort or enjoyment of the complainants, or those sought to be relieved, or which sensibly diminish the value of property sought to be relieved, from the effects of such alleged nuisance.

*Attorney-at-law, St. Paul, Minn.

An Individual Must Expect to Suffer Some Annoyance

If one lives in a town, of necessity he must suffer some annoyance from the carrying on of the various trades which are properly located and carried on in his immediate vicinity, and which are necessary for the public trade and convenience, and for the public at large." And, according to the same decision, if a person takes up his residence in a business district, he must abide the natural inconvenience attendant upon residence in such a neighborhood. But if a business enterprise invades a residence district, a dwellinghouse owner will be entitled to enjoin conduct of the business in such manner as impairs the enjoyment of his home and the value of his property.

But, as decided by the Illinois Supreme Court in the case of Wente vs. Commonwealth Fuel Co., 83 Northeastern Reporter 1049, the standard of discomfort in the enjoyment of a home is not established by the sentiments of "persons of delicate sensibilities and fastidious habits, but by the habits and feelings of ordinary people."

In the last cited case, which was a suit to restrain defendant from piling coal against the wall of plaintiff's building and from operating a coal hopper in such a manner as to cause smoke, dust and cinders to permeate the air in the building, the Illinois court decided that the fuel company could not assert as a defense to the suit the fact that the hopper had been created at great expense. Justice Cartwright said: "If the existence of a private right and the violation of it are clear, it is no defense to show that a party has been to great expense in preparing to violate the right. The law does not undertake to estimate the difference between the loss that would be sustained by the party owning the thing complained of and of the damage to the injured party, nor to grant or withhold relief on such a basis."

Judge Refused to Grant Temporary Injunction

In a New York case, Russell vs. Popham, 3 New York Legal Observer 272, a judge refused to grant a temporary injunction (a restraint pending determination of the right to a perpetual injunction) against the operation of a coal yard adjacent to plaintiff's dwelling-house. He said: "A coal yard *prima facie,* is not a public nuisance, though it is possible so to use it as to make it noxious to the public. But if the affidavits on the part of the defendant are true, this yard is not so conducted as to be a public nuisance. The alleged injury to the complainant's house by the deposit of coal upon the adjoining lot may be such a private nuisance as to entitle the complainant to the interference of this court, after he has established the fact that it is a real and substantial and continuing injury to his premises, in a suit at law. It would, however, be going much further than the court has heretofore considered itself as justified in going, to interfere by a preliminary injunction upon the state of facts presented."

Recent Developments in the Colorado Strike

At the beginning of December of last year, inquiry was being made into the Colorado strike by both a federal grand jury in Pueblo, and a military commission at Trinidad. Before the former, indictments were brought against John P. White, president of the United Mine Workers of America, Frank J. Hayes, vice-president, and others, in all 25 persons. The jury returned 25 indictments against 24 men, Hayes being charged with obtaining a monopoly on labor and conspiring to restrain trade. The specific charges against those indicted include the stopping of coal destined for interstate purposes, the holding of cars after they were loaded for shipment and the asking of Wyoming operators to withhold coal from Colorado.

The military commission listened to the admission of Robert Uhlich, indicted president of the local union, that he had personally carried arms to the 400 miners at Ludlow, the night before the last battle at that place when a mine guard was killed by a shot. He was arrested and the authorities are seeking his deportation. Born in Saxony where he deserted the army, he fled to France, Spain and Mexico, and did not come to Colorado until 1910.

TWO BASES FOR SETTLEMENT REJECTED

On Dec. 2, the miners refused to accept the proposition of Governor E. M. Ammons for a settlement based on the following understanding: The law forbidding employers to interfere with the joining of unions by their employees or to discharge or coerce them on account of their affiliations was to be enforced. The employment of checkweighmen chosen and paid by the miners was to be allowed and the 8-hr. law was to be obeyed. The workers were to be free to buy their goods and to board where they pleased. The miners were to be paid twice a month. All provisions of the coal-mine inspection law were to be observed and all strikers were to be reinstated except where guilty of acts of violence.

A joint proposition of the governor and of the Secretary of Labor, W. B. Wilson, was that an arbitration committee should be formed consisting of three operators, three strikers and one disinterested party. All questions involved in the strike were to be submitted for adjustment except that of recognition of the union. This proposition was held up until the referendum vote accepting or rejecting the proposal of the governor had been cast.

When, on Dec. 4, the count of the referendum vote revealed a determination on the part of the miners to reject the original proposition, W. B. Wilson met with the operators and endeavored to get them to submit the difference to arbitration, but they refused. So he returned to Washington.

OPERATORS REDUCE PRICE OF COAL

On Dec. 3, the operators declared that the miners were working so steadily that a drop of $1.75 per ton could be made in the price of lignite. It had been $6.50 retail for first grade and $6 for second grade in Denver, for some weeks.

Vice-President Hayes, of the Mine Workers Union, then issued a manifesto stating that the coal offered for sale had been standing since before the strike and that the operators had been trying to make an excess profit of $52,000 per day on it for two months.

On the same day Dec. 3, President J. McLennan and Secretary W. T. Hickey, of the State Federation of Labor, called a convention to meet Dec. 16 to consider a statewide sympathy strike and Dec. 5, nine speakers were sent out to urge such a strike on the labor unions. The miners of the Aguilar district resolved on Dec. 3 to request the district officers to take the necessary steps for the recall of Governor Ammons and General Chase, the latter being at the head of the state militia.

THE MILITARY COMMISSION

On Dec. 6, the military commission reported on 43 cases arising out of the strike. It recommended that five men be held for murder, three for felonious assault, two that their cases may be further investigated and Uhlich as a dangerous agitator and alien.

The commission then took up its investigations at Walsenburg and dismissed 20 men. On Dec. 12, Captain Colesworth was named to relieve Major C. E. Townsend as acting judge advocate with Major Boughton. This was a cause of great rejoicing to the union officials. They alleged that the militia in Major Townsend's district took Andrew Colnar, an innocent Pole, and caused him to dig his own grave on the threat that he would be shot in the morning and taunted him until he fainted and fell in the hole. Further they stated that union officials have been held incommunicado and without charges being made.

The National Socialist party in Chicago and the Young Women's Christian Association sent word to the miners' union, the word arriving on Dec. 13, that they would send money for the support of the children of strikers.

On Dec. 16, Adjutant General John Chase declared that the mines were getting their full quota of men, the Forbes mine, for instance, being about 5 per cent. short and the Ideal having a full quota. The men were leaving the tent villages ostensibly for other states, but many of them sought work in nearby towns as strike breakers. He stated that in accord with the law, all men entering Colorado to seek employment were warned that a strike was in progress.

THE STATE FEDERATION MEETING

The much heralded meeting of Dec. 16, at last convened, but no figures of national importance in other lines than coal mining were in attendance. There were, however, the familiar figures of J. P. White, president, and W. Green, secretary of the United Mine Workers of America, and "Mother" Jones. In all about 450 delegates represented 250 unions. W. Green delivered the following remarks according to the "Rocky Mountain News":

There was a time when the governor could have rendered a distinct service to the people of the state, but that time has long passed. He should have given the operators one week to arbitrate with the understanding that, if they did not do so, he would instruct the attorney-general to go to court, have a receiver appointed for the coal companies and operate the mines in the name of the state.

It does not appear that Mr. Green's remarks were taken seriously, as his wild suggestions, which are neither just nor of legal force, were not embodied in the resolutions adopted. A visit was made by a committee of five on Governor E. M. Ammons. The committee declared that if the military commission executed anyone, lynching parties would follow.

THE STATE-WIDE STRIKE UNPOPULAR

The federation did not vote for a general strike in Colorado as the delegates thought that Wyoming coal miners should first strike in sympathy. Nevertheless a resolution was passed in a half-hearted way empowering the executive committee of the Colorado Federation of Labor to call a state-wide strike without further formality or notice. This meant but little as the federation officials had the power to make such a call without any such vote.

The meeting supported the resolution of Congressman Edward Keating in favor of a congressional investigation into the Colorado strike, and ordered its approval of the resolution sent to all the Colorado congressmen; it indorsed the single tax, commended Roady Kenehan, the state treasurer demanded the removal of Sheriff J. Farr, of Huerfano County, and condemned the newspaper inquiry into the strike, declaring it representative of only a few papers and stating that the miners were not allowed to talk as long as the operators. It also made the accusation that the judgment was prepared before the testimony was heard. It recommended a constitutional amendment providing for the operating of coal mines by the state and favored the bill permitting cities to file upon federal coal lands for municipal use.

On Dec. 18, the federation ended its sessions, having first arranged to prepare petitions for the recall of Governor E. M. Ammons and having marched to the state house and met the governor and Attorney General Fred Farrar in the house of representatives. The governor agreed to investigate charges brought against the militia and desired the federation to name a committee to assist in the investigation.

On the same day 185 strike breakers were brought into Trinidad from Pennsylvania. About 1500 strikers and sympathizers with the strike met them and were kept back only with difficulty by five companies of militia. On Dec. 19, fighting took place at Oak Creek, Colo., and at the Cameron mine, Walsenburg, Colo., which has been running steadily since the strike commenced.

THE PROGRESSIVE PARTY AND THE STRIKE

On Dec. 22, Merle Vincent, leader of the Progressives on the Western slope, demanded that Governor Ammons send a communication to operators and miners requiring them to recognize and negotiate with each other. Failing results, he should call a special session of the legislature to devise ways and means for operating such mines as are on state lands. Vincent declared the militia, "the body-servants to the operators" and added that the operators could be sued for having organized in restraint of trade.

Four of the five committeemen appointed by the strikers to prepare charges against the militia met on the same day. They were Prof. J. H. Brewster, of the University of Colorado. James Kirwan, of the Western Federation of Miners, Eli M. Gross, of the Denver Cigar Makers Union, and John R. Lawson, of the striking miners. Lawson was elected chairman and Gross, secretary.

Discussion By Readers

The Certificate Law

Letter No. 9—In recent issues of COAL AGE, I have read the opinions of different men as to the advisability of establishing an interchange of certificates, issued by the different mining departments and mining boards in the several coal-producing states of the United States. I am in favor of a law or plan that would bring about an interchange of certificates for such positions as mine managers (mine foremen) mine examiners (firebosses) and hoisting engineers; because of certain cases that have come under my observation, in connection with my work as chief clerk and secretary of the State Mining Board.

Men have made application in Illinois for examination as mine managers, and have had in their possession certificates of competency granted them in other states. These certificates may have been issued several years before, since which time they have acted in the same capacity successfully, for a number of years; but, under the state mining law, they were required to take an examination in practically the same subjects in which they had formerly been examined in another state. Their work had taken up so much of their time that they had not kept up their study and were unable to pass the examination in Illinois. Nevertheless, they were capable and qualified according to the laws of another state to perform such duties and had secured a certificate of competency as required by law.

In most of the states that produce coal, there is created by law, a board or commission or a chief mine inspector, who have charge of the examinations for certificates as mine managers, etc., and the law, in most cases, provides in what subjects the applicant shall be examined. The conditions are very similar. Why then should a man who has passed the examination in one state, and received a mine manager's certificate, be asked to take an examination in the same subjects in another state?

In my opinion, there should be an interchange of certificates, with the possible exception of state mine inspector.

MARTIN BOLT,
Chief Clerk, State Mining Board.

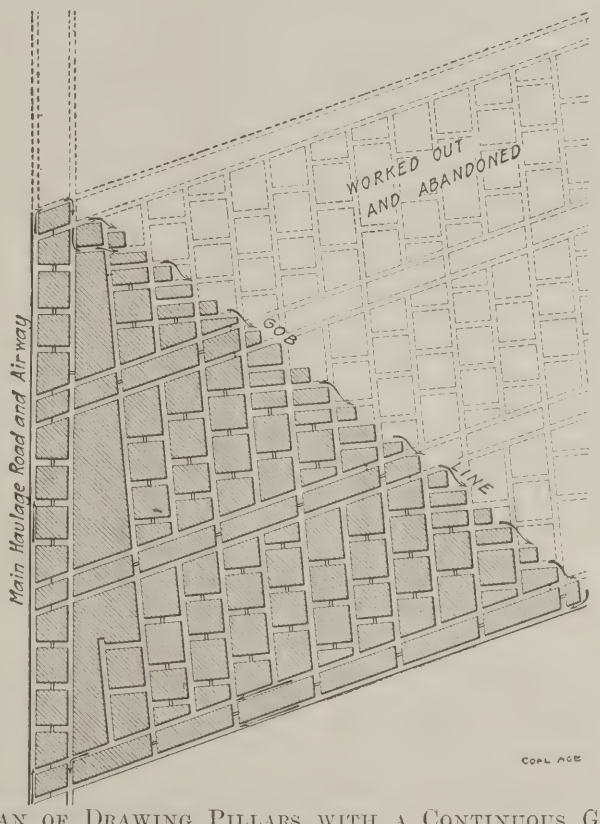
Springfield, Ill.

Extraction of Pillars

I have been greatly interested in the recent discussion bearing on the recovery of pillar coal and submit herewith a plan that has proved very successful in this locality, both with respect to the percentage of coal recovered, the ventilation of the pillar workings and the general condition of safety while drawing back the pillars. The system also favors a minimum cost of production.

As shown in the accompanying sketch, cross-headings are driven off the main haulage road in pairs. These headings are driven on 50-ft. centers and about 300 ft. apart. Rooms are turned to the rise of the cross-headings, the rooms being driven on 80-ft. centers and bear to the left or toward the main headings, about 10 ft. per 100 ft. of length. The grade in the rooms is about 2 per cent.

In this system, the main headings are driven to the boundary line or the limit of the panel, and the work of drawing back the pillars is started at the top rib, on the inby end of the last pair of cross-headings, or the extreme inby end of the panel. Some considerable time is required to develop the full extent of the gob line in a panel or section. As shown in the figure, about seven ribs are all that can be maintained between two pairs of cross-headings. It is important that the development of the gob line should not be rushed too rapidly, but this development should take place regularly, or serious results may follow. Thus, each pillar is stepped back from 35 to 40 ft. before work on the next pillar is started.



PLAN OF DRAWING PILLARS WITH A CONTINUOUS GOB LINE

The method is as follows: The pillar is cut across so as to leave about a 15-ft. stump. When this has been done, a slab of about 4 ft. is taken off on the inby rib. Owing to the angle by which the rooms bear toward the main heading (1 to 10) the cross-cut in the pillar gains about 8 ft. toward the "flat" or cross-heading. On this account, it is clear that the steps in each successive pillar cannot be less than 35 or 40 ft., or much coal would be lost in the stump end when working back.

The ventilation is on the ascensional plan, the air being taken in on the main heading to the inby end and returned along the gob line, as shown in the figure. This is ac-

complished by putting canvas checks in the rooms. By means of canvas hung on the rise-headings, some air is diverted through the crosscuts along the gob line, sufficient to keep these places free from gas. The circulation is so arranged, however, that the most of the air is made to traverse the gob line.

While this is a gassy mine, we have never been troubled with gas on the falls, which proves the efficiency of the system. We always expect to find traces of gas on the top rib, but this is so diluted by the air below the point of ignition that it can only be found by a careful test.

GEORE H. DAVIS,
Asst. Mine Foreman, Thompson No. 1.
Epton, Penn.

Handling Fine Dust in Washing Coal

In the article of J. Drummond Paton on this subject, COAL AGE, Oct. 18, p. 573, the statement is made that "to allow all the small coal under 1 mm. (one-twenty-fifth in.) to pass into the washery is radically wrong." The author further states that the formation of sludge when this and finer dust are allowed to pass into the washery makes the operation of the latter difficult. He explains that not only is the washed fine coal hard to dry but the mass is so dense that the passage of water through it is slow; and, besides, the fine sludge absorbs an immense quantity of water. He concludes that this fine dust cannot be treated successfully in a washer.

The experience of the Keystone Coal & Coke Co., in their washeries at Salem and Huron, would seem to prove the contrary of this claim. These washeries generally get only the sizes of coal that pass through the one and one-fourth-in. bar-screen. But since this coal is mostly cut by machines, it contains considerable fine dust that is high in both sulphur and ash. This condition, therefore, presents such a problem as Mr. Paton claims cannot be handled successfully by washing. I want to say that the rejections at these washeries show a low percentage of coal, not exceeding 5 per cent., while the washed coal shows a satisfactory reduction in ash and sulphur. No water is thrown away, except that which is carried up with the washed coal and refuse and that which is drained out of the tanks once a week for the purpose of inspecting the submerged parts of the machinery.

Before draining the tank, the machinery is always run slowly for a considerable time, in order to save the fine material. That this fine material has undergone an effective separation is proved by repeated analyses, which have usually revealed the following results: Washed coal smudge, sulphur, 1.3 per cent.; ash, 14 per cent. Refuse smudge, sulphur, 5.18 per cent.; ash, 29.5 per cent.

The washed coal smudge here referred to is under one-seventieth in. in diameter and is allowed to pass off from the washed-coal elevator boot along with the overflow water.

A series of tests of the washed coal have shown that sizes down to one-fortieth in. in diameter contain about the same precentage of impurities. Only as the size approaches one one-hundredth in. in diameter, does the material show any great increase in sulphur or ash. For this reason, we aim to draw off only the very finest of the smudge, the rest being good enough to pass up with the washed coal. The fine smudge is not wasted, but is finally allowed to settle out and mixed with the other middlings for the plant boiler fuel.

We have never yet determined here just what proportion of the one-seventieth-in. material passes up with the washed coal. The proportion, however, is probably small, since the greater part of it overflows with the water. Particular attention has been paid to the arrangement of the sluices and settling tanks. The final settling tank, into which all waters flow before returning to the circulating pump, is arranged so that the least possible disturbance of the water occurs. The scrapings from this tank are a mixture of settlings from both refuse-tank water and washed-coal-tank water; and, as previously stated, this goes to the boiler plant. Its analysis is approximately as follows: Sulphur, 2.7 per cent.; ash, 16 per cent.

Our experience leads me to conclude that the dry dust, in the separation suggested by Mr. Paton, could not be handled as easily and economically, in our case, at least, as the smudge we are handling at the present time; and it is certainly being washed fairly successfully, as is proved by the analyses.

E. C. TAYLOR, Supt.,
Keystone Coal & Coke Co.
New Alexandria, Penn.

Grand Jury Investigates Strike Situation

Referring to the editorial, Two Phases of the Colorado Strike, COAL AGE, Dec. 20, p. 943, allow me to draw attention to the following rulings of the federal grand jury, bearing on the strike situation.

The federal grand jury investigating the coal strike in Colorado recently issued a statement relative to conditions in the mines in which it says: "The operators appear to have been somewhat remiss in endeavoring to secure and hold the good will of their employees, and the grand jury has deduced from testimony that there existed reasonable grounds for many of the grievances complained of by the miners. We believe that many of these complaints are substantiated and have merit."

The grand jury found that the state laws have not been so enforced as to give all persons concerned the benefits which are derived therefrom, and that "the coal companies have been sufficiently influential to nominate, elect and control many county officers, and have done so with the result of complicating the industrial situation by excusing political prejudices."

The report further sets out that "many camp marshals whose appointments and salaries are controlled by coal companies have exercised a system of espionage and have resorted to arbitrary powers of police control, acting in capacity of judge and jury and passing sentence upon miners who had incurred the enmity of the superintendent or pit boss for having complained of real grievances or for other causes. These, taken with assaults by camp marshals upon miners, have produced general dissatisfaction among miners, who fear generally to complain of real grievances because of danger of their discharge."

Viewed in the light of these grand-jury investigations, the present labor trouble in Colorado does not appear to have all the right and justice on the side of the mine owners.

A CONSTANT READER.

How To Buy Coal

Letter No. 1—I have read with considerable interest the article by J. S. Burrows, entitled, How to Buy Coal, COAL AGE, Dec. 6, p. 866. While Mr. Burrows has demolished, by very logical arguments, the preconceived ideas of a large number of purchasers of coal, and even admits that he was one of the originators of the heat-unit system, he, nevertheless, offers no substitute.

I quite realize that in the chemical analyses, by sample, of several hundred tons of coal, the result is more or less subject to error; but, if the net result of a series of samples of different lots is taken, say an average of ten separate analyses, would not the result be as much to the advantage of the seller as the buyer. While the sample of one or two lots might show an excessive proportion of ash, sulphur, or a low-heat value, it cannot be denied that subsequent analyses might give the advantage to the seller. An average, therefore, of, say ten analyses of samples, taken from as many distinct deliveries of approximately equal quantities of coal, would at least give a fairly good general idea of how the coal was running, and whether or not the seller was living up to the standard required by the contract.

The purchase of coal for bunker purposes differs materially from that for shore use; and, aside from the effort to obtain suitable coal for steaming, careful consideration should be given to the elimination of any risk of spontaneous combustion, especially where the vessel is to be bunkered for a long voyage during which the coal will be subjected to climatic changes. In such cases, it is very difficult to arrive at a practical result, owing to the difference in steamers, engineers, firemen, weather conditions, etc.

Until some better and more reliable method is established, therefore, it is fair to assume that the purchaser is safeguarded, at least to some extent, against a poorer grade of coal than is guaranteed by the seller, and the latter will suffer no hardship by the present system provided that he intends to live up to the conditions of his contract.

In the case of bunkering steamers, it seems to me that a fair way of sampling is to take a small sample of coal from each or every other bucket, keeping the samples taken from each barge separate; and after thoroughly mixing each lot reduce the amount in the customary manner to a quantity sufficiently small to analyze. I believe this would give a net result that would demonstrate, with a degree of fairness, the quality of the coal delivered.

W. J. RAEBURN.

New York City.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

RATIO AND PROPORTION

Ratio—The word "ratio," as used in mathematics, expresses the numerical relation that one quantity bears to another of the same kind. The two quantities so related or compared are called the "terms" of the ratio; and the two terms taken together are called a "couplet."

How Expressed—A ratio is expressed in two ways:

1. By writing the two terms with a colon between them; thus, the ratio of 2 to 4 may be written 2:4 and is read 2 is to 4.

2. By writing the terms as a fraction; thus, the ratio 2:4 may also be written 4/2, the first term of the ratio being preferably made the denominator and the second term the numerator of the fraction.

When so written the ratio may be read as before "2 is to 4"; or, as is frequently done, "4 divided by 2," which expresses the fact the ratio is intended to convey; namely, that the first term of the couplet 2:4 is a base or standard of measurement for the second term, and the ratio shows how many times the second term will contain the first, or expresses the value of the second in terms of the first or standard.

The Meaning of Ratio—To illustrate the meaning and use of ratios, in mining problems:

Nitrogen gas is 14 times as heavy as the same volume of hydrogen, and the ratio of the weights of equal volumes of these two gases is therefore 1:14. In this case, hydrogen is made the base or standard of measurement.

Again, a cubic foot of anthracite (hard coal) is, practically, 1½ times as heavy as a cubic foot of water, and the ratio of the weight of anthracite to that of water, volume for volume, is therefore 1:1.5. Here, water is the standard and the weight of the coal is calculated from the known weight of the standard.

Ratios are useful in the calculation of many problems in mine ventilation, where it is often desired to calculate the volume of air a given power will circulate in one airway of a certain size, from the circulation produced in another airway of known size, which is taken as the standard.

A Simple Ratio—A simple ratio is one formed of a single couplet of like terms only; as when length is compared with length, or width with width.

Example—If one strip of carpet contains 10 sq.yd., how many square yards are there in another strip of the same width but twice as long?

Solution—These strips of carpet differ only in length, the length ratio being 1:2; or 2/1 = 2. Hence, the number of square yards in the second strip is found by multiplying the number of yards in the first strip by this ratio. Thus, 10 × 2 = 20 sq.yd.

In this case the ratio is a simple ratio, because it is expressed by a single couplet the terms of which both refer to the length of carpet in the strips. This is possible, because the width of the strip is the same in each case and need not therefore be considered.

The Coal Age Pocket Book

A Compound Ratio—A compound ratio is one formed of two or more couplets, the terms of which are different for each couplet. In other words, a compound ratio involves two or more simple ratios of different kind.

The value of a compound ratio is determined by multiplying together the first terms of the several couplets, for a new first term; and, likewise, the second terms of those couplets, for a new second term. The resulting ratio is the value of the compound ratio.

Example—If a certain strip of carpet contains 12 sq.yd., how many square yards will there be in another strip twice as wide and three times as long?

Solution—In this case, two simple ratios are involved. The width ratio is 1:2, and the length ratio 1:3, which together form a compound ratio that may be expressed by the products of the corresponding terms. Thus,

$$(1 \times 1) : (2 \times 3); \textit{ or simply } 1 : 6$$

The number of square yards in the second strip of carpet is, then, 12 × 6 = 72 sq.yd.

Example—A certain mine sump, 6 ft. wide, 14 ft. long and 11 ft. deep, holds when full 6912 gal. of water; what is the capacity of another sump that measures 7 ft. in width, 12 ft. in length and 6 ft. in depth?

Solution—These sumps differ in all three dimensions, width, length and depth. The width ratio is 6:7; the length ratio 14:12; and the depth ratio 11:6. The compound ratio of capacity, is therefore, in this case,

$$(6 \times 14 \times 11) : (7 \times 12 \times 6); \textit{ or } 924 : 504$$

This ratio can be reduced by dividing both terms by 84, which is their greatest common divisor; or by canceling the common factors in the two terms of the compound ratio; thus,

$$(\overset{2}{\cancel{6}} \times \overset{}{\cancel{14}} \times 11) : (7 \times \overset{6}{\cancel{12}} \times \cancel{6}) = 11 : 6; \textit{ or } \tfrac{6}{11}$$

The capacity of the second sump or basin is, then,

$$6912 \times \frac{6}{11} = 3770+ \textit{ gal.}$$

To Reduce a Ratio—To simplify the working of problems all ratios should be reduced to their simplest form, by writing the ratio as a fraction and reducing this fraction to its lowest terms.

For example, the ratio 12:16 when reduced to its simplest form is

$$\frac{16}{12} = \frac{4}{3}; \textit{ or } 3 : 4$$

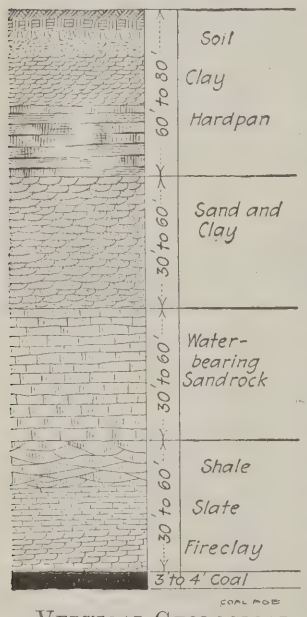
The terms of any compound ratio consist, each, of the corresponding terms of the simple ratios of which it is formed. These simple terms enter the compound ratio as factors or "elements," as they are called. In reducing a compound ratio, cancel the equal elements and factors in each term.

Inquiries of General Interest

Working Coal under Watery Strata

We are starting to develop a coal property that presents an interesting and difficult problem in mining. Having noted the previous valuable discussion on working coal under sandstone cover, allow me to present the following proposition for the discussion of readers:

We have already sunk an air shaft to the coal, which lies about 200 ft. below the surface. The shaft is making 500 gal. of water per minute, which all comes practically from the water-bearing sandrock, so marked in the accompanying section. This sandstone is not stratified and the water flows through it freely in every direction.



VERTICAL GEOLOGICAL SECTION

In order to assist in sinking the air shaft mentioned, we drilled two 10-in. boreholes, one on each side of the shaft and about 50 ft. distant from the same. We pumped about 150 gal. of water per minute from each of these holes; and the sinking of the shaft did not seem to affect the flow in either hole, even after the shaft had penetrated and passed through the sandrock from which the water came. The natural head of the water is about 100 ft. above the sandrock, which extends for miles in all directions from the shaft. The source of the water is unknown, there being no large bodies of water closer than 15 miles. I would like to suggest the following questions for discussion by readers:

1. If the coal in this seam is taken out to such an extent as to break the sandrock, would it be reasonable to expect the same flow of water from each break as what finds its way into the shaft?

2. Assuming we can handle from 1000 to 1200 gal. of water per minute, in this mine, and estimating that it will be necessary to leave about 50 per cent. of the coal in place, in order to prevent breaking the rock, would it be advisable to leave such a large percentage of coal for the support of the overlying strata? Under ordinary mining conditions we would expect to take out from 80 to 85 per cent. of the coal.

3. We expect to sink a hoisting shaft about 300 ft. from the air shaft. Will this shaft make the same amount of water as the air shaft?

GEO. MACPHAIL, Engr.,
What Cheer Coal Mining Co.

Bay City, Mich.

[This is a problem of great interest in coal mining. Our correspondent has given little information in regard to the geological cross-section of the locality. The vertical section given, however, shows approximately the character of the strata overlying the coal seam, and it may be assumed that the location of the shaft is in the basin, at or near the bottom of the syncline. Here is an opportunity for practical mining men to give helpful suggestions, by citing instances in their own experience. Let us have a good discussion of the question.—ED.]

Weathering of Coal

Recently, I read a statement to the effect that a small pile of coal that had become heated to a temperature of 165 deg. F., later cooled down to the normal. As this is contrary to general experience in the practice of storing coal, I would like to ask if such a statement could be correct.

In the storage of coal, is the idea of ventilating the pile in order to reduce the heat generated, of practical value; or, in other words, can the idea be applied to advantage in the storage of coal in large heaps or in bunkers?

PURCHASING AGENT.

Philadelphia, Penn.

Opinion varies widely in regard to the immediate cause of the generation of heat in a coal pile. There are unquestionably a number of contributory causes, all of which produce a greater or less effect and assist or retard the generation of heat in the coal. One of the most potent of these causes, probably, is the absorption by the coal, of the oxygen of the air. The oxygen thus absorbed is brought into intimate contact with the carbon of the coal. The absorption of oxygen is greater in the small sizes of coal, owing to the greater surface exposed to the atmosphere, for the same mass concerned.

Moisture, the presence of sulphur in the coal, the hardness and cleavage character of the coal, are all factors that assist or retard the reaction that takes place between the carbon and the oxygen. This reaction generates heat, which in turn accelerates the oxidation of the coal.

The purpose of ventilating the pile would be to carry off the heat generated in this way. The idea, however, is not generally regarded as of practical application, not only for the reason that it is impracticable to ventilate a large coal pile or storage bin thoroughly throughout its mass: but the air introduced into the pile of heated coal furnishes the necessary oxygen to carry on the combustion.

Coal stored in bunkers should be kept as dry as possible and the space above and around the coal should be thoroughly ventilated. It is possible, although exceptional, for a coal pile that has started to heat, to cool down again under favorable climatic conditions respecting temperature and moisture in the air. Climatic conditions have a greater effect on the tendency of coal piles to heat than is generally supposed. This has been clearly shown by the difficulty experienced in seagoing vessels sailing in different climes.

Examination Questions

Miscellaneous Questions

(Answered by Request)

(*Concluded from last issue*)

(b) The introduction of a regulator in an airway has practically the same effect as increasing the length of the airway and will increase the water gage, for the same power on the air.

(c) For a constant power on the air, the pressure or water gage varies inversely as the quantity of air in circulation; in other words, the water-gage ratio is equal to the inverse quantity ratio. Calling the required water gage x and assuming an original water gage of 2 in.,

$$\frac{x}{2} = \frac{20{,}640}{12{,}250}$$

$$x = \frac{2 \times 20{,}640}{12{,}250} = 3.37 \text{ in.}$$

(d) For the same conditions in the airway and the same opening in the regulator, the power required to increase the circulation to the original amount, and the resulting water gage are determined by the rule that the power varies as the cube of the quantity and the water gage as the square of the quantity. In other words, the power ratio is equal to the cube of the quantity ratio, and the water-gage ratio is equal to the square of the quantity ratio. Calling the required power and water gage x, respectively, the original circulation being 6.5 hp. and a 2-in. water gage, we have

Horsepower, $$x = 6.5\left(\frac{20{,}640}{12{,}250}\right)^3 = 31.09 \text{ hp.}$$

Water gage, $$x = 2\left(\frac{20{,}640}{12{,}250}\right)^2 = 5.68 \text{ in.}$$

Ques.—If a true meridian line is established and the declination of the needle is known to be 4 deg. east of north, will the needle of a compass when unlocked read N 4° E?

Ans.—Assuming there is no local attraction to deflect the needle, it will point to the magnetic north when unlocked. If the sights of a simple compass having no declination plate be directed to the true north so that the sight line of the compass will correspond with the established true meridian, the reading of the needle will be N 4° E.

If, however, the compass has a declination plate and the declination of the needle is set off, 4 deg. to the east of north, the reading of the needle will then be zero; because, in setting off the declination on the compass, the zero of the limb or graduated circle has been moved 4 deg. to the right of the sight line of the compass. In this position, the north and south points of the graduated circle coincide with the magnetic meridian when the sight line of the compass is in the true meridian.

Ques.—If a given power produces 60,000 cu.ft. of air in three airways, each 6 ft. high, 8 ft. wide and 4000 ft. long; what quantity of air will the same *power* produce when one of these airways is closed?

Ans.—For the same power on the air, the quantity of air in circulation in a mine is directly proportional to the total sectional area of the airways or area of passage, and inversely proportional to the cube root of the rubbing surface. Assuming that each of the three airways, in this case, starts from the bottom of the downcast and returns to the foot of the upcast, making three separate splits of air, and ignoring the shaft or slope resistance, both the total sectional area and rubbing surface for the entire mine will be proportional to the number of airways or splits. This is true, since the airways are all of the same size and length.

Then, the quantity of air in circulation being proportional to the sectional area and inversely proportional to the cube root of the rubbing surface, the quantity ratio is equal to the area ratio times the cube root of the inverse rubbing-surface ratio; and, since there are 3 splits in the first case and 2 splits in the second, calling the required quantity of air x,

$$\frac{x}{60{,}000} = \frac{a_2}{a_1}\sqrt[3]{\frac{s_1}{s_2}} = \frac{2}{3}\sqrt[3]{\frac{3}{2}} = 0.7632$$

and

$$x = 60{,}000 \times 0.7632 = \text{say } 45{,}800 \text{ cu.ft. per min.}$$

The above method, by ratios, is the simplest, most direct and accurate method of calculating such problems.

Ques.—The depth of a downcast shaft is 600 ft. and the temperature 50 deg. F.; the depth of the upcast is 900 ft. and its temperature 100 deg. F. What water gage should result from this condition?

Ans.—Assuming the given downcast temperature (50 deg.) represents the temperature of the outside air, the height (h) of air column producing circulation in this mine, estimated in terms of the air in the upcast shaft, is

$$h = D\frac{T - t}{460 + t} = 900\frac{100 - 50}{460 + 50} = \frac{900 \times 50}{510} = 88.23 \text{ ft.}$$

The weight of 1 cu.ft. of the upcast air, at a temperature of 100 deg. F., assuming a barometric pressure B = 30 in., is

$$w = \frac{1.3273\,B}{460 + T} = \frac{1.3273 \times 30}{460 + 100} = \frac{39.819}{560} = 0.0711 \text{ lb.}$$

The pressure due to 88.23 ft. of air column of this air is then

$$p = w\,h = 0.0711 \times 88.23 = 6.28$$

The water gage corresponding to this pressure is

$$w.g. = 6.28 \div 5.2 = 1.2 \text{ in.}$$

Correction

(*Examination Questions, Nov. 8, p. 711*)

Ques.—The anemometer indicates a velocity, etc.

Ans.—The answer should read as follows:

(c) The water gage is 2.08 ÷ 5.2 = 0.4 in.

Coal and Coke News

Washington, D. C.

The Interstate Commerce Commission has handed down an unusually important decision in the case of the Traffic Bureau of Nashville vs. the Louisville & Nashville R.R. Co. In this it is found that conditions affecting the transportation of coal from Louisville & Nashville R.R. western Kentucky mines to Louisville, Memphis and Nashville are not so dissimilar as to preclude a comparison of rates from the same fields to these three cities. The rate of $1 per ton on coal to Nashville from Louisville & Nashville mines in western Kentucky is found to be unreasonable and a rate of 80c. is prescribed.

A like rate from Nashville, Chattanooga & St. Louis Ry. mines in Tennessee and Alabama is found to be unreasonable and a rate of 90c. is prescribed. It is held that the current complaints as to the unreasonableness of the rate of $1 to Nashville on coal from Illinois Central western Kentucky mines had not been sustained.

With reference to the question of refusal on the part of the Louisville & Nashville and Nashville, Chattanooga & St. Louis to switch coal to and from the Tennessee Central, as well as the practice of the latter in retaliating in kind is held to be unreasonable while the practice of the first two roads is said to be unjustly discriminatory. Finally it is held that a carrier may not exercise any arbitrary discretion in saying what roads and what traffic it will admit to its terminals and what shall be rejected.

The decision is of special interest because of the elaborate discussion it affords with reference to the use of statistics showing ton-, car- and train-mile movements as a basis for the making of rates. In this connection, speaking specially of coal movements the commission says in its decision:

Ton-mile statistics, reflecting as they do neither car loading, train tonnage, nor car- or train-mileage, are far from being infallible guides in fixing freight rates. A high average ton-mile revenue may be due to short hauls, a preponderance of which occasions the railroad traffic manager much uneasiness, while it has been repeatedly shown that traffic low in ton-mile earnings may, because of its farther carriage and greater density, be the most remunerative. Per-car earnings, with distance considered, are much more reliable.

Where the commodity moves in trainloads the earnings per train-mile furnish the best criterion, not only the car loading, but also such physical conditions as grades, etc., being here reflected. Comparisons of any kind, however, to be effective must be analogous, or nearly so; that is, the the rate charged or gross earnings derived on any basis for the transportation of a given commodity between two points furnishes a guide in arriving at the rate to be charged upon the same or nearly the same commodity between two other points similarly circumstanced.

Comparisons made with coal moving to the lakes for transshipment, to tidewater and between points in central freight association territory are of little value here because of the manifest difference in transportation conditions, particularly with respect to density of traffic, train tonnage, and return empty hauls.

Chattanooga, Knoxville and East St. Louis have coal mines in their immediate vicinities, and such juxtaposition of supply and market must needs exercise a material influence over the rates from farther distant mines thereby lessening the strength of the comparison.

In analyzing the actual tonnage situation, the commission points out that the $1 per ton rate to Nashville has been in effect since 1888 and has therefore remained unchanged for 25 years and that as the volume of traffic has greatly increased there is ample reason to believe that the proportionate share of revenue obtained from the hauling of coal in this way is much greater now than it was then so that a reduction is reasonably to be expected. No award is made of reparation for past charges.

The Rate Increase Controversy

An increasing number of coal producers are preparing to participate in the 5% rate advance controversy with the railroads and are filing statistics in opposition. The roads themselves are beginning to appreciate the character of the antagonism they must meet from this source and are getting ready to show statistically the situation under which they are laboring in coal territory.

Among the recent data filed by the roads are statistics showing that there has been an enormous increase in wages. According to this analysis the various railroad companies paid out $506,000,000 in wages and salaries in the year ending June 30, 1913 Estimates for 29 of the 38 railroad systems concerned show an increase in wages for 1913 over 1910 of $48,618,972.41, due to changes in rates of pay and working conditions.

This figure was obtained as a result of a request to the railroads to take the actual performance for the year ending June 30, 1913, and compare the rates of pay and working conditions prevailing in that period with those in effect in October, 1909, a period prior to the date of the important increases.

In addition to the increases up to June 30, 1913, careful estimates show that the increases in wages recently granted to the firemen, conductors and trainmen will add not less than $8,750,000 more to the expenses of the railroad, this estimate being based on the volume of business for the calendar year 1912.

In addition to the wage increases granted in the calendar year 1910, a small portion of which was effective in the fiscal year ending June 30, 1910, the engineers, firemen, conductors and trainmen have been awarded increases through arbitration proceedings amounting to $10,350,000 per annum on the eastern railroads, and increases in rates of pay have been granted to various other classes of labor amounting to large sums in the aggregate in addition to those granted in the year 1910.

Taken altogether, there has been an increase of 10.62 per cent. in the average rates of pay on these railroads in 1913 over 1910. Special data are also being prepared with reference to wage conditions in the coal regions.

Experiment Stations Are Popular

More bills for the establishment of mining experiment stations have been introduced within the past few days, one by Mr. Taylor, of Colorado, who calls for 10 such stations with elaborate functions, another by Mr. Hensley, who would create one such station at Flat River, Francois County, Mo. There seems to be little reason to expect that any action will be had on these proposals for experiment stations any more than on the numerous propositions of the same kind that have come to the front in past years.

HARRISBURG, PENN.

The Auditor General has made his first ruling under the new law taxing anthracite coal, effective the first of the year. It relieves operators of the payment of the tax on as much coal as is necessarily and exclusively used in the operation of their collieries.

This ruling provides that as much of the mined product as is burned for lighting or heating the mines or connected offices, or in providing steam or electric power to run fans or other machinery used in coal operating is to be tax free.

The Auditor General, however, draws a sharp line between coal used for such purposes and coal used at the collieries for the production of light, heat or power for other purposes. Some companies supply light to the dwellings they own, and in such instances and in cases where light, heat or power is sold, the coal will be taxed.

A rather curious question, of interest in many communities in the Anthracite country, has been put up to General Powell by county officials who ask whether coal pumped from river beds, where it has been deposited by floods, is subject to the tax. While the point has not been formally ruled upon, the department is of the opinion that such coal is taxable.

Lively interest in the new tax is being shown by officials of the anthracite counties for the reason that it is expected to make important additions to the revenues of their cities, boroughs and townships. Half of the tax collected will be retained by the state.

Rules Will Likely Be Issued Soon

While the Chief of the Department of Mines, Jas. E. Rodenck, has made no official announcement it is generally expected that rules promulgated at the recent conference of mine inspectors held in Reading will shortly be issued.

Among the rules is one which provides that coal companies in the anthracite fields employ patrolmen, whose duties it will be to make an inspection of the face of pitching breasts, at least once a day. The idea is to promote safety and to have first-hand assurance that no pockets of gas have escaped nor that there is danger of squeezing or of falling roof. This will probably mean the employment of at least

a half dozen patrolmen at each individual colliery. None but practical and long experienced miners can be given the position.

Another order will force the elimination of fuses and caps in blasting. Electric batteries must be used and the miner and his laborer must descend the breast and be present at the starting of the battery.

PENNSYLVANIA

Anthracite

Larksville—Employees of the Lance No. 11 Colliery of the Lehigh & Wilkes-Barre Coal Co., who have been on strike for two weeks, have gone back to work, pending a settlement of their grievance. Until the matter is heard and settled by the Conciliation Board, District Vice-President Yannis will act as check weighman, in place of Joseph Bogden, the discharged check-docking boss, who will still be paid by the men until the matter is settled.

Moconaqua—Mine workers throughout the anthracite field are interested in a question raised by the miners employed at the West End Coal Co.'s mine a Moconaqua, who ask that surveyors be required to join the union. It is the contention of some of the district officers that such a course is not legal, and a report on the situation is to be made at the next district meeting.

Lansford—Three collieries of the Lehigh Coal & Navigation Co., in Panther Creek Valley, are idle owing to a strike involving 2000 employees. At collieries Nos. 5 and 6 the drivers were requested to report 20 minutes before the regular starting time so that their mules would be harnessed in time. This they refused to do, and all the other employees went out on strike with them.

Scranton—The Delaware, Lackawanna & Western R.R. tracks which run from the Keyser Valley yards to the Pyne breaker in Taylor borough subsided recently from a mine cave, so that traffic was interfered with for some time. Extreme precautions are constantly taken to guard against disturbance of the main line, and it is not likely that such an occurrence will take place.

Bituminous

Harwick—The fanhouse of the Allegheny Coal Co.'s mine here was wrecked by an explosion of dynamite Christmas night. Three men whose names appear on the commitments as John Doe, Richard Roe and John Dinamiter have been arrested. They were traced to "Dinamiter's" home by footprints in the snow, which led from the scene of the explosion. Guards have been kept at this mine since Oct. 8, when a riot occurred, but these were eluded by the miscreants in the darkness. Despite the dynamiting of the fan, the mine operated the next day as usual.

WEST VIRGINIA

Wheeling—A canvass of the mining situation of the state shows that there are only about 50% of the miners at work at the present time. Of a total of 72,000 coal miners, there are but little more than 25,000 working. Unless there is a decided improvement in the iron industry, it is feared that these conditions will not be better before spring.

Morgantown—Only one day was allowed for the miners' Christmas by the Elkins Coal Co. Notices posted earlier in the week ordered back to work every miner on the 26th, and all but a few responded. Every mine of the company is running to capacity despite the fact that the coke market remains bad.

Prince—Work was recently begun for the operation of the old Royal mine at this place. The premises are being rehabilitated generally. The houses, tipples, tracks, etc., are undergoing repairs and the first property to ship coal out of Raleigh County will be shipping coal again before many weeks.

Elkins—A. P. Brady, formerly of the Brady Coal Co. will shortly take over the Leroy mines at Coalton owned by W. H. Green and operate the same. Mr. Green has made arrangements to operate the mine at Weaver.

KENTUCKY

Madisonville—It is reported in the western Kentucky coal fields that the interests which have been attempting to effect a consolidation of a number of the larger operating companies for several years, have practically closed a deal involving the transfer of about 5000 acres of coal lands in the Kirkwood field, and that other fields in that section will be taken up shortly. The statement is made that some of the money has been paid over for the deal just completed. C. H. Murphey has been working on the consolidation project for several years.

Lexington—At a recent meeting of the executive committee of the Kentucky State University, it was decided to begin the short course in mining enginering, which has proved very popular, on Apr. 1, instead of at the beginning of the summer term, as has been the practice heretofore. The change was decided upon in order to make the course better suited to the convenience of the miners who make up the greater number of the students.

TENNESSEE

La Follette—The strike at the Rex mines of the La Follette Coal, Iron & Railway Co. has been settled and the mines once more are in full operation.

ALABAMA

Birmingham—The Birmingham Railway, Light & Power Co. has closed a three-year contract with the Alabama Co. for approximately 140,000 tons per year of Lewisburg washed slack. This is one of the largest contracts in the South, and many of the operators were bidding on it. The contract is made on a guaranteed analysis, on the basis of a penalty and bonus clause.

OHIO

Shadyside—The Webb mine of the George M. Jones Coal Co., which is being opened near Shadyside, Ohio, will soon be ready for operation. Entries are being driven and from 40 to 50 cars a week of coal are being loaded therefrom. The material for the steel tipple is on the ground.

Columbus—Miners in Ohio are not assured of the passage of the anti-screen law as recommended by the Ohio Mining Commission, but will have to fight before the Ohio General Assembly to secure the passage of the bill. Operators announce that they will put up a stiff fight to prevent the enactment of the law which will give operators in other fields all the advantage.

A number of the larger employers of labor in Ohio, including quite a few coal operators, have elected to carry their own insurance under the new compensation law rather than to pay into the Ohio State Board of Awards a certain percentage of their pay-rolls. Rules for the corporations and individuals to carry their own insurance have been promulgated by the Board of Awards and the experiment will be watched with considerable interest by other coal concerns in the Buckeye State. The employer is compelled to settle all claims on the same basis as the Ohio State Board of Awards.

INDIANA

Bicknell—It is reported that two men were killed by an explosion of gas in the Indian Creek coal mine early on Dec. 29. Practically all the night shift of 150 men had just come to the surface when the explosion occurred. Work was immediately begun to recover the dead.

ILLINOIS

Springfield—Representatives of 50 Illinois mines recently met in Springfield and organized the Central Illinois Coal Operators' Association. This organization has as its principal object the carrying on of negotiations and effecting agreements with labor organizations interested in coal mining in central Illinois, furthering the safeguarding of life and property and advancing in every way the industry of coal mining. No mines affiliated with railroad companies are included in the organization.

De Soto—H. O. Ozburn, of Murphysboro, has been appointed receiver for the J. B. Kreikemeier Coal Co., at this place. The receivership was made necessary by the failure of the company to meet the pay-roll on Dec. 15, and the trustee for the bondholders applied for the receivership. The mine has been producing about 500 tons a day and is in excellent condition, but the property never made money for anybody, and several have lost fortunes in the past 10 or 15 years trying to operate it.

Murphysboro—Christmas in the mining districts of southern Illinois this season was perhaps one of the bluest that the miners have experienced for several years. Throughout the mining districts the Elks and other fraternal societies brightened the occasion by their liberal donations to those who were needy.

New Baden—The blacksmith shop, machine shop and storage room of the New Baden mine of the Southern Coal, Coke & Mining Co., of St. Louis, was destroyed by fire Christmas night.

ARKANSAS

Fort Smith—State Mine Inspector Shaw recently closed mine No. 2 of the Western Coal & Mining Co. at Denning. Failure of the company to comply with instructions relative to the construction of an air-shaft is given as the chief reason for closing the mine, which is one of the largest in this section of the coal field.

COLORADO

Trinidad—According to figures recently given out by local operators the coal production in the southern Colorado fields, is about 60 per cent. of the normal output.

Denver—It is reported from the coal mining district, where several thousand men have been on strike for some months that the industrial strike was forgotten on Christmas day and good-will prevailed. Christmas exercises were held in each of the strikers' tent colonies, huge Christmas trees being gaily decorated and loaded with gifts for the children, the United Mine Workers of America providing 8000 baskets of candies, fruits and sweets. In the militia camps also decorations were numerous.

FOREIGN NEWS

London, England—Among the most interesting of the specimens brought back by the Scott Antarctic Expedition are some pieces of coal found by Captain Scott's party in latitude 85° south in the middle of the frozen plateau that stretches from King Edward's Land to beyond the South Pole.

PERSONALS

F. J. Devlin, recently superintendent of the Santoy, Ohio coal mines, has been transferred to the superintendency of the Jones & Adams Coal Co.'s Peerless Mine, at Springfield, Illinois.

J. E. Beebe, formerly of the Black Diamond, has recently allied himself with the Old Ben Mining Corporation. The offices of his new employers are in the McCormick Building in Chicago.

William Moody, superintendent of the Sunnyside coal mines, near Evansville, Ind., and a well known figure in the coal trade in southern Indiana and western Kentucky, was stricken with paralysis a few days ago and is not expected to survive.

George Wolf, of Davy, W. Va., was recently appointed general manager of the Superior Pocahontas Coal Co. at Davy, and the Winding Gulf Colliery Co., of Winding Gulf. The latter firm has mines on the Chesapeake & Ohio and Virginian railroads.

William Hartman has been appointed mining inspector for the second district of Illinois, vice Thomas Hudson, of Galva, term expired. George L. Morgan, of Benton, has been appointed inspector for the tenth district, vice Thomas Little, of Murphysboro, term expired.

David Z. Thrush and Patrick Hogan of Farmington and Canton, Ill., respectively, have been appointed state mine inspectors. Mr. Thrush who at the present time is county mine inspector, succeeds James Taylor, of Peoria, who recently tendered to the governor his resignation.

Henry H. Otto, of Wilkes-Barre, has been appointed Division Engineer of the Lackawanna Division of the Lehigh Valley Coal Co., with headquarters at Pittston, to succeed G. P. Troutman, who recently resigned to accept the position of Assistant General Manager of Markle & Co.

OBITUARY

Thomas A. Ritson, a prominent citizen of Steubenville, Ohio, and one of the most experienced mine bosses in that section, died recently at Gill Hospital as the result of an operation. Both in Ohio and West Virginia, he repeatedly carried to a successful conclusion the work of clearing up and putting mines in shape after explosions and floods. It was in his work as a mine boss and expert that he was a valuable man to coal operators.

CONSTRUCTION NEWS

Johnstown, Penn.—A. W. Hoy was recently awarded the contract for building a tipple at the Park Hill Coal Co.'s plant above Conemaugh.

Zanesville, Ohio—The Blue Rock Run Coal Co. has recently started work on a coal mine on the Thornton Olden farm in Harrison Township.

Newport News, Va.—It is expected that the new steel coal pier which is being built at a cost of $1,500,000 will be completed on or shortly after Jan. 1, and will be immediately ready for the dumping of coal. This dock is the largest in the United States, being 1200 ft. long and having a capacity of 40,000 tons of coal daily. It is believed that at least two of the old piers will be abandoned when this one is completed.

Meyersdale, Penn.—A contract has been signed between the Brothers Valley Coal Mining Co. and the Penn Public Service Co. whereby by the middle of March, the former firm's large plant, near Berlin, will be operated by electric power furnished by the Service Co. The Brothers Valley Mines are now operated by electricity, steam and compressed air. The output is expected to be increased and at a less proportionate cost.

St. Louis, Mo.—Work was recently started on the $2,000,000 coke oven plant, which the Laclede Gas Light Co. will build on a 200-acre tract between South Broadway and the Mississippi River, Klausmann's Grove and Jefferson Barracks. The plant will have 56 ovens with a daily producing capacity of 750 tons. The coke will be made from Pennsylvania bituminous coal, brought to St. Louis on barges by way of the Ohio and Mississippi Rivers.

Millsboro, Penn.—Announcement has been made that Millsboro, which is in the center of the predicted coal and coke development of Washington and Greene counties is to have a new industry in the form of a powder and explosive plant of the Lowintite Explosive Manufacturing Co. A location has been secured upon the farm of James Allen and the plant will be in close proximity to the extensive coal fields which are just beginning development. It is planned to deliver powder by motor trucks within a radius of 20 miles.

Barbourville, Ky.—It is reported that the Louisville & Nashville is considering estimates on the cost of double-tracking its Cumberland Valley division, the additional trackage being necessary on account of the heavy coal traffic from the Harlan county field. The Harlan mines are now averaging an output of 160 cars a day, and this production will be largely increased in the future. It is said that about 600 cars of coal a day from the several southeastern Kentucky fields pass Barbourville for Corbin, Ky., where they are transferred for movement north or south. This heavy movement has become so difficult to handle that it is interferring with the passenger traffic, and the company has come to the conclusion that double-tracking is the only solution of the problem.

Norton, Va.—An extension by the Southern Ry. of its line now terminating at Norton, Va., operated by the Interstate Railway Co., is the latest railroad project announced for the purpose of giving the eastern Kentucky coal field an outlet to the Atlantic coast. The extension which seems to have been definitely approved, will pass through the headwaters of Guests' River and the Pound River, both of which are important coal and timber districts of Wise County, and thence through Pound Gap into Kentucky, a total distance of about 25 miles. It is stated that the construction of the road will be started within the next 60 days. Other projects which have been discussed recently are still on the program, and it seems certain that several new lines will be completed into eastern Kentucky during the coming year.

NEW INCORPORATIONS

Cincinnati, Ohio—The Murdock Coal Co. has applied for permission to increase its capital stock from $10,000 to $20,000.

Scranton, Penn.—The Plymouth Red Ash Coal Co. was recently incorporated under the laws of Pennsylvania with a capital stock of $10,000.

Hazard, Ky.—The Eastern Kentucky Coal Co. has been organized with a capital stock of $250,000 to develop 40,000 acres of coal land in Perry County.

Rockford, Ill.—Samuel G. Duran, of Philadelphia, Fayette S. Munroe, of Harlem Park, Ill., and others have formed a company to build a steam railroad to tap the coal field of Kankakee County.

St. Louis, Mo.—A license to do business in Missouri has been granted to the Staunton Coal Co. organized under the laws of the State of Illinois with a capital stock of $300,000 and offices in St. Louis.

Richmond, Va.—The Himyar Coal Corporation has been organized in Richmond with a capital stock of from $25,000 to $50,000. T. L. Young is president, L. C. Derrickson, secretary and treasurer, both of Lexington, Ky.

Herrin, Ill.—The Herrin Coal Co. has been chartered with a capital of $4500 to engage in a mining, mercantile and manufacturing business. The incorporators are Paul B. Herrin, John Herrin, H. P. LaMaster and A. E. Elles.

Frankfort, Ky.—Articles of incorporation for the Coal, Oil and Gas Co., of St. Matthews with a capital stock of $60,000 have been recently filed. The incorporators are A. J. Fraley, of Wrigley, L. M. Render, Louisville, and John P. Haswell, Jr., of Hardingsburg.

Joplin, Mo.—The Melva Mining and Milling Co. of Joplin has filed articles of incorporation with a capital stock of $30,000. The principal stockholders are L. M. McGuire of Kansas City, J. W. Commerford, of Joplin, S. A. Kellar, of Joplin, Mark Ramsey, of Joplin.

Charleston, W. Va.—The Profound Number Five Coal and Mining Co. has been organized at St. Albans for the purpose of operating coal mines in Boone County. The capital stock is $60,000 and the incorporators are J. F. Thompson, Dr. A. E. Winters, R. M. Figman, W. B. Lauder, W. H. Lauder and I. J. Williams.

Toronto, Canada—An adjourned special general meeting of the shareholders of the Intercolonial Coal Mining Co., Ltd., was held at Montreal on Dec. 18. The Board of Directors reported that satisfactory financial arrangements had been effected for carrying on the operations of the company without the necessity of issuing any further securities at present. D. Forbes Augus having resigned the presidency, Charles Fergie, M. E., was elected president and managing director.

INDUSTRIAL NEWS

Wilkes-Barre, Penn.—The old Enterprise mine in Plains Township, which was abandoned on Nov. 18, 1889, will shortly be reopened.

Pottsville, Penn.—Engineers have recently made surveys at the Ellangowan and Suffolk collieries with the intention of taking a thousand feet of coal from the former to the latter's opening.

Indiana, Penn.—A $60,000 coal deal between the Operators Coal Co., of Johnstown, and the residents of West Wheatfield Township, has just been consummated. Work will be started shortly on the opening of a mine with New Florence as the center of operation.

Fairmont, W. Va.—A team from the Consolidation Coal Co. and one from the Jamison Coal & Coke Co. have finished the work given by those in charge of Mine Rescue Car No. 6, of the U. S. Bureau of Mines, now located at Chiefton. Both teams showed much natural aptitude for the work.

Birmingham, Ala.—The Pratt Consolidated Coal Co. will furnish the New Orleans Street Railway, Light & Power Co. with its coal for the coming year. This contract calls for 125,000 tons, and the needs will likely go to 175,000 tons. Shipments will be made daily beginning the first of January.

Briceville, Tenn.—The Knoxville Iron Co. offers for sale as a whole for cash its Cross Mountain Mine, at Briceville, Anderson County, Tenn., and all real estate appertaining thereto or used in connection therewith including houses, commisaries, mules, cars, chutes, engines, boilers, stables, feed and all other equipment.

Charleston, W. Va.—Governor Hatfield will likely be called upon to settle a controversy existing between the Signal Knob Coal Co., of Ansted, and the miners who have been on strike since Sept. 1. The conciliation board failing to reach an agreement on the matter has ordered that the case be presented to the governor for adjustment.

New Orleans, La.—The Alabama & New Orleans Transportation Co. has just launched at its ship yard near New Orleans, the fifth of its steel coal barges. These boats are self-propelling and have a capacity of 1000 tons each. The sixth barge is nearing completion and will be launched in the near future. Several additional barges have been started.

Belvidere, Ill.—The Chicago & Northwestern R.R. is storing coal in the local yards at the rate of five cars per day and will continue to thus accumulate fuel until 10,000 tons are in storage. This action is taken by the transportation company as a precaution against a possible strike of the miners next spring when new contracts are to be drawn up.

Pittsburgh, Penn.—With the close of navigation on the Great Lakes, railroads operating to ports on Lake Erie having little use for their coal and ore cars are trying to induce the iron mills in Ohio and Pennsylvania to make use of them. Unfortunately the need of cars for immediate shipping purposes for this class of traffic has lessened considerably and it is not easy to obtain such freight.

Charleston, W. Va.—Antonio Cirvallo and others who sued the Cabin Creek Consolidated Coal Co. for $15,000 for alleged injuries in being ejected from company houses during the recent strike in that section, lost their case recently. It was alleged that the wife of an Italian was mistreated and that the company had employed a number of guards to eject the miners. It took the jury but a short time to reach the verdict of "not guilty."

Pomeroy, Ohio—The leasehold and all the equipment of the Hartford Coal & Mining Co. was recently sold by the deputy sheriff to satisfy a judgment in favor of the Pomeroy National Bank for $5,577.50. There were three other judgments outstanding against the company, which run the total claims up to about $6000. The property and leasehold were offered as a whole and were purchased by E. D. and Mrs. Jennie M. Newton for the sum of $6500.

Columbus, Ohio—According to State Senator J. B. Dollison, of Logan, Ohio, practically every coal mine in the southern part of the state has closed because the operators are unable to compete with those of West Virginia by reason of discriminatory freight rates. The senator estimates that 10,000 men are out of employment. The State Public Utilities Committee has been ordered to investigate the charge of alleged discrimination in freights.

Pineville, Ky.—Announcement has been recently made that a deal has been consummated between the Continental Coal Corporation and certain Tennessee parties by which the latter have taken over three coal mines at Four Mile, on Jellico Creek. More than $1,000,000 is involved in the deal. The new corporation will be known as the Four Mile Coal Co. and W. M. Woods, who has operated mines in this district, will be the manager of the new concern.

Charleston, W. Va.—Photographs and motion pictures are being made to play a part in the educational system now being developed by the coal operators in West Virginia to lessen the number of mine accidents, increase efficiency at the mines and add to the earning capacity of the miners. Although this is by no means a new idea, it is said that in no other way have the companies been able to bring home to the men the danger and the need of caution.

Charleston, W. Va.—The report of Earle Henry, Chief of the Bureau of Mines, recently made public, shows one death from accident for every 700,000 tons of coal mined in six of the coal-producing counties of West Virginia during the first eleven months of 1913. In ten coal counties, there were no deaths from mine accidents. Total deaths in the mines of the state number 309 compared with 340 for the same period last year, the number of miners employed being increased approximately 5000.

Helena, Mont.—The Montana State Railroad Commission has started to investigate the coal rates charged by the Great Northern R.R. from the Bear Creek and Roundup coal districts to the various cities of that state. The first hearing will be held at Billings on Jan. 6. The investigation is started by the commission on its own motion, because of the complaints it has received from residents of the state who desire to use Montana coal, but on account of the excessive rates, are forced to use either Canadian or Wyoming coal.

Columbus, Ohio—A mine-rescue car, equipped with all the latest appliances for rescuing miners entombed as a result of explosions, cave-ins, or other causes, has just been purchased by the state utilities commission from the Pullman Co., of Chicago, for $3000. The new car is to be delivered just as soon as completed. It will be equipped with a naptha tank, 12 sets of oxygen breathing apparatus, 1 recharging device, 12 extra oxygen cylinders, 40 approved safety lamps and in fact everything necessary to aid the rescuers in saving the lives of entombed miners.

St. Louis, Mo.—The Missouri Supreme Court, in an opinion, declined to rescind the contract under which Miss Anna B. Haldiman, of Versailles, sold to Jos. E. Ryan and C. C. Magenheimer, 5111 acres of land in Morgan County, Mo., for $55 an acre. The two above mentioned plaintiffs and the Morgan County Coal Co. sued to rescind the deed upon the ground that the defendant, through her agents, represented to them that the land was underlaid with coal, and it later developed that it was not. The court directs a verdict of $31,920 for the defendant, claiming the plaintiffs waited too long before suing and before they made tests to determine whether or not the property was underlaid with coal.

Coal Trade Reviews

GENERAL REVIEW

Lower temperatures and holiday curtailment at the mines inject a better tone into hard coal, although market is still heavy. Production may be further restricted. Softening tendency in bituminous continues. Considerable coal on hand and indications point to a slow recovery.

Under the combined influence of a heavily curtailed production over the holiday period, and a sharp decline in temperatures, the general tone of the anthracite trade is improved. Consumers are evidencing some interest in supplies and coal is moving more freely. Conditions are, however, generally unsatisfactory. The customary holiday demand failed utterly to materialize, with the result that the companies still have large stocks on hand, and a further curtailment in mining will be necessary unless the situation is relieved by a long period of cold weather.

There has been little change in the soft coal situation and the trade rounded out the year in poor form. Business is dull and heavy, and in distinct contrast to the summer and early fall. While prices have been tentatively held at some points, the general demand is so light that there has been a perceptible tendency toward a further softening. The holidays have apparently retarded industrial demands. The only encouraging feature is the reduced production over the holiday period, and consequent light shipments to the consuming markets. A comparatively long period of fairly cold weather will be necessary to reëstablish the trade on a firm basis.

Mine operations in the Pittsburgh district were much reduced over the holidays, but general industrial and manufacturing were equally curtailed; while prices are fairly well maintained, there are heavy offerings at the circular and indications point to a further decline. Ohio mines have scarcely worked 50% capacity during the past two weeks, but even under these conditions it has been difficult to place the tonnage. Optimistic reports indicate a greater industrial activity after the first of the year, but more seasonable weather conditions will be required to put the domestic business on a firm basis. Prices are comparatively steady with cutting confined principally to the smaller companies.

Some hard winter weather has injected a slightly better feeling into the Southern trade, although this has not been of sufficient duration yet to be felt in the operating departments. An important increase in the freight rate on coke to the Western smelters created a slight flurry on the part of consumers desirous of accumulating stocks at the old schedule. Colder weather has also stimulated business in the Middle Western market, but with unusually large supplies on hand and a scarcely perceptible demand, the recovery will be slow. The trade has seldom ever reached such a low ebb in the fall of the year, and the only encouraging feature is the fact that prices have shown such a stubborn resistance on the decline. With more cheerful reports regarding general industrial conditions after the first of the year, there is a better tone in the market than for some time.

EASTERN MARKET

NEW YORK

Improved tone to anthracite under more seasonable weather conditions and curtailed mining. Stocks on hand still heavy. Bituminous holding moderately firm in spite of the large amount of coal at tide and a generally light demand.

Anthracite—Reports show that the stocks in the hands of the retail dealers are still heavy, and buying in consequence is light on all of the domestic sizes, but continuance of the cold weather will, no doubt, stimulate buying. The general tone under the improved weather conditions is much better. The storage capacity of most of the local dealers is such that large stocks cannot be carried to advantage, and the business is effected almost directly by temperature changes.

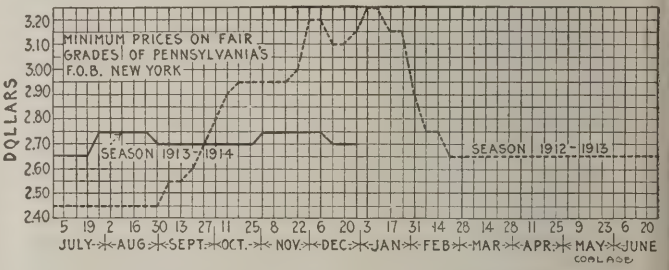
Egg contnues to be the weak size, selling as much as 50c. off circular in some cases where offered alone. Stove and chestnut are moving fairly well at, or about circular prices. Pea continues quite active on the line, but is not strong at tidewater. No. 1 buckwheat is easy, while No. 2 and No. 3, more especially in the high grades, are short; in poorer grades, Schuylkill and Lehigh, are offering freely.

Most of the operations closed down from Christmas eve until Monday. Some endeavored to work Friday and Saturday, but the men did not come out in large numbers and the result was practically no tonnage. Under present conditions, stoppage of this kind is healthy for the business; as there will probably be a recurrance of this situation over the New Year holidays, conditions should be much better after first of the year.

We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	.....	$5.05	
Egg	5.25	$5.25@5.35	5.30	$4.75@5.20
Stove	5.25	5.25@5.40	5.30	5 20@5.35
Chestnut	5.50	5.40@5.50	5.55	5.35@5.45
Pea	3.50	3.40@3.50	3.50	3.35@3.45
Buckwheat	2.75	2.70@2.75	2.45@2.70	2.25@2.70
Rice	2.25	2.25	1.95@2.20	1.80@2.20
Barley	1.75	1.60@1.75	1.70	1.40@1.70

Bituminous—The soft-coal situation remains practically the same. There is a considerable amount of coal on hand at New York loading ports, but prices have not changed materially even in the face of the light demand. The general embago on shipments to South Amboy was lifted 24 hr. after it had been in effect, and only a few of the shippers are now subject to the restriction.



As the mines worked only about three days during Christmas week, and as the celebration continued well into the current week, arrivals at tide are now light. The normal winter weather in the mining regions and colder temperatures in the consuming centers should have a beneficial effect on the situation.

Pending the probable increased demand, due to the approach of the period for negotiations between the miners and operators on the subject of the new scale of wages, to be effective Apr. 1, the only stimulus is likely to come from more severe weather conditions. Quotable prices remain as follows:

West Virginia steam, $2.60@2.75; fair grades of Pennsylvania, $2.70@2.80 good grades of Pennsylvania, $2.80@2.90; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.

PHILADELPHIA

Anthracite fails to show any improvement in spite of curtailed mining and more seasonable weather. Large stocks still on hand and further curtailment in production seems probable.

Despite the fact that there has been curtailed mining, and some more seasonable weather the expected increased demand for coal has not materialized. It is true that the enforced reduction in the output has taken care of some surplus that had accumulated, but it was not found necessary to dip into stocks on the ground. Anthracite men are at a loss to explain the slump in the market, particularly at this season of the year. It is understood that many of the companies still have large stocks of pea coal on hand which have usually disappeared by this time in normal years.

It is certainly a fact that within the last ten years, no such experience has been undergone as characterize conditions now. Even stove coal has become easy, in the face of reduced output. Unless there is a continuous spell of cold weather for at least a month, conditions are in no way likely

to improve. The dealers in general seem to have ample supplies of all sizes of coal, many of them complaining that their stocks hardly give them a chance to move around. The advance in prices effective about the first of December, still continue to be generally observed by the retail trade. Further curtailment of mining is likely, if conditions do not improve in the near future.

Bituminous trade still continues to hold forth no promise, and good coals are being offered at prices that hardly show a profit for the mining. Large quantities are still coming to market, and are practically forced on the consumer by prices that they can hardly resist. It looks as though the same conditions that will add a little snap to the anthracite, will stir up things in the bituminous as well, and until that time comes, no improvement is looked for.

BALTIMORE, MD.

Year closes in dull form. Mine production cut due to holidays. Prices are still uncertain, and the demand light. Colder weather helps anthracite trade.

Soft coal interests rounded out the last week of the year 1913 in rather dull form. The state of the trade was a distinct contract to the busy period during the summer and the early fall, which contributed to make the year a successful one as a whole. The holidays cut heavily into mine production, Christmas week being light in all regions. This was rather welcomed all along the line, however, in view of accumulations that have begun to show up.

Prices are fluctuating badly, as was the case last week. Slack has taken a new slump, and was offering in West Virginia as low as 65 and 70c. Gas run-of-mine was around 80c. and three-quarter at 85c. to the trade. Best Georges Creek could be bought at about $1.50, and other fine Pennsylvania coals that were selling a few weeks ago at $1.40 to $1.45 are offering at $1.25. Demand continues light, the holiday season having apparently still farther retarded the industrial situation generally.

Coke is heavy, Connellsville furnace selling down to $1.85 in some instances, and West Virginia furnace 10 to 15c. off that low price.

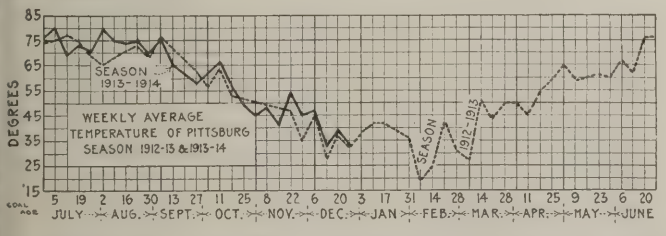
A number of foreign loadings were recorded the last month of the year, and it is expected that the export figures will run about 200,000 tons in excess of those of 1912.

CENTRAL STATES

PITTSBURGH, PENN.

Coal demand light and prices somewhat unsteady; mine operations reduced on account of the holidays. Connellsville furnace coke stronger than expected, with some sales for 1914 at $2. Foundry coke slightly easier.

Bituminous—Mine operations were at a reduced rate last week, on account of the holiday celebration, and probably less than 50% of the full tonnage was shipped, against a rate of about 60% maintained before the holiday interruption. Demand from manufacturers has been particularly light in the aggregate as a great many mills closed over the holidays and domestic demand has been light except for a little spurt in the past two or three days. Prices are fairly well maintained, but there are heavy offerings at the regular level, which we continue to quote as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.



Connellsville Coke—The furnace coke market is doing much better than expected. The offerings of coke at less than the $2 price asked by a majority of operators proves insufficient for the demand, partly because a considerable portion of the lower priced material is not altogether up to standard in quality, and several purchases have been made at the full $2 figure, though as a rule for only January or three months. However, one operator is refusing to sell beyond March at the figure, using $2.10 for second quarter. In the past week prospects have been that the cheap coke would all be cleaned up and the market firmly established at $2, but latest information is that Corrigan, McKinney & Co., whose requirements for their six blast furnaces amount to about 75,000 tons a month, have decided to blow out their five active stacks at once, presumably because they are unwilling to pay prices asked for coke. Foundry coke has softened about 10c. We quote: Prompt furnace, $1.75@1.85; contract furnace, $1.90@2; prompt foundry, $2.40@2.65; contract foundry, $2.40@2.65, per ton at ovens.

The "Courier" report production in the Connellsville and lower Connellsville region in the week ended Dec. 20 at 284,964 tons, a decrease of 22,826 tons, and shipments at 278,355 tons, a decrease of 27,490 tons.

BUFFALO, N. Y.

Better coal weather, but still no great activity. Reports show that dealers and consumers are overstocked with both anthracite and bituminous. Slight move in coke. Christmas shutdown will relieve the tension in the market.

Bituminous—There is a showing of more seasonable weather and the feeling is better, but dealers find that there is such an overstock of all sorts of coal that it will take a long time to establish a really firm basis. The bituminous trade has been pushed so much more actively than conditions justified that buyers have no room to store more coal. This is reported from all sides.

There is not much coal being produced now and it is estimated that there will be a shutdown in all the Pennsylvania districts that should amount to a full week; this will do something toward relieving the tension. Shippers now say that there is nothing that will help the situation now but weather severe enough to increase the consumption very materially.

There is not much unsold coal on track here and some jobbers report the filling of good-sized orders. While the railroads are not taking coal in large amounts some of the mines are able to keep going on railroad orders alone. The bituminous market is at least no weaker than it was, the basis remaining as before.

Coke—There is a report from Connellsville that the situation has improved a trifle in the past week. The demand is somewhat heavier and shippers are refusing to take long-time contracts. This is the first indication of improvement in coke for a long time and it is to be hoped that it will continue. The prices are on a basis of $4.60 for 72-hr. Connellsville foundry.

Anthracite—There is a slight stir in domestic sizes of anthracite and if cool weather should continue the market would right itself soon. Still some of the shippers report considerable amounts on track which they must dispose of to avoid demurrage. The surplus that comes here can go into lake vessels for the winter, but the shipping agents much prefer to sell it now, at the higher prices. After Feb. 1 anthracite is to be placed completely on the demurrage list; the practice of allowing it to stand on track indefinitely in case it is waiting for reconsignment will not be permitted any longer. It is hard to understand why such coal has ever been exempted. Four or five lake cargoes for winter storage have so far been loaded, all by a single shipper, with more tonnage under charter.

COLUMBUS, OHIO

Combination of the holiday season and continued mild weather has made trade quiet. Dealers in all sections are over-supplied and domestic trade is dull. Let-up in steam business and cessation of lake shipments have affected the trade in all districts.

Many operators in Ohio closed their mines the day before Christmas for the remainder of the week. Others, who tried to operate, were generally without orders and the production was at a low point. In the Hocking Valley field the output is estimated at 40 per cent. and the same percentage is reported from the Pomeroy Bend district. In eastern Ohio there was also a scarcity of orders and 35 per cent. will cover the production. The other fields produced only a small part of the usual tonnage.

Prices have remained rather firm at the levels which have prevailed for some time. The larger operators are not disposed to cut quotations below the circular but the smaller fellows are shading prices and as a result the coal that is moving, outside of contracts, is at lower figures than the circular.

Stopping of many manufacturing enterprises during the holiday season together with the general slow-up in business has affected the steam trade adversely. Railroads are not taking much fuel at this time because of the small movement. It is believed there will be an improvement in business soon as many plants may resume operations after the holiday season.

Retail trade is slow because of the continued unfavorable weather. There is a good demand for some fancy grades but this will probably be only temporary unless the weather becomes more favorable. Bins are full and most of the large users have laid in their supply of fuel for the winter. The market is now entirely at the mercy of the weather.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.85 @ 1.75	.....	$2.00 @ 1.85	$1.70 @ 1.60
3-4 inch	1.65 @ 1.60	$1.20 @ 1.15	1.80 @ 1.70	1.50 @ 1.45
Nut	1.40 @ 1.30	.....	1.65 @ 1.55	1.40 @ 1.30
Mine-run	1.40 @ 1.30	1.10 @ 1.05	1.30 @ 1.25	1.40 @ 1.30
Nut, pea and slack	0.80 @ 0.75	.....	0.90 @ 0.85	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	0.90 @ 0.80	0.80 @ 0.75	0.70 @ 0.65

DETROIT, MICH.

Some activity in domestics but trade generally quiet. Steam consumers out of the market. Operators holding prices moderately firm.

Bituminous—A number of manufacturers have closed down, while others are running on short time so that steam business is at a minimum. Consumers are showing no disposition to accumulate surplus stocks while in some instances consignments arriving on contracts are being refused.

Some improvement is noticeable in domestic grades, but stocks are large and generally speaking dealers are prepared for almost any emergency that may arise. Operators and jobbers are making determined effort to maintain circular quotations, but prices are unsteady on all grades. Smaller companies are showing a tendency to force business by cutting prices and while nominal quotations are: $1.85@$2 on the Hocking domestic lump, with Pomeroy at $2.15@2.25, and Kanawha $1.75, any of these grades can usually be had for prompt shipment at $1.40.

The market is quotable on the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump	$1.75	....	$2.00	....	....	$2.50	$2.50
Egg	1.75	....	2.00	....	....	2.50	2.50
Nut	1.10	....	1.15	....	....	....	....
Steam lump	1.20	....	....	....	....	....	....
¾-in. lump	1.10	$1.10	1.10	$1.10	$1.10	....	....
Mine-run	1.00	1.00	1.00	1.10	1.10	1.40	....
Slack	0.85	0.85	0.65	0.80	0.75	....	....

Anthracite—Consumers all appear to be over-stocked on hard coal and demand has ceased entirely. The trade is marking time pending the arrival of more continued cold weather.

LOUISVILLE, KY.

Some hard winter weather has injected a better feeling into the trade. Effects not yet felt in the operating departments which are under curtailed production because of the holidays.

Christmas brought a pronounced cold snap, which made people realize that winter had arrived. A good deal of snow fell, accompanied now and then by a freezing rain, and the weather has held well since, so that the trade is looking forward confidently to some real business from now on.

As yet the demand expected to result from the improved weather conditions has not materialized, which is just as well considering the usual holiday lay-off at the mines; little coal has moved of late, so that the market condition fitted in nicely with the small supplies available. The relatively light demand reported by the retail trade indicates that the stocks laid in early in the season are, in most instances, still on hand. This will hold up the demand for a few days, but the trade is bound to feel the effects of the improved consumption shortly.

Domestic prices have shown a stiffer tendency as a result of better prospects for business, quotations for January delivery of good Eastern Kentucky coal being $2.25 for block, $2 for lump and $1.75 for egg. The steam market is in a rather anomalous state, due largely to the dealers themselves. The low production of the prepared grades has kept down the amount of screenings available, which has maintained prices but in spite of this some dealers have recently shown signs of making concessions. This condition will probably disappear, however, with a more active movement of domestic, and a continued upward tendency on both sides of the market may be expected.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM, ALA.

Little change in the coal market. Furnace coke somewhat more active with larger shipments. Pig iron quiet, though price holding firm at $11. Car supply shows improvement.

The coal markets, both steam and domestic, show little change over last week. There is small demand for either grade, though lump coal has slightly improved. The usual holiday business did not materalize, which was a disappointment to the operators; ordinarily the mines are rushed to full capacity during this time, and while a few companies had orders for extra billing, the operators as a whole received no benefit. A good many of the mines are closed down for a few days, the producers taking advantage of the quiet market and not asking their men to report back for work until Dec. 29.

Due to the advance of $2 per ton on coke to Western points, which goes into effect on Jan. 1, many of the Western smelters have placed orders for a good tonnage of furnace coke for shipments prior to that date, and this has greatly assisted in keeping the coke market in a satisfactory condition. Foundry coke is quiet, and some producers are offering 72-hr. foundry as low as $3.75. The regular price is from $4 to $4.25 per ton. No large sales of pig iron are being made, though many small orders for prompt shipment are coming in. The price is holding up on the basis of $11 for 2F f.o.b. Birmingham.

Due to the quiet trade, and the fact that many of the mines closed down for a few days during the holidays, the car situation shows some improvement.

INDIANAPOLIS

Little change in situation. Mild weather continued almost to the end of December. Sentiment more cheerful at coming of January. Prices unchanged.

The month of December was an unusual one in its mildness and it is seldom that so little coal is necessary. The one comforting condition to the trade was that prices held up. It seemed useless to cut them for buyers simply did not need the coal and were afraid to take on more, even at low figures. This was not true of screenings at first and they were practically given away but the slow demand for the larger coal finally compelled the closing of mines; then screenings and other steam grades became scarce and prices were pulled back to somewhere near normal.

As railroads were retrenching near the end of the year, so that their annual reports might make as good showing as possible, there may be improvement in the service from now on. Under the urgings of the Indiana Public Service Commission, the railroads have succeeded in relieving the congestion at important points and the situation is quite favorable as the new year starts. Industrial conditions are not bad locally and an optimistic tendency is noticed since the currency question was settled.

The year 1913 will be easily remembered by coal men because of the unparalleled floods in March that carried away much coal, shut down factories and filled mines with water. In this city, two memorable strikes occurred and few of the coal men will forget the summer weather that continued up to Christmas.

CHICAGO

Return of lower temperatures brightens outlook for coal dealers. Expected that recovery from dull conditions will be slow. Little demand for lump coal and screenings market is not strong. Small amount of anthracite being disposed of and few sales of Hocking. Smokeless dealers report slack business. Coke market slow.

Return of colder weather has brought Chicago coal dealers hope for greater briskness in business, although it is expected that the recovery will be slow. Conditions in nearly all lines continue unsatisfactory.

The demand for lump coal is scarcely noticeable, all dealers having their bins well stocked; few operators are producing much in the larger sizes. There are unusually large supplies of anthracite in the hands of the dealers and the demand continues light. Little of this coal is being forwarded from the docks to the interior. Standard shippers of Hocking are maintaining the circular price of $2 a ton with few sales being recorded. Other producers have offered $1.50 on shipments direct from the mines, but this inducement has not resulted in materially increasing sales. Some free coal up to car service has been sold as low as $1.40.

Carterville operators report that conditions are stationary. Some of them are running their mines on a steam-coal basis or have closed down where no orders for the output are on hand. In the Springfield market most of the domestic coal is being held at $1.50. Many of these producers are closing down rather than ship on consignment. Some improvement has been noted in the demand for screenings.

Weakness prevails in the smokeless lump and egg market and some producers will ship a car of lump and egg on a mine-run order rather than shave the price. There is better call for the mine-run as there is a continuous demand from apartment house owners. Standard shippers have kept the

ine-run price at $1.40, while some thin vein and off-grade al has been disposed of at $1.25. The market for screenings would be better if factories were not running on short me.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W. Va.
omestic lump	$2.32	$2.45@2.80	$2.27	
eam lump	1.97		1.97	
gg		2.45@2.80		$4.30
ine-run	1.87	2.30	1.87	3.45
reenings	1.42	1 75@1.85	1.37	

Quotations on Harrisburg coal are: Domestic lump and gg, $2.55@2.85; steam lump, $2.25; mine-run, $2.25; screenings, $1.75@1.85; No. 1, nut, $2.55@2.85; No. 2, nut, $2.55.

Carterville prices are: Lump, egg and No. 1 washed, $2.55@85; No. 2 washed, $2.55.

Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; yproduct, egg, stove and nut, $4.90@5; gas house, $4.75@85.

ST. LOUIS, MO.

Indications point to an advancing market. Weather colder ith good future prospects for domestic inquiries. Steam zes holding up good. On anthracite, coke and smokeless the arket is slow and soft.

A little colder weather caused a toning up of the mar-t during the last days of the year. The first snow came hristmas Day, and while it was only light, it seemed to have ie effect of helping business along, and the dealers received ders; while they were not large ones, they were still sufficient to keep things moving, and there has been a slight mand for all grades of domestic coal. It has not made ie market as good as the operator would like, but coal is oving which is something that could not be said for it for ie past two or three weeks.

There seems to be a little demand right now for anthracite, and strange to say it is somewhat hard to get, although it a week or ten days ago the market was demoralized. oke is heavy, with no chance of picking up, and the same pplies in a way to smokeless.

In the local coals, screenings from both the Carterville and andard fields are still holding up, the former at 60 to 65c. id the latter at 45 to 50c. the mines. The nut sizes are agging; No. 1 raw has gone as low as $1, under demurge, and No. 2 at 90c., but the general market is considably better.

Indications are that after the first of the year there will a stiffening up on all sizes, and operators are not selling uch in advance.

The prevailing market is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
in. lump				$0.95@1.10
in. lump			$1.40	
in. lump	$1.25 @ 1.50	$2.25	1.50	1.15@1.25
mp and egg	1.85 @ 2.15			
o. 1 nut	1.15 @ 1.40			
reenings	0.40 @ 0.50			
ine-run	1.10 @ 1.20			
o. 1 washed nut	1.75 @ 1.90	2.25	1.60	
o. 2 washed nut	1.35 @ 1.50		1.25	
o. 3 washed nut	1.15			
o. 4 washed nut	1.05			
o. 5 washed nut	0.50			

Franklin County and Carterville 6-in. lump and 3x6 egg, .25@1.50; No. 1 nut, $1.15@1.40.

Quotations on anthracite are: Chestnut, $7.54; egg and ove, $7.28; grate, $7.02.

Smokeless lump and egg is quotable at $4.75@5.

Gas house coke is $4.85@5 with byproduct $5 to 5.15.

KANSAS CITY, MO.

Little activity over the holidays. Colder weather depleting stocks and outlook is brighter. Mine operations heavily rtailed.

Though the past week saw little activity in mining circles Kansas and Missouri, the prospects are now regarded as ing a decided improvement over those of the last couple months. The weather is more favorable and dealers' ocks are being rapidly depleted. This heavier consumption expected to affect wholesalers, early in the near year, alers apparently having waited for the turn of the year fore renewing their stocks. Few mines have worked more an half time during the holidays, while many operated only about one-fourth of their capacity.

The market has held steady but an advance is likely, if e situation continues to improve. Residents of Missouri id Kansas have practically abandoned their efforts to burn as for fuel, and coal will be used almost exclusively, both for domestic and commercial use during the winter, in marked contrast to the conditions in previous years.

PORTLAND, ORE.

No change in market conditions although demand is a little stronger due to the colder weather.

There has been no material change in the coal market here excepting perhaps that the demand is a little stronger with the advance of winter. So far little really cold weather has been experienced here as yet, but in anticipation of what may follow soon after the first of the year, supplies are being laid in to last through the colder months, January and February.

The Monarch Coal Company which operates a new mine in the vicinity of Centralia is now shipping coal into this territory. It has established an office and the retail prices are: Lump, $6; egg, $5.75; nut, $5.50.

PRODUCTION AND TRANSPORTATION STATISTICS

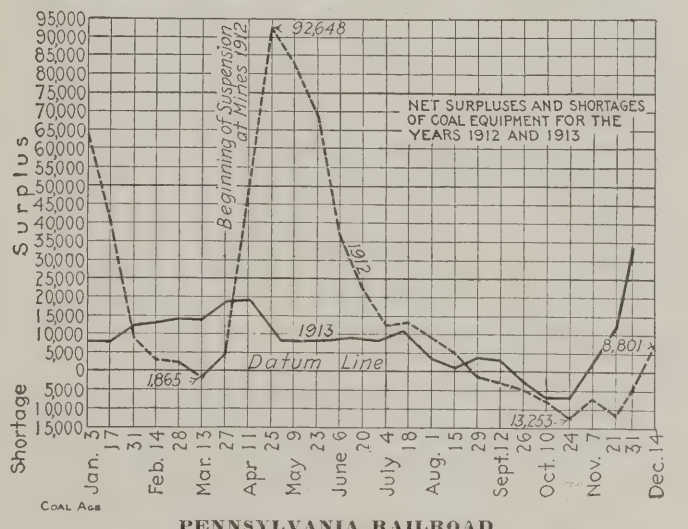
THE CAR SITUATION

American Ry Association reports surpluses and shortages of coal equipment for two weeks ended Dec. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	175	0	**175**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	2,062	0	**2,062**
Ohio; Indiana; Michigan; Western Pennsylvania	18,201	0	**18,201**
West Virginia, Virginia, North & South Carolina	689	2,124	1,435
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	3,824	31	**3,793**
Iowa, Illinois, Wis., Minn.; North & South Dakota	5,878	2	**5,876**
Montana, Wyoming, Nebraska	118	18	**100**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	1,882	50	**1,832**
Texas, Louisiana, New Mexico	420	23	**397**
Oregon, Idaho, California, Arizona	3,186	47	**3,139**
Canadian Lines	0	0	0
Total	36,435	2,295	**34,140**

	Aug. 15	Sept. 1	Sept. 15	Oct. 1	Oct. 15	Nov. 1	Nov. 15	Dec. 1
Surplus	8,293	8,689	8,714	7,953	6,014	6,720	10,520	17,621
Shortage	7,038	5,209	7,731	10,393	12,502	12,595	8,477	5,095
Net*	**1,255**	**3,480**	**983**	2,440	6,488	5,875	**2,043**	**12,526**

***Bold face** type indicates a surplus.



PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for November and first eleven months of this year and last year in short tons:

	November		Eleven Months	
	1913	1912	1913	1912
Anthracite	987,487	916,914	9,699,210	9,275,631
Bituminous	4,509,375	3,934,876	47,171,538	42,162,485
Coke	999,500	1,245,500	13,011,863	12,128,463
Total	6,496,362	6,097,290	69,882,611	63,566,579

BALTIMORE & OHIO

The following is a comparative statement of the coal and coke movement over this road for November and the first eleven months of this year and last year:

	November		Eleven Months	
	1913	1912	1913	1912
Coal	2,939,975	2,864,734	32,091,742	29,140,169
Coke	343,387	435,001	4,350,800	4,318,122
Total	3,283,362	3,299,735	36,442,542	33,458,291

COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during October and the first ten months of this year in comparison to last year, in short tons:

	October		Ten Months	
Anthracite	1912	1913	1912	1913
Baltimore & Ohio[1]	184,252	166,214	1,267,222	1,226,938
Chesapeake & Ohio[1]	1,440	1,645	20,711	14,639
Erie[3]	761,360	794,528	6,202,725	7,283,826
Pennsylvania[1 3]	970,880	1,046,703	8,358,717	8,711,723
Virginia[2 1]	77	50	97	909
Total 5 roads	1,918,009	2,009,140	15,849,472	17,238,035
Bituminous				
Baltimore & Ohio[1]	3,038,407	3,401,618	28,431,931	30,652,147
Buffalo, Roch. & P.[1 2]	812,418	985,223	6,827,271	8,037,988
Buffalo & Susq.[1 2]	157,493	168,148	1,246,422	1,507,341
Chesapeake & Ohio[1]	1,362,680	1,570,072	14,480,895	14,188,105
Erie[3]	14,609	13,298	220,070	319,764
Hunt. & Br'd T. Mt[1 2]	129,111	127,898	1,011,737	1,135,294
New York Central	814,144	889,153	6,667,903	7,658,720
Norfolk & Western[1 2]	1,939,772	2,098,241	19,048,864	20,037,498
Pennsylvania[1 3]	4,113,550	4,887,840	38,227,609	42,662,163
Pitts. & Lake Erie[1 2]	1,158,203	1,144,112	9,527,976	10,812,407
Pitts. Shaw. & North[1 2]	218,387	270,174	1,619,271	2,307,343
Virginia[1 2]	338,518	476,482	2,950,100	3,768,423
Western Maryland	207,829	248,858	2,322,620	2,459,414
Total 13 roads	14,305,121	16,281,117	132,582,669	145,546,607
Coke				
Baltimore & Ohio[1]	433,547	388,337	3,932,524	3,667,855
Buffalo, Roch. & P[1 2]	57,673	32,059	442,220	445,162
Buffalo & Susq.[1 2]	29,184	30,965	227,664	255,503
Chesapeake & Ohio[1]	25,060	33,035	213,087	299,921
New York Central	7,812	.....	72,937	36,207
Norfolk & Western[1 2]	131,007	111,020	1,197,943	1,287,622
Pennsylvania[1 3]	1,211,620	1,152,950	10,882,963	12,012,363
Pitts. & Lake Erie[1 2]	587,638	567,661	5,171,735	5,750,552
Pitts. Shaw & North[1 2]	.....	.....	5,155	9,383
Western Maryland	5,986	4,892	57,624	64,115
Total 10 roads	2,489,527	2,320,919	22,203,852	23,828,783
Coal and Coke, 13 Roads				
January			16,421,839	18,936,646
February			17,787,331	17,546,496
March			19,483,025	17,631,345
April			13,429,367	16,850,690
May			15,635,568	18,986,796
June			16,702,153	18,580,363
July			16,635,448	18,704,710
August			18,396,247	19,718,856
September			17,432,358	19,046,247
October			18,712,657	20,611,176
November			17,815,767	.....
December			17,929,632	.....
Total, 12 months			206,381,392	

[1] Includes coal from connecting lines.
[2] Includes company's coal.
[3] Does not include company's coal hauled free.

Note.—The Southern Railway hauled 351,220 short tons of coal during September, 1913, and 3,127,282 short tons during the nine months ending September 30, 1913.

COAL FREIGHT DECISIONS

Suspension Docket No. 181—Rates on coal to Milwaukee and other Wisconsin points.

The holding of the original opinion, 27 I. C. C., 223, as to the maintenance of routes and rates for the transportation of soft coal from certain West Virginia and Kentucky mines to points on the west shore of Lake Michigan, when destined to points beyond, is affirmed. An advance of 10c. per ton in the proportional rates here in question is likewise permitted.

FOREIGN MARKETS

GREAT BRITAIN

Dec. 19—The coal market continues strong in tone with large coals scarce. Quotations are approximately as follows:

Best Welsh steam	$4.98@5.16	Best Monmouthshires	$4.44@4.50
Best seconds	4.80@4.92	Seconds	4.14@4.26
Seconds	4.56@4.74	Best Cardiff smalls	2.64@2.70
Best dry coals	4.56@4.80	Seconds	2.52@2.64

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, and for cash in 30 days.

RUSSIA

The imports of coal into Russia during the first half of 1913 totaled 2,557,000 tons, as against 1,860,000 tons in the first half of 1912; coke imports amounted to 402,000 tons, as against 309,000 tons.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Dec. 27:

	Week's Range			Year's Range	
Stocks	High	Low	Last	High	Low
American Coal Products	..	..	80	87	80
American Coal Products Pref	..	..	105	109¼	102
Colorado Fuel & Iron	29⅜	28	29	41½	24½
Colorado Fuel & Iron Pref	....	....	155	155	150
Consolidation Coal of Maryland	....	....	102½	102¼	102¼
Lehigh Valley Coal Sales	190	175	175	....	....
Island Creek Coal Com	49½	47	49	53½	47
Island Creek Coal Pref	83½	83¼	83½	85	80
Pittsburgh Coal	19½	18⅜	18⅜	24⅜	14¼
Pittsburgh Coal Pref	87½	86⅛	87½	95	73
Pond Creek	19⅜	18⅝	19⅜	23¾	16¼
Reading	171¾	164½	169¼	171	151⅛
Reading 1st Pref	86	86	86	92½	82½
Reading 2nd Pref	92½	87⅞	91½	95	84
Virginia Iron, Coal & Coke	..	..	36	54	36

	Closing		Week's Range or Last Sale		Year's Range	
Bonds	Bid	Asked				
Colo. F. & I. gen. s.f.g. 5s	90	93	91½	Dec. '13	90	99½
Colo. F. & I. gen. 6s	102	106½	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	..	78	75	76	75	85
Cons. Ind. Coal Me. 1st 5s	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s	..	92	87¾	87¾	87	87¾
Gr. Riv. Coal & C. 1st g 6s	..	..	102⅝	April '06	..	..
K. & H. C. & C. 1st s f g 5s	92½	..	92¼	Dec. '13	91	98
Pocah. Con. Coll. 1st s f 5s	..	88½	86	Oct. '13	85	87½
St. L. Rky. Mt. & Pac. 1st 5s	76	77	76	Dec. '13	73	80½
Tenn. Coal gen. 5s	96	97½	96	Dec. '13	96	103
Birm. Div. 1st consol. 6s	101½	Sale	100⅜	101½	100⅜	103
Tenn. Div. 1st g 6s	101½	Sale	101½	101½	99	102
Cah. C. M. Co. 1st g 6s	..	..	103	July '13	103	103
Utah Fuel 1st g 5s	..	..	..	....	..	..
Victor Fuel 1st s f 5s	..	84	80	May '13	79¾	80
Va. I. Coal & Coke 1st g 5s	92½	93	92½	Dec. '13	92	98

DIVIDENDS

Delaware, Lackawanna & Western—Regular quarterly dividend of 2½%, payable Jan. 20, to holders of record Jan. 3.

Lehigh Valley Coal Sales Co.—Regular quarterly dividend of $1.25, payable Jan. 20 to holders of record Jan. 2.

Lehigh & Wilkesbarre Coal Co.—Dividend of $3.25, payable Dec. 27 to holders of record Dec. 24.

Nova Scotia Steel & Coal, Ltd.—Regular quarterly of 1½% on the common and 2% on the preferred, payable Jan. 15 to holders of record Dec. 31.

Pittsburgh Coal Co.—Regular quarterly on the preferred of 1¼%, payable Jan. 2 to holders of record Jan. 15.

Island Creek Coal Co.—Earnings of this company in September of last year were at a rate which, if maintained throughout the year, would mean profits of about $900,000 after depreciation, or about $6 on the common stock after the regular 7% preferred had been paid.

Wilkes-Barre Colliery Co.—This company is issuing $500,000 first mortgage, 6% sinking fund gold bonds. Bonds are dated Sept. 1, 1912, and due Sept. 1, 1923, but are redeemable on any interest date at 102 and interest. Bonds are guaranteed by Madeira, Hill & Co.

Canadian Coal & Coke Co.—This company having $15,000,000 capital stock, and an authorized issue of $3,000,000 bonds, has taken over the Western Coal & Coke Co., Pacific Pass Coal Field, St. Albert Collieries, and the Lethbridge Colliery. It is said the new company will issue immediately $3,750,000 preferred stock, about $9,500,000 common stock, and $2,000,000 bonds.

Consolidation Coal Co.—The total assets of this company for the year of 1912 amounted to $62,965,467 as compared with $60,409,468 for the year previous. Capital assets for the same period were $49,274,181 and $46,400,867 respectively. The surplus last year amounted to $1,144,492 which was an increase of $962,171.

Bond County Coal Co. (Illinois)—The recent first mortgage issued by this company will be secured by 12,000 acres of thick vein Illinois coal owned in fee and estimated as containing 84,000,000 tons of recoverable coal. The bonds are guaranteed by the Peabody Coal Co., of New Jersey, which has a net paid in capital, surplus and reserve of $4,028,361.

The Reading Co.—Earnings of this company for October of last year amounted to $4,641,338 which is $148,268 or 3% less than the same period in 1912. This is accounted for by the unusual activity in the trade last fall due to the shortage of some 6,000,000 tons as a result of the suspension in mining early in the year.

Index of Current Coal Literature

We will furnish copy of any article (if in print) for the price quoted. Where no price is quoted, the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

ACCIDENTS AND THEIR PREVENTION

Monthly Statement of Coal-Mine Fatalities in the United States, October, 1913; with Revised Figures for Preceding Months. Albert H. Fay. Bureau of Mines, 1913; 17 pp.

BLASTING, EXPLOSIVES

Method of Tamping for Greater Safety in Blasting. G. Volf. Coll. Engr., December, 1913; ⅓ p. 40c.

BORING AND TUNNELING

Recent German Drilling Practice. (Translation from Zeit. f. das Berg. H. u. Salinenwesen.) Coal Age, Dec. 13, 1913; ¾ p., illus. 10c.

BRIQUETTES

A 40- to 50-Ton Coal-Briquetting Machine. Iron Coal Tr. Rev., Dec. 12, 1913; ⅓ p., illus. 40c.

The Briquetting of Flue Dust in the United States by the Schumacher Process. Felix A. Vogel and A. M. Tweedy. Trans. A. I. M. E., December, 1913; 5½ pp., illus.

COKE

Gas Exhauster for Coke Ovens. Coll. Engr., December, 1913; 1¼ pp., illus. 40c.

Koppers Byproduct Coke Ovens at Llwynpia Colliery. (This plant deals with 2200 tons of coal per week, producing about 1760 tons of coke with the class of coal used.) Iron Coal Tr. Rev., Dec. 5, 1913; 1¼ pp., illus. 40c.

Probable Future of the Connellsville Coke Region. John W. Boileau. Black Diamond, Dec. 6, 1913; 1⅓ pp., illus. 20c.

Selection of Coke Samples for Analyses. (Paper by Fred C. Keighley read before the Coal Min. Inst. of Amer.) Coal Age, Dec. 13, 1913; 1½ pp. 10c.

The Automatic Control of Byproduct Coke Oven Plants. A. Thau. Gas Wld., Dec. 6, 1913; 3 pp., illus. 40c.

The Recovery of Benzol from Coke Oven Gas. Coll. Guard., Dec. 5, 1913; 1¼ pp., illus. 40c.

COMPRESSED AIR

Air Compressors and Compressed Air Machinery. (Chapter IV of series of articles by Robt. L. Streeter.) Eng. Mag., December, 1913; 18½ pp., illus. 35c.

DRAINAGE, PUMPING, ETC.

Centrifugal Pumps. (Paper by A. Temple Thorne read before the Graduate Section of the Northeast Coast Inst. of Engrs. and Shipbuilders, Nov. 15, 1913.) Coll. Guard., Dec. 12, 1913; 1⅓ pp., illus. 40c.

Experience with Pumping Machinery. (Paper by John Brindley read before the So. Staffordshire and Warwickshire Inst. of Min. Engrs.) Coll. Guard., Dec. 19, 1913; 1 p. 40c.

ELECTRICITY

Electricity vs. Steam for Winches. Coal Age, Dec. 27, 1913; 1 p., illus. 10c.

Electric Coal Mining in Central Illinois. (The O'Gara coal mine at Sangamon County, Ill., is now producing from 800 to 1000 tons of coal daily at an average cost of $400 per month for electrical energy.) Elec. Wld., Dec. 13, 1913; 2 pp., illus. 20c.

Electricity in Coal Mining. Geo. R. Wood. Coal Age, Dec. 6, 1913; 1 p. 10c.

Electric Installations in Gaseous Mines. Dr. Alfred Gradenwitz. Coal Age, Dec. 27, 1913; ¾ p. 10c.

Storage Batteries for Mine Locomotives. Wm. Van C. Brandt. Coal Age, Dec. 6, 1913; 1¼ pp. 10c.

Safeguarding Electricity in Mines. (Read by Clyde G. Brehm before the Coal Min. Inst. of Amer.) Coal Age, Dec. 6, 1913; 1¾ pp. 10c.

Testing Transformers for Colliery Work. (Paper read by John Bentham before the Yorkshire Branch of the A. M. E. E.) Iron Coal Tr. Rev., Dec. 5, 1913; 1¾ pp. 40c.

The Electrical Equipment of a Modern Mine. W. R. Jones. Coal Age, Dec. 6, 1913; 2 pp., illus. 10c.

The Use of Electricity in Mines. Clyde G. Brehm. Coal Age, Dec. 6, 1913; 2¾ pp., illus. 10c.

Underground Lighting Transformer. Iron Coal Tr. Rev., Dec. 5, 1913; ⅓ p., illus. 40c.

EXPLOSIONS

Explosions in Mines. (The fifth and abstract of the remainder of the report of the Explosions in Mines Committee.) Coll. Guard., Nov. 21 and 28, 1913; 7½ pp., illus. 80c.

FUEL TESTING

Lignite Coal-Testing Plant. (Reprinted from the Public Service Monthly, Regina, Sask.) Can. Min. Jour., Dec. 12, 1913; ¾ p. 25c.

The Oxidation of Coal and of the Process of Combustion. (Address delivered by Horace C. Porter before the Amer. Chem. Soc. Sept. 9, 1913.) Can. Engr., Dec. 18, 1913; ½ p. 20c.

GENERAL

Bujun Coal Mine in Manchuria. Min. & Sci. Press, Nov. 29, 1913; ¾ p. 20c.

Coal Mining in South Africa. Coll. Guard, Dec. 12, 1913; ½ p. 40c.

Fluctuations in the Coal Trade. (Paper by D. H. Robertson read before the Royal Statistical Society.) Coll. Guard., Dec. 19, 1913; ⅔ p. 40c.

Long-Distance Steam Transmission. F. W. Brady. Coal Age, Dec. 20, 1913; 3¾ pp., illus. 10c.

Nationalization of Mines. (Address by J. Chapman before the Newcastle Economic Soc., Dec. 3, 1913.) Coll. Guard., Dec. 5, 1913; ½ p. 40c.

Purchasing Coal under Specifications. Reginald Trautschold. Coal Age, Dec. 20, 1913; 2 pp. 10c.

Reporting on Coal Properties. (Paper by Frank Haas to have been read at the W. Va. Coal Min. Inst., Dec. 8, 1913.) Coal & Coke Op., Dec. 25, 1913; 2 pp. 20c.

The Zeiss Level. (Paper by J. Husband read before the Midland Inst. of M. C. M. E.) Coll. Guard., Dec. 19, 1913; ⅔ p. 40c.

Swedish Coal Contract Specification. Iron Coal Tr. Rev., Dec. 5, 1913; ½ p. 40c.

The Origin of Coal. W. G. Burroughs. Coll. Engr., December, 1913; 3⅓ pp., illus. 40c.

The Coal Fields and the Coal Industry of Eastern Canada. F. W. Gray. Trans. I. M. E., Vol. XLVI, Part I; 36 pp., illus.

Unwatering the Frisco Mine. N. S. Greensfelder. Colo. School of Mines Mag., December, 1913; 2 pp. 30c.

HOISTING AND HAULAGE

Electric Mine Haulage. E. A. Lof. Coll. Engr., December, 1913; 5¼ pp., illus. (To be continued.) 40c.

Prevention of Overwinds at Collieries. Min. Eng., December, 1913; 2¾ pp., illus. 40c.

Shaft Gate Controlling Device. Coll. Engr., December, 1913; 1 p., illus. 40c.

The Safety of Winding Ropes. (Preliminary report of the Prussian Winding Rope Commission.) Coll. Guard., Dec. 5 & 12, 1913, 1⅔ pp. 80c.

Use of Gasoline Motors in Mines. (Paper by W. C. Whitcomb read before the Dec. 8, 1913 meeting of the Kentucky Min. Inst.) Coal Age, Dec. 27, 1913; 2¼ pp. 10c.

Winding Appliances, Winding Ropes and Capels: Past and Present. (Continuance of Discussion of A. S. Bratley's paper read at meeting of Natl. Assn. of Colliery Managers.) Iron Coal Tr. Rev., Dec. 19, 1913; 1¼ pp. 40c.

LEGAL REFERENCES

Effect of "Strike Clause" in Fuel Sales Contracts. A. L. H. Street. Coal Age, Dec. 6, 1913; 1 p. 10c.

Mining Companies and the Corporation Tax. Eng. & Min. Jour., Dec. 13, 1913; ¼ p. 25c.

The Coal Industry and the Sherman Law. (Address delivered by Chas. M. Moderwell before the Natl. Civic Federation Dec. 12, 1913.) Coal & Coke Op., Dec. 25, 1913; 1½ pp. 20c.

LIGHTING

Electric Safety Lamps. (Address by W. Maurice before the Natl. Assn. of Colliery Mgrs.) Iron Coal Tr. Rev., Nov. 28, 1913; ⅔ p. 40c.

Flame vs. Electric Safety Lamps. E. A. Hailwood. Coal Age, Dec. 6, 1913; 1½ pp. 10c.

Safety of Portable Electric Mine Lamps. (First part of paper read by H. H. Clark at the Dec. 5, 1913 meeting of the Coal Min. Inst. of Amer.) Coal Age, Dec. 27, 1913; 2 pp. 10c.

Some Notes on Mine Lighting. R. S. Iremonger. Coal Age, Dec. 6, 1913; 1½ pp., illus. 10c.

The Difficulties Involved in Adding a Gas Detector to Portable Electric Lamps. Sydney F. Walker. Iron Coal Tr. Rev., Nov. 28, 1913; ⅔ p. 40c.

The Physiological Characteristics of Acetylene with Relation to Its Use as an Illuminant in Mines. (Paper read by Dr. E. E. Smith at recent meeting of the Intl. Acetylene Assn.) Can. Min. Jour., Dec. 15, 1913; 4¼ pp. 25c.

MINING COSTS

Analyzing the Mine Cost Sheet. J. B. de Hart. Coal Age, Dec. 6, 1913; ¾ p. 10c.

MINE FIRES

Discussion of Henry Rowan's Paper on Underground Fires. Trans. I. M. E., Vol. XLVI, Part I; 6 pp.

Spontaneous Combustion in Coal Mines. (Evidence before the Departmental Committee.) Iron Coal Tr. Rev., Nov. 21, 28, Dec. 5 and 12, 1913; 7 pp. $1.

Comparative Inflammability of Mixtures of Pit Gas and Air Ignited by Momentary Electric Arcs. (Discussion of Prof. W. M. Thornton's paper read at meeting of No. of Eng. Inst. of Min. & Mech. Engrs.) Iron Coal Tr. Rev., Dec. 19, 1913; ⅔ p. 40c.

MINE GASES, TESTING

Apparatus for the Determination of Carbon Dioxide and Oxygen in Mine Air. (Paper by Prof. Daniel Burns read before the Min. Inst. of Scotland.) Coll. Guard., Dec. 19, 1913; ⅓ p. 40c.

Experiments with Animals in Carbon Monoxide. (Paper by Geo. A. Burrell and Frank M. Seibert read before the Dec. 5, 1913 meeting of the Coal Min. Inst. of Amer.) Coal Age, Dec. 27, 1913; 3½ pp. 10c.

PREPARATION

Coal Mining and Coal Washing in Belgium. (Papers by L. D. Ford read before the No. of Eng. Inst. of Min. & Mech. Engrs.) Coll. Guard., Dec. 19, 1913; ⅔ p. 40c.

New Principles in Anthracite Preparation. (The L. V. C. Co. at their Mineral Springs breaker has abandoned the larger sizes of lump and done away with the picker boy.) Black Diamond, Nov. 29, 1913; ½ p., illus. 20c.

Short Mountain Breaker of the Summit Branch Mining Co. (This breaker has been designed not so much as a labor saver as to prevent the degradation of coal.) Wm. Z. Price. Coll. Engr., December, 1913; 3¾ pp., illus. 40c.

RESCUE, SAFETY APPARATUS

German Rescue Organization. (Translated from Glückauf.) Coll. Engr., December, 1913; 2⅔ pp., illus. 40c.

How Breathing Apparatus Works. Coal Age, Dec. 20, 1913; 2 pp., illus. 10c.

Improvements in Oxygen Apparatus. (From a paper by Berg. Grahn read at Intl. Life-saving Congress at Vienna, 1913.) Coll. Guard., Nov. 28, 1913; ⅔ p., illus. 40c.

Industrial Safety. (Abstract of article by Herbert M. Wilson read before the Coal Min. Inst. of Amer.) Coal Age, Dec. 13, 1913; 1 p. 10c.

Injectors in Oxygen Apparatus. (Paper by Berg. Forstmann read at Intl. Life-saving Congress, Vienna, 1913.) Coll. Guard., Nov. 28, 1913; ⅔ p., illus. 40c.

Liquid Air for Use in Rescue Work in Mines. Iron Coal Tr. Rev., Nov. 28, 1913; 1 p., illus. 40c.

Vigilance and Coöperation as Factors of Safety. W. E. Holland. Coal Age, Dec. 13, 1913; ½ p. 10c.

Reopening Norton Colliery with Rescue Apparatus. (Discussion of J. R. L. Allott's paper read at meeting of No. Staffordshire Inst. of Min. & Mech. Engrs.) Iron Coal Tr. Rev., Dec. 19, 1913; ⅔ p. 40c.

SANITATION, DISEASES

Malaria—Its Effect on Work and Workmen. H. G. F. Spurrell. Min. & Sci. Press, Dec. 6, 1913; 5½ pp. 20c.

Sanitation and Health of the Mining Community. (Address by Dr. H. A. Hatfield to the W. Va. Coal Min. Inst. Dec. 8, 1913.) Coal & Coke Op., Dec. 25, 1913; 3 pp. 20c.

STEAM ENGINES AND BOILERS

Motor-Driven and Ash-Handling Equipment at Pacific Mills, South Lawrence, Mass. Elec. Wld., Dec. 6, 1913; 1¼ pp., illus. 20c.

Notes on the Clinkering of Mixed Coals. (Paper by R. D. Quickel read before the Dec. 8, 1913 meeting of the Kentucky Min. Inst.) Coal Age, Dec. 27, 1913; 3 pp. 10c.

Removing Soot and Other Deposits from Boiler Tubes. Elec. Wld., Dec. 27, 1913; 1¼ pp., illus. 20c.

The Use of Pulverized Coal as a Fuel for Boilers. Prof. R. C. Carpenter. Sibley Jour. of Eng., December, 1913; 9 pp., illus. 35c.

The Adaptation of Boiler Furnaces to Available Coals, and Discussion. Henry Kreisinger and Walter T. Ray. Jour. Western Soc. Engrs., November, 1913; 61 pp., illus. 60c.

Large Prime Movers and Boilers for Power Houses. (Discussion of E. Kilburn Scott's paper read at Natl. Assn. of Colliery Managers and Assn. of Min. Elec. Engrs.) Iron Coal Tr. Rev., Dec. 19, 1913; 1½ pp. 40c.

SHAFTS, SHAFT SINKING

Celymen North Colliery, Newport, Mon. (Describes sinking of first shaft, encountering at a depth of about 100 yd. a feeder of some 20,000 gal. of water.) Iron Coal Tr. Rev., Nov. 28, 1913; 1 p., illus. 40c.

Permanent and Watertight Shaft Construction in Europe and the United States. Min. Sci., December, 1913; 1¼ pp. 35c.

Removal of a Shaft-Pillar at South Kirkby Colliery. Chas. Snow. Trans. I. M. E., Vol. XLVI, Part 1; 4¾ pp., illus.

The Sinking and Lining of Shafts. Francis Donaldson. (From Proc. Engineers' Club of Philadelphia.) Min. & Sci. Press, Nov. 29, 1913; 4¾ pp., illus. 20c.

SIGNALING

Cable Wiring for Mine Telephones. Gregory Brown. Coal Age, Dec. 6, 1913; 2¼ pp., illus. 10c.

TRANSPORTATION

A New Coal Dock at Vera Cruz, Mexico. Black Diamond, Dec. 6, 1913; ½ p., illus. 20c.

Coal Trestles Becoming Obsolete. Coal Tr. Jour., Dec 17, 1913; ½ p., illus. 35c.

Motor Trucks in Mining Work. R. W. Hutchinson, Jr. Eng. Mag., December, 1913; 14¼ pp., illus. 35c.

New Coaling Stations on the Oregon Short Line. (Describes the means by which the customary trouble with the choking of coal in leaving the cars is eliminated.) Ry. Age Gaz., Dec. 19, 1913; ¾ p., illus. 25c.

Pneumatic Plant for Transporting Coal. (Translated from article in Glückauf.) Coal Age, Dec. 27, 1913; ¾ p., illus. 10c.

Suction Conveyor for Handling Coal and Ashes. Reginald Trautschold. Can. Engr., Dec. 18, 1913; 3¼ pp., illus. 20c.

TIMBERING, PACKING, ETC.

Examples of the Use of Concrete at Collieries. John Gregory. Trans. I. M. E., Vol. XLVI, Part I; 11¾ pp., illus.

VENTILATION

A Pressure and Velocity Meter for Mines. Coll. Engr., December, 1913; ¾ p., illus. 40c.

Discussion of John Watson's Paper on the Testing of Fans: A Plea for Standardized Test Conditions. Trans. I. M. E., Vol. XLVI, Part I, 8 pp.

Ventilation of Mines. (Paper by W. Pile read on Nov. 8, 1913 before the So. African Inst. of Engrs.) Jour. of So. African Inst. of Engrs., November, 1913; 7¾ pp., illus.

Wet and Dry Recording Hygrometer. Metall. & Chem. Eng., December, 1913; ½ p., illus. 35c.

WORKING OF MINERALS

A New Type of Coal Cutter. C. E. Warbom. Coal Age, Dec. 20, 1913; 2 pp., illus. 10c.

Obtaining Anthracite by Open-Air Mining or Stripping Process. Schuylkill Co., Penn. Coal Tr. Jour., Dec. 17, 1913; ½ p., illus. 35c.

Stripping Anthracite in Pennsylvania. Excavt. Engr., December, 1913; 5¼ pp., illus.

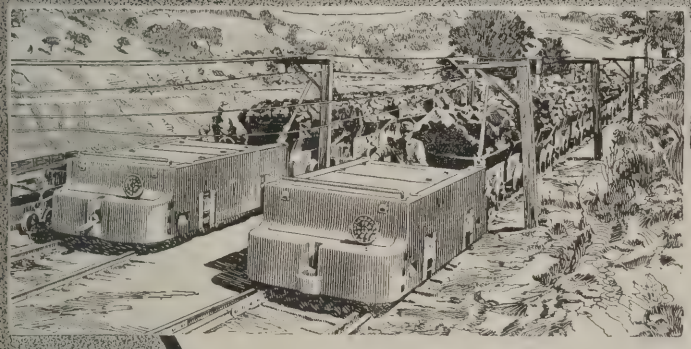
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 2
Issued Every Saturday
Hill Publishing Company

NEW YORK, JANUARY 10, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



In 1914 Remember

—that profits, though good, might be better if repair bills were less; that locomotive breakdowns are responsible for a good share of your repair bills; that nine-tenths of locomotive breakdowns can be laid to bearing wear on armature shafts; and that

HESS-BRIGHT BALL BEARINGS
Built for Endurance

on these armature shafts will practically *eliminate* wear from consideration. Hess-Bright Bearings assure that the armature revolves on a true center without vibration. The armature will not drop on the pole pieces. Dust and oil are kept out of the motor.

Request the builder to equip every one of your mine locomotives with the tried and guaranteed bearing —Hess-Bright. Don't permit substitutes —they involve a chance with the unknown.

HESS HB BRIGHT

The Hess-Bright Mfg. Co.
Front Street and Erie Avenue
Philadelphia, Pa.

18 Fifty-Ton Railroad Cars Loaded In a Day With One Baldwin-Westinghouse BARSTEEL Electric Mine Locomotive



ground up.

MOTORMAN ESTABLISHES RECORD AT SCALP LEVEL

SPECIAL TO JOHNSTOWN DEMOCRAT.

SCALP LEVEL, Sept. 19—What is believed to be the highest record ever made in any section was made today in No. 1 mine of the Scalp Level Coal Mining company, one of the John Lochrie operations, when 18 steel cars were loaded by one motorman. The motorman who made the record output was Victor Gustasson. The foreman at No. 1 is William B. Wilson.

Eighteen steel cars of coal loaded in a single day with but one motorman is the highest run that has ever been made in this vicinity and it is believed that it has never been equalled anywhere.

On this particular day they worked exactly nine hours and forty-five minutes. The only haulage equipment used was an eight-ton Baldwin-Westinghouse **Barsteel** Electric Locomotive, equipped with commutating-pole motors.

This locomotive, except for a few mine cars hauled from a dip from a point in the heading by a mule, did all the work, gathering the coal cars and hauling the same to the tipple.

When they stopped work in the evening the locomotive was inspected and found to be in first-class condition, in spite of the heavy work it performed. The motors were nearly as cool as when started in the morning.

Twelve mine cars, each loaded with two tons of coal, were hauled on each trip. The longest haul was made about 2500 feet from the face of first left to tipple and about the same distance from face of main heading to tipple. At two points in the mine for a distance of 400 feet the grades are 1½% against the loads.

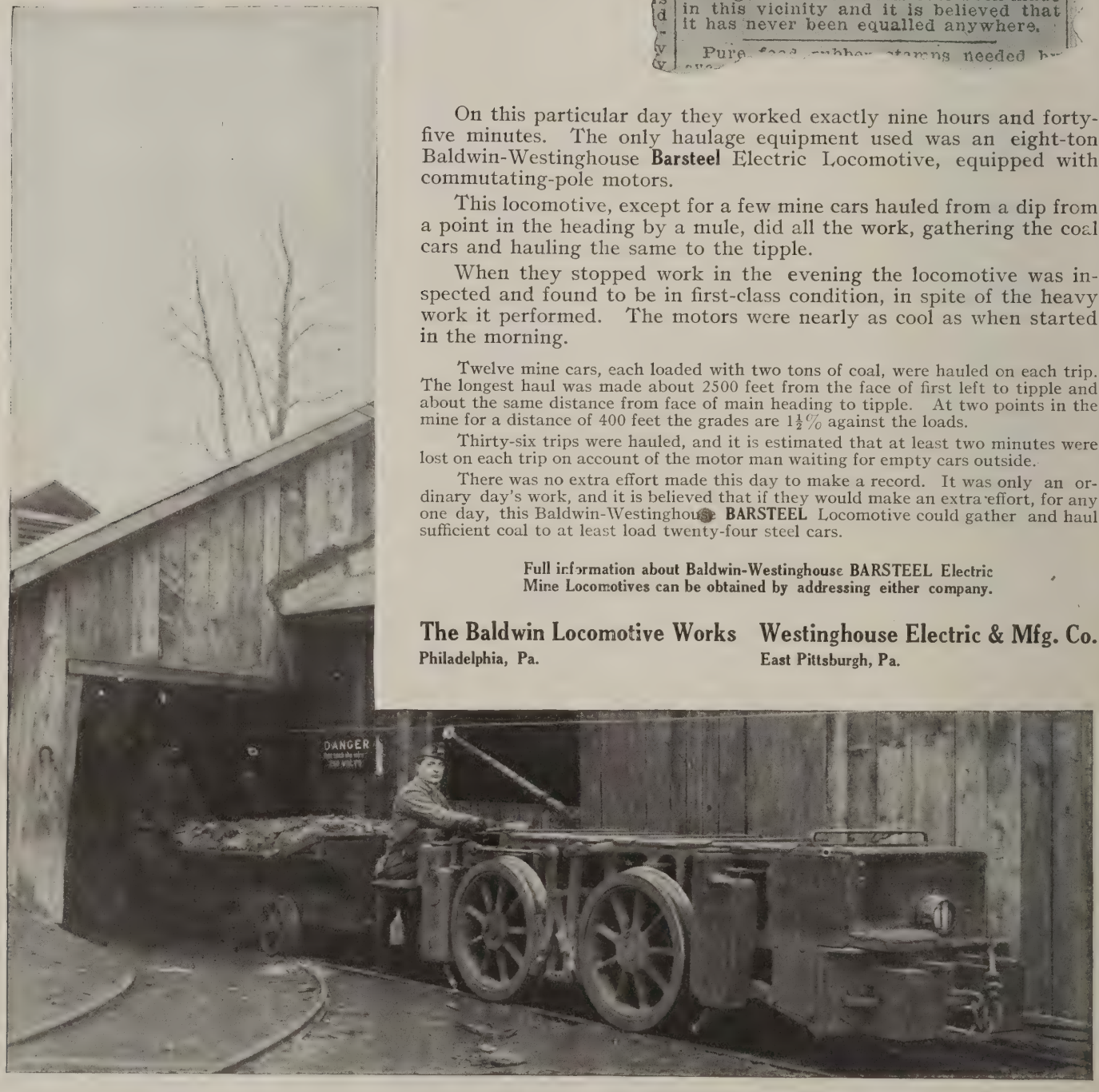
Thirty-six trips were hauled, and it is estimated that at least two minutes were lost on each trip on account of the motor man waiting for empty cars outside.

There was no extra effort made this day to make a record. It was only an ordinary day's work, and it is believed that if they would make an extra effort, for any one day, this Baldwin-Westinghouse **BARSTEEL** Locomotive could gather and haul sufficient coal to at least load twenty-four steel cars.

Full information about Baldwin-Westinghouse BARSTEEL Electric Mine Locomotives can be obtained by addressing either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.



A view of the Mines, the Motorman, and the Baldwin-Westinghouse BARSTEEL Locomotive which made this record

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JANUARY 10, 1914 NUMBER 2

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 43

Facts and Figures. A condensed review of the coal-mining industry for the year 1913, and some remarks concerning the future outlook. COAL AGE, Vol. 5.

REVIEW OF COAL MINING FOR 1913: *Pages* 44-64

Reports from mine inspectors and special correspondents in Alabama, Alaska, Arkansas, Colorado, Idaho, Illinois, Iowa, Indiana, Kansas, Kentucky, Maryland, Michigan, Missouri, Montana, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Washington, West Virginia and Wyoming. Estimates of the year's production are given, with forecasts relative to probable business in 1914. COAL AGE, Vol. 5.

FOREIGN COAL PRODUCTION FOR 1913: *Pages* 65-68

Reports from mine inspectors and special correspondents in British Columbia, Saskatchewan and Nova Scotia. COAL AGE, Vol. 5.

PRESENT CONDITIONS IN COAL FIELDS OF MEXICO: *Pages* 68-69

Practically all the coal plants owned by Mexican capitalists were destroyed. Properties of American and English investors were not molested. If peace should be restored, the plants still standing will not be able to supply the demand of the country. COAL AGE, Vol. 5.

BUSINESS CONDITIONS AND THE NATIONAL COAL MARKETS IN 1913: *Pages* 70-74

Through a period of continued uncertainties in business, the coal markets developed an unexpected buoyancy and producers controlled the situation most of the time. A. T. Shurick. COAL AGE, Vol. 5.

REVIEW OF THE EXPORT TRADE IN 1913: *Pages* 75-76

More attention is being paid to the possibilities of foreign markets. American companies have had agents abroad surveying the ground. A number of fairly good contracts have been closed. American coal in South America. F. R. Wadleigh. COAL AGE, Vol. 5.

MARKETING AND SHIPPING CONDITIONS ON THE ATLANTIC COAST IN 1913: *Pages* 77-79

The year just closed was distinguished by the highest average prices that ever prevailed; $2.85 was the base price for Pocahontas, New River and Georges Creek. The sustained high level for the better Pennsylvania grades was a striking development of 1913. G. G. Wolkins. COAL AGE, Vol. 5.

NEW YORK MARKET EXPERIENCES A PERIOD OF UNUSUAL PROSPERITY: *Pages* 80-81

THE ANTHRACITE MARKET: *Pages* 81-82

CONNELLSVILLE COKE AND THE PITTSBURGH COAL MARKETS IN 1913: 82-85

A heavy Lake and manufacturing demand in the Pittsburgh region created an active coal market. Circular prices well maintained, with occasional premiums until the cessation of Lake shipping. B. E. V. Luty. COAL AGE, Vol. 5.

ANTHRACITE SHIPMENTS BY LAKE AND THE BUFFALO MARKET IN 1913: *Page* 85

TE OHIO COAL MARKETS AND PROGRESS IN MINING DURING 1913: *Pages* 86-87

HAMPTON ROADS MARKET STRONG AND HAS A RECORD-BREAKING YEAR: *Pages* 87-88

THE CHICAGO MARKET AND TRADE CONDITIONS IN 1913: *Pages* 88-90

MARKETING CONDITIONS IN THE MISSISSIPPI VALLEY IN 1913: *Pages* 90-91

MILWAUKEE MARKET IN 1913: *Pages* 91-92

THE NEW ANTHRACITE RULES OF PENNSYLVANIA DEPARTMENT OF MINES: *Pages* 92-94

Letter sent to anthracite mine superintendents by James E. Roderick, chief of Department of Mines of Pennsylvania. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 95-96

New Year Prospects in the Public-Land States—Mining Education.

LEGAL DEPARTMENT: *Page* 97

WHEN DOES A LABOR UNION BECOME AN UNLAWFUL COMBINATION?

A combination formed by members of a labor union which has the effect of limiting free combination in the production of coal in interstate commerce is as much violative of the federal anti-trust law as a similar combination between mine operators. A. L. H. Street. COAL AGE, Vol. 5.

BRIQUETTING IN NORTH AMERICA: *Page* 98

More than 40 briquetting plants have been built, but at present only 14 are in operation, due to various causes. C. T. Malcolmson. COAL AGE, Vol. 5.

DISCUSSION BY READERS: *Pages* 99-101

Longwall Mining Methods. Letters 1 and 2—The Certificate Law. Letter No. 10—The Danger of the Injector

STUDY COURSE IN COAL MINING: *Page* 101

INQUIRIES OF GENERAL INTEREST: *Page* 102

Calculation of Sines and Cosines.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 103

COAL AND COKE NEWS: *Pages* 104-107

COAL TRADE REVIEWS: *Pages* 108-112

ADVERTISING INDEX: *Page* 80

CIRCULATION OF THIS ISSUE 15,000

None sent free regularly, no returns from news companies, no back numbers

Six Principles

The Weekly Ad-Talk Page

1. We believe the basic principle on which every trade paper should build is SERVICE—service to readers and service to advertisers, in a way to promote the welfare of the general public.

2. We believe in TRUTH as applied to the editorial, news and advertising columns.

3. We believe in CO-OPERATION with all those movements in the advertising, printing, publishing and merchandising fields which make for business and social betterment.

4. We believe that the best interests of manufacturers, the business press and consumers can be advanced through a greater interchange of facts regarding merchandise and merchandising, and to this end invite co-operation by manufacturers and consumers.

5. We believe in co-operating with all interests which are engaged in creative advertising work.

6. We believe that business papers can best serve their trades, industries or professions by being leaders of thought; by keeping their editorial columns independent of the counting room, unbiased and unafraid; by keeping their news columns free from paid reading notices and puffery of all kinds; by refusing to print any advertisement which is misleading, or which does not measure up to the highest standards of business integrity.

These are six out of ten "principles" as outlined by the Federation of Trade Press Associations in the United States in their eighth annual convention in New York.

Second the motion; we not only believe it—we're *doing* it. 'Nuff said!

COAL AGE

Vol. 5 NEW YORK, JANUARY 10, 1914 No. 2

Facts and Figures

The year 1913 was the greatest period ever experienced in the coal-mining industry. The output reached a total of 562,000,000 short tons which compares with a production of 534,000,000 tons in 1912.

Not only did the output exceed all previous records, but the value of the product at the mines was $753,000,000, an increase of 8.4 per cent. over the preceding year.

Bituminous production increased 22,000,000 tons, while the anthracite output was 5,600-000 greater than in the previous twelve months

Coke increased 2.8 million tons in output, reaching a total of 45,000,000. The value of this tonnage at the ovens was $135,000,000, an increase of 26 per cent. over the value of the 1912 production. Therefore in both quantity and price, coal and coke figures in 1913 established a new record.

The principal states to show increases in coal production were, Alabama, Illinois, Indiana, Kentucky, Ohio, Pennsylvania and West Virginia. Colorado showed a decrease in output caused by a serious strike that still exists in that state. Maryland also showed a small decrease due principally to some confusion resulting from recently enacted laws regulating child labor and providing for workmen's compensation. It is likely, however, that the Maryland field has reached its stage of maximum production.

The increased coke tonnage came principally from West Virginia and Alabama. The Pennsylvania output, although exceeding any previous year, was cut down by the slump that occurred in November and December. Alabama, also, would have made a better showing had it not been for the war in Mexico. This latter country is one of Alabama's best markets.

The most noteworthy event of the year in coal mining, was the national movement to reduce accidents and improve working conditions. Every manager, superintendent and foreman of any consequence, is striving to give his mine a clean slate in the matter of fatalities. Our greatest trust, the steel corporation, is without doubt the most ambitious aspirant for honors in the campaign for safety.

The outlook for 1914 in the coal industry would be better than any time in recent years were it not for the expiration of wage agreements in the bituminous field on April 1. The miners are instructing their delegates to insist on a "mine-run" basis, which demand the operators will surely refuse to consider. The action of the Ohio commission in approving the "mine-run" basis of payment will encourage the men and weaken the case of the owners.

Taking it all in all, the prospect for peace in the bituminous regions this spring is not favorable unless great forbearance is exercised by the two contending factions. The union in Central Pennsylvania has not relished the action of the operators in making public the frequent violations of the Scale Agreement by the men, and although the owners have temporarily insured better conditions by calling their employees to account, they have added fuel to the flames that may break out after April 1.

"It's an ill wind that blows no one good," and of course the anthracite mines and the West Virginia operations would profit by the misfortunes of the soft-coal owners in the unionized fields, should a lengthy suspension occur. However, it is best to remember that what hurts one part of the industry is also harmful to the business as a whole.

Let us all pray for peace in 1914. That accomplished, we will have the most prosperous year in history.

Reviews of Coal Mining for 1913

By B. M. Starnes*

Reports from state mine inspectors and special correspondents, giving estimates of the year's production and the outlook for 1914.

Alabama*

SYNOPSIS—Alabama coal production increased a million tons. Accidents materially reduced and but one explosion during the year. Trade and market conditions were exceptionally good. Car supply inadequate throughout the year. Water transportation from Alabama to the Gulf was opened and considerable new development carried through.

The coal mines of Alabama during 1913 produced 17,500,000 tons of coal, breaking all previous records by over a million tons of coal. Had the operators not been handicapped by a serious car shortage, and had business during the last two months held up the production would have been at least 18,500,000 tons, as it is estimated that a million tons were lost by these two causes alone. This will put Alabama in sixth place among coal-producing states of the Union.

Alabama has produced since 1870, which is as far back as the records go, the following tonnage of coal, coke and pig iron:

	Coal	Coke	Pig Iron
1870	13,200	.....	11,171*
1880	380,000	60,781	68,925
1890	4,090,409	1,072,942	816,911
1900	8,273,363	2,110,837	1,184,337
1910	16,139,228	3,231,399	1,939,141
1911	15,011,853	2,756,697	1,696,999
1912	16,513,040	2,881,861	1,832,146
1913†	17,500,000	3,500,000	2,018,343

* For 1872. † Estimated.

The number of nonfatal accidents in the Alabama mines during 1913 is approximately 133, which is about 15 per cent. less than in 1912. The fatal accidents for the year number 120, which is one less than the previous year. Below is a comparison of accidents in recent years:

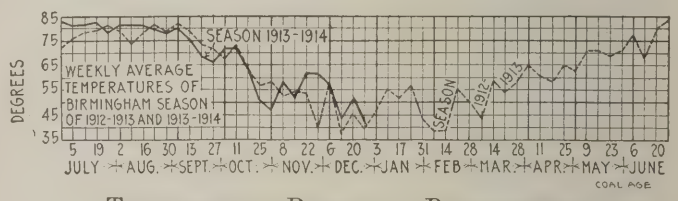
Year	Fatal	Nonfatal	No. Employees per Life Lost	Tons per Life Lost
1900	37	13	386	223,603
1910	238	48	92	67,812
1911	209	90	108	71,827
1912	121	153	193	136,471
1913	120	133	206	147,060

There was only one mine explosion during the year, that at the Acton mine of the Alabama Fuel & Iron Co. in November, in which 24 men lost their lives. The Government has placed at the Birmingham rescue station the only automobile ambulance and rescue car in the Unietd States, and it has proved of great value in this work. Conditions at the mines for the safety of the men are improved vastly over last year, and the operators are giving more time and attention to "Safety First" than ever before.

Market Conditions

Steam and Domestic Coal—During the winter and early spring of 1913, the market on all grades of coal was exceedingly good, though lump coal was slightly under the average in tonnage due to a rather warm winter. The spring business beginning with Apr. 1 was excellent, the usual heavy tonnage of lump coal moving. The operators were looking for a rather quiet summer, but they were agreeably surprised, for 1913 will long be remembered as one of the best summers in the coal business in Alabama. Prices on all grades held up, and a heavy tonnage was moved. During the first six months over 10 million tons were handled. The great surprise of the year was the tendency of the market to lag during early fall, which is not usual in this district; it continued getting worse and worse, until there was practically no market whatever at the close of the year. Of course the usual contracts were made, but a large portion of Southern consumers prefer to buy on the open market as they need the coal, and it is this class of trade that seems to have dropped out of sight. The usual holiday-rush business failed to make its appearance, but the steam coals held their own in fair shape.

Blacksmith Coal—The producers of blacksmith coal enjoyed a good business, at prices from $2@2.25 per ton during the entire year. The tonnage was large during the winter and spring, falling off slightly in the summer, but recuperating as winter drew near. Prices have been about normal, and the operators are content.



Temperature Range at Birmingham

Furnace and Foundry Coke—The market on both furnace and foundry coke for 1913 has been a disappointment, for while the prices have held up well, the demand has been far under the expectations of the manufacturers. It is true that a larger tonnage was produced than ever before, but most of this increased tonnage went into the manufacture of iron by the makers themselves. The Mexican situation has cut Alabama from a profitable territory, as usually a large tonnage of coke is shipped to the Mexican smelters. The market conditions for the year could only be classed as fair.

Prices, Labor and Transportation Conditions

Below is a schedule of prices f.o.b. mines for the year on two of the standard lump coals of the district. Due to the unfavorable conditions, these prices have been cut materially during the latter part of 1913, though during the first nine months they were rigidly adhered to.

	Cahaba Lump[1]	Cahaba Nut[2]	Carbon Hill Lump[1]	Carbon Hill Nut[3]
January	$3.00	$2.50	$2.25	$1.90
February	3.00	2.50	2.25	1.90
March	2.50	2.00	1.75	1.45
April	2.50	2.00	1.75	1.45
May	2.60	2.10	1.85	1.55
June	2.70	2.20	1.90	1.60
July	2.80	2.30	1.95	1.65
August	2.90	2.40	2.00	1.70
September	3.00	2.50	2.15	1.75
October	3.00	2.50	2.25	1.95
November	3.25	2.75	2.25	1.90
December	3.25	2.75	2.25	1.90

[1] Over 6-in. screen. [2] From 3-in. to 6-in. [3] From 2-in. to 6-in.

Prices on Steam Coal—Approximate prices obtained on a few of the standard steam coals f.o.b. mines were:

*Sloss Sheffield Steel & Iron Co., American Trust Building, Birmingham, Ala.

Pratt run of mines	$1.25@ 1.45
Big seam run of mines	1.00@ 1.10
Cahaba run of mines	1.30@ 1.45
Black Creek run of mines	1.35@ 1.50
Washed slack	1.20@ 1.30
Unwashed slack	0.30@ 0.60

Blacksmith Coal and Coke f.o.b. mines were about as follows:

Blacksmith coal	$2.00@ 2.25
Furnace coke	2.75@ 3.50
Foundry coke	3.50@ 4.25
Coke breeze	1.50@ 2.00

Car Supply—This district has suffered severely from a serious car shortage during the entire year. Even during the summer months, the railroads were not able to supply sufficient equipment to enable the operators to run regularly; in some cases the mines worked only from one-third to one-half time. The dull market during the last three months has aided the roads in this respect, but, should the usual winter trade develope after the halidays, the railroads will not be able to cope with the situation. It is estimated by the coal operators of this district that the production was restricted by over 500,000 tons by the lack of cars.

Labor Situation—Alabama has had no labor troubles this year. Many of the large operators have voluntarily



Charles H. Nesbitt, Alabama

increased wages to all employees, and, as the mines have been almost constantly at work, it has kept the labor in this district well satisfied.

Water Transportation—The dream of the coal operators in this district—water transportation from Birmingham to the Gulf—has at last come true. The Alabama & New Orleans Transportation Co. is now operating barges from Tuscaloosa, Ala., down the Warrior River to Mobile and New Orleans. While it has not yet proved a decided success, owing to the low water and the unfinished lock, still, within the next year, Alabama will see at least 500,000 tons of coal barged to the Gulf, at a much lower cost than by rail.

Improvements

Some of the principal improvements by coal companies during the past year are as follows:

Central Iron & Coal Co., at Holt, constructed 40 byproduct coke ovens, of the Semet-Solvay type.

Alabama Co. reopened its Searles mines, which had been closed down for about a year. They are now operating on a capacity of 1000 tons per day.

American Steel & Wire Co.'s wire and nail mill, at Fairfield, put into operation.

Tennessee Coal, Iron & R.R. Co. announced that it would build a new furnace and steel converter at Ensley, at a cost of $200,000.

Sloss Sheffield Steel & Iron Co. relined the Philadelphia furnace, Florence, Ala.

United States Steel Corporation announces that it will build an ore-unloading plant at Mobile, at a cost of $800,000 to receive its Cuban ores.

Sloss Sheffield Steel & Iron Co. opened nine new mines at Drifton, Brookside, Dora, Cardiff and Blossburg.

Pratt Consolidated Coal Co. built a new washer and tipple at the Banner mines, concrete and steel structure.

Sloss Sheffield Steel & Iron Co. opened nine new mines at Top.

Tennesee Coal, Iron & R.R. Co. opened up its Bay View mine and announced that they would open up a new mine at Bloston on the Woodstock seam.

Bessemer Coal & Iron Co. installed a new washer at Aldrich, Ala.

Red Eagle Coal Co. opened up a new mine at Bloston.

American Coal Corporation developed its Beltona mines near Warrior, Ala., at an expenditure of $400,000. Now operating and getting out 600 tons per day.

Alabama Consolidated Coal & Iron Co. properties transferred to the Alabama company.

Southern Iron & Steel Co. sold to the Gulf States Steel Co.

G. B. McCormack and Erskine Ramsay announce that they would build a battery of byproduct coke ovens with a capacity of 1500 tons of coke daily.

Sloss Sheffield Steel & Iron Co. announce it will build a battery of 300 beehive ovens at Bessie.

Bessemer Coal & Land Co. purchased the properties of the Montevallo Mining Co.

Yolande Coal & Coke Co. purchased the Abernant Coal Co.

Bessemer Coal, Iron & Land Co. purchased 40,000 acres of land in Fayette County, said to contain a high-grade coal.

Pierce Coal & Lumber Co. developing 20,000 acres of coal lands in Jackson County.

Panama Coal Co. announced that it would develop 15,000 acres of coal lands in the Sipsey Valley.

Alabama Fuel & Iron Co. opened up its No. 4 Marguerite mine at Marguerite.

Central Cahaba Coal Co. opened up a new mine at West Blocton.

'Frisco R.R. built a 12-mile spur, tapping the coal fields of Walker County, known as Sipsey Valley, thus opening up a large territory rich in coal.

New Incorporations

The following are the principal new incorporations during the year:

C. B. Stalnacker and associates, of Jasper, developing a tract containing a 9-ft. seam near Jasper.

Gas Light Coal & Coke Co. To develop 2000 acres of coal at Dulin.

West Pratt Coal Co. Capital, $100,000. John Armstead, president. To develop coal lands at Dora.

Morris Coal Co. W. F. Francis, president. To develop 2000 acres near Morris.

Little River Mining Co. To develop 7500 acres in north Alabama.

Maryland Coal & Coke Co. To develop 15,000 acres of coal lands in the Sipsey Valley. Now operating and getting out 800 tons per day Black Creek coal.

Eureka Coal Co. To develop tract of coal land at Fallis-ton.

Blount Mountain Coal & Lime Co. To develop tract of land in Blount County.

Nunley Ridge Coal Co. Capital, $24,000. R. D. Curry, president.

General Notes

The Acmar mine, of the Alabama Fuel & Iron Co., will lead the mines of this state in tonnage for 1913 with

approximately 460,000 tons. The Sayreton mine of the Republic Iron & Steel Co. will follow with an output of approximately 440,000 tons. It is estimated that there are 24,014 miners in Alabama.

It is rumored that the Southern Ry. is to purchase the Gulf, Florida & Alabama R.R., which owns extensive terminals in Pensacola, Fla. This line is building from Pensacola to Jasper, Ala., the center of the coal fields, at which point it will connect with the Southern, and thus give the latter a direct connection with the export trade at Pensacola.

It is also rumored that the Central of Georgia will build through Milton, Fla., to Pensacola, and, as this road is owned by the Illinois Central, which penetrates the coal district of Alabama, Pensacola will thus have another coal railroad; at the present time, the only line into Pensacola by which coal can be shipped is the Louisville & Nashville. With three roads, Pensacola would be a great bunkering point on the Gulf.

Alaska

Sumner S. Smith, U. S. mine inspector for Alaska, reports to us that mines are few in that territory, and only a small tonnage of coal has ever been produced.

"During the past season," he says, "some 1600 tons were mined from the Wharf property, near Seldovia, on the south coast of Kachemak Bay of the Kenai Peninsula. The coal is lignitic. A few tons may have been mined on Chicago Creek, near Candle, but Mr. Smith is not certain. Candle is located on the west coast of Alaska a halt a degree south of the Arctic Circle, on Kotzebue Sound.

Eight hundred tons, as will be seen in another part of this issue, were produced for the use of the navy on the Chickaloon River, a branch of the Matanuska.

This tonnage, however, is doubtless yet at the mine and it is questionable whether the weather conditions will permit it to be shipped to tidewater this winter.

Arkansas

By Thomas H. Shaw*

SYNOPSIS—The coal in Arkansas is of excellent quality and sells for a good price. Its presence has been known since 1818. The labor situation in 1913 has been complicated by a disagreement over the interpretation of a contract signed with the union.

In reviewing the coal-mining industry of Arkansas for 1913, it will not be possible for me to give the exact figures as to coal production, number of employees, number of days worked, etc., for the calendar year ending Dec. 31, 1913. This is due to the fact that the state law requires all statistical data relating to the coal-mining industry to be collected for the fiscal year ending June 30.

The area of the coal regions is about 2000 square miles, comprising six counties, viz.: Sebastian, Scott, Franklin, Johnson, Logan and Pope. The counties producing the largest amount of coal are Sebastian, Franklin and Johnson.

Early Mining History

Coal in this state was given its first written notice in 1818. The first opening deserving mention was the old Spadra mine, located at the mouth of Spadra Creek, in Johnson County, where a steam plant was in operation about the year 1870. Mining was carried on at Ouita in Pope County in 1873. About this date, country banks were opened on Massard prairie not far from Fort Smith and on Long prairie near Jenny Lind, which produced collectively about 8000 tons per annum and which was hauled to Fort Smith in wagons. About the year 1887 the Western Coal & Mining Co. and the Kansas & Texas Coal Co. commenced extensive mining operations at Jenny Lind, Hackett and Huntington. The production increased to 1,900,000 tons per annum from 1900 to 1906.

Production of Fiscal Year

The production reported for the fiscal year ending June 30, 1913, was 1,952,461.93 tons, which was produced by 4188 miners, 316 mules and 77,785 kegs of black powder. Five companies did not report. They employ about 300 men. I estimate their tonnage at about



Thomas H. Shaw, Arkansas

200,000 tons per annum, which would make the total 2,152,461.93 tons. I believe that it will be safe to say that the production for the calendar year will exceed 2,250,000 tons. Five of the largest mines in Sebastian County have installed electric coal-mining machines which are proving to be a success in two ways: First, in safe-guarding the shotfirers and property from explosions, which are frequent in these mines when the coal is shot off the solid; second, in making a better quality of coal.

A new mine at Hartman, Johnson County, and another at Alix, in the same county, will be ready to ship coal in the near future. Pope and Johnson Counties have a fine quality of semi-anthracite coal second to none in the entire Southland; it is free burning, producing a uniform heat, does not clinker, and is an excellent stocker; the average selling price, f.o.b. mine, is about $3 per ton. The mining of coal will make a manufacturing city of Fort Smith, the county seat which is surrounded by cheap coal, and has six railroads entering into it.

During the last year there have been many local strikes caused by a difference of opinion as to the construction

*State mine inspector, Midland, Ark.

to be placed on the agreement between the miners and operators. The mine of the Scranton Anthracite Coal Co., at Montana, Johnson County, is still idle over a strike that commenced on Sept. 5. Six fatal and 25 nonfatal accidents occurred during the fiscal year.

There have been numerous minor explosions in the mines of Arkansas during the past 20 years, of which no official record has ever been made. It is of interest to note the two largest accidents which have occurred in the mines of this state, namely, that at Huntington in 1897 and that at Bonanza in 1903. On Mar. 4, 1897, in the Kansas & Texas Mine No. 44 at Huntington, Ark., a powder and dust explosion occurred, in which 14 men were killed and 12 badly burned. On Nov. 20, 1903, in the Bonanza No. 20 mine at Bonanza, Ark., a gas explosion occurred in which 11 men were killed and two escaped, both badly burned.†

Colorado

By A. R. Tibbitts*

SYNOPSIS—The production of coal has been considerably affected by a strike which commenced in the northern field in 1909, and which was ineffective but never declared at an end. The southern field was unionized and a strike was declared on Sept. 23, which is likely to last some time. The strike occurred in face of large concessions in wages to day men.

With the closing of the year 1913, the coal industry of Colorado is seriously hampered by a bitter coal strike. Furthermore, there are no prospects of a settlement in the near future. Both parties to the dispute are determined not to concede the one vital point on which the strike hinges, namely, recognition of the union.

In the early months of the year, during the session of the last legislature, a new coal-mining bill was submitted for passage and was referred for a revision to a subcommittee, composed of two operators, one representing the Colorado Fuel & Iron Co., the other the Rocky Mountain Fuel Co., two coal miners, one the state inspector of coal mines and the other a member of the international board of the United Mine Workers of America, representing District No. 15, and the fifth member, an acting state senator and a metal miner by calling, who was the chairman of the committee.

A Drastic Law Which Met with Ready Compliance

The result was a strong and effective law, in the modeling of which, for the first time in the history of Colorado, laborer and employer were in harmony. The law as revised received the approval of all the operators and the mine workers. This law went into effect on Apr. 5, and gave the operators six months to comply with its provisions. The result was gratifying. Immediately the coal companies, especially the large ones, proceeded to carry out the numerous improvements demanded by the act which in most cases meant the outlay of much money, and in all cases, compliance with its new requirements increased the cost of production.

One of the great contentions had been the nonemployment of check weighmen at the various mines. The miners were allowed, without any protest or delay, to avail themselves of the provision in the new law permitting them to select their own check weighmen.

Concessions to Miners

An eight-hour law had been passed by the 19th general assembly, and before it went into effect, most of the large companies placed their mines on its basis with pay for a 10-hour day. In addition to these concessions, in the northern field, where the strike called in 1909 is still in progress, the operators on Oct. 15 of this year, granted a further increase in the wage scale to the underground workers amounting to 6 per cent.

However, with the beginning of the year, each month showed a decrease in the production of coal, the cause of which was laid to shortage of men. In July the production took an upward turn until the strike was called. Under normal conditions the production would probably have been about the same as in 1912, to wit, 11,016,948 tons. Conditions were improving at all the mines, the wage scale seemed satisfactory and there was no special indications of unrest.

Beginning of Strike

The strike that had been called in the northern field in April, 1909, and is still in force, resulted from a disagreement as to the wage scale. However, nonunion miners took the places of the strikers, and while production was not and has not resumed its normal capacity, yet it was sufficient to meet the demand of the market. The Moffat R.R. bringing to Denver large shipments of Routt County coal, no doubt lessened the demand for lignite, as the former coal is considered a splendid fuel for all purposes.

The United Mine Workers, it would seem, have not been idly waiting for the settlement of this older strike, but had a number of their organizers out in the southern field and an effective unionizing of the men was accomplished as results show.

In September a conference was called by the leaders of the union but was ignored by the operators, not one responding, and on Sept. 23 a strike was called, and about 85 per cent. of the men came out. In consequence, the production in October was over a half million less than in September, that month holding its own, as great activity was displayed at the mines in anticipation of the coming strike.

The November and December output will show the same decrease. Several sincere attempts have been made to effect a settlement but they failed. The operators are willing to grant open shop, to abolish compulsory trading at their company stores, to carry out all the provisions of the new law, but they absolutely refuse to recognize the union as a body. The men as stubbornly will not waive this one demand. Some of the operators of small mines have signed up with the union and are getting out increased tonnages.

The militia was called out to maintain order and allow such men as wished to return to the mines to work unmolested, but notwithstanding there is very little change in the situation.

High Price of Coal Creates Unfavorable Criticism

Shortly after the strike was called, the market price of coal went up as high as $7.25 for bituminous and $6.50 for lignite lump coal per ton. Whether there was more

†Neither of these is recorded in the remarkably complete list compiled by the Bureau of Mines.—Ed.

*State inspector of coal mines, Denver, Colo.

coal stored than was known, or the consumption of coal was curtailed by the warm weather prevailing in October and November, the prices have dropped 25 and 50c. per ton.

Several of the large coal companies are operating state land and as their production is affected by the strike and the prospects of a settlement are not encouraging, there is much agitation in favor of the state of Colorado operating the mines on its own land. However, as this would be a radical experiment with uncertain consequences, it is not likely to be put into effect; the advocacy of such a move probably being nothing more than a resentful protest against the increased cost of fuel and the loss and demoralization of all business that a strike of such proportions as this is bound to entail.

The new law imposed a tax of $\frac{1}{2}$c. per ton on run-of-mine, payable quarterly, and creates a coal-mine inspection fund. Two quarters have elapsed and there has been no trouble in the collection of this tax and no question of legality raised to evade payment.

COAL PRODUCTION OF COLORADO FOR THE YEAR 1913

Number of mines in operation		167
Tons of lignite coal produced	1,513,528	
Tons of semibituminous coal produced	824,549	
Tons of bituminous coal produced	6,850,355	
Tons of anthracite coal produced	51,903	
Total number of tons produced	9,240,335	
Total number of tons produced in 1912	11,016,948	
Total number of tons of coke produced		889,989
Total number of employees in and about the mines		13,107.6
Total number of days worked		191.2
Number of men killed in the mines (38 killed in the Vulcan disaster.)		111

PRODUCTION BY COUNTIES

Boulder	968,018	Jefferson	154,531
Delta	79,005	Las Animas	3,781,713
El Paso	329,054	La Plata	138,414
Fremont	536,793	Mesa	123,876
Garfield	159,589	Pitkin	52,048
Gunnison	474,469	Routt	304,737
Huerfano	1,647,368	Weld	428,795
Jackson	61,925		
		Total	9,240,335

December output (estimated) 608,898 tons.

Idaho

By Robert N. Bell*

SYNOPSIS—The state only produced about 2000 tons in 1913. The Interior Department has recently permitted entry on coal lands and some progress in development may be expected.

The coal-mining industry of Idaho is in an embryonic stage as the state is almost exclusively occupied by crystalline metal-bearing formations. We import and use annually from the neighboring states of Wyoming and Utah and from British Columbia approximately two million tons of coal and produce from Idaho sources a negligible quantity of about 2000 tons, which has been the annual output for the past 7 or 8 years.

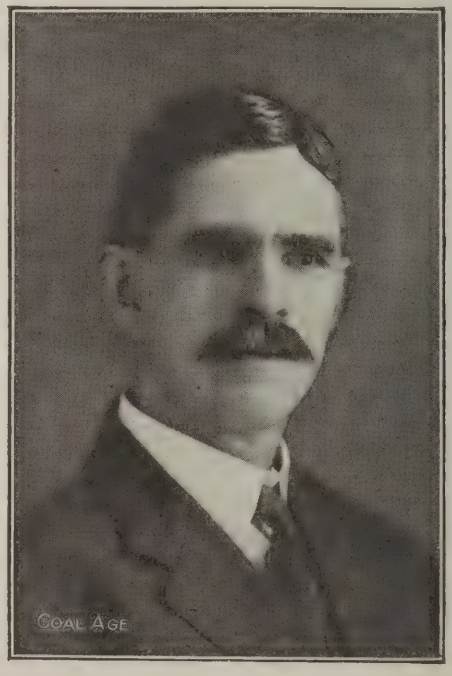
Our metal mines employ over 6000 men and their principal product is lead-silver ore. We excel every other state in the Union in the output of this class of mineral, but our possible coal-bearing formations are limited indeed and consist of a small area embracing only a few townships on the eastern border of the state in Fremont County, where a portion of the rich coal-bearing Laramie Cretaceous horizon extends over the Idaho line from Uintah County, Wyoming, and in which there has been discovered a series of 18 closely parallel and steeply pitching seams of high-grade soft coal.

This coal, like many other Western fuels, is classified as black lignite, but as a matter of fact is of excellent quality and high heating value with a long flame and equal to some of the best Eastern bituminous coals in steam-producing and storage qualities.

Until a year ago, when a new railway branch was completed within 10 miles of the mines, these deposits were situated nearly 35 miles from the nearest transportation point, and all the coal mined in their development has been sold to the local farming community of the Upper Snake River plains which is a well populated irrigated- and dry-farm territory. The trade with the farmers occurs when sleighing is good, the coal being sold them at the mine at prices ranging from 50c. per ton for slack to $3.50 per ton for clean lump coal.

A Reason for Idaho's Backwardness

The tardiness of the development of this promising series of coal deposits is accounted for by the fact that they are owned by local Idaho people of small means, and have been situated until a year ago on unsurveyed public land, which, since the discovery of the coal, has been withdrawn as forest reserve, phosphate-rock reserve and for coal classification.



Robt. N. Bell, Idaho

This has made the process of obtaining title from the government difficult, but the present administration of the Interior Department has taken a broader view of the matter and has restored to entry the two sections of land covering the principal development. Final certificate for patent has been issued on these two claims, and with the completion of title, it is likely that these deposits will be more extensively developed as there is a crying demand by the settlers in this locality for cheaper fuel. Soft coal from Wyoming and Utah brings from $8.50 to $10 per ton at the railroad siding and we are living in hope that Idaho will make a little better showing in the coal-production list of the United States is the not distant future.

*State mine inspector, Boise, Idaho.

Note—For lack of space, this interesting report has been curtailed and will be completed in a forthcoming number.

Illinois

By Martin Bolt*

SYNOPSIS—A substantial advance has been made in coal mining during the past two years. No serious labor troubles have been experienced although there have been many petty suspensions. The fatal mining accidents are estimated at 180 for the year, six large new mines have been sunk and the tendency in practice is away from the mine of small production.

Coal mining in Illinois has been making a steady, substantial advance for the fiscal years, ending June 30, 1912 and 1913. The number of short tons mined for the above periods was for the year ended June 30, 1912, 57,514,240, and for that ended June 30, 1913, 61,846,204.

The output of the shipping mines, for the same years, was: June 30, 1912, 56,096,696; June 30, 1913, 60,616,416. These figures show an increase of 4,519,720 tons.

From Jan. 1, 1912, to June 30, 1912, the shipping mines produced 26,574,232 tons; from July 1, 1912, to Dec. 31, 1912, 32,494,086 tons.

Figures at hand at the present time will show that the commercial or shipping mines produced in the calendar



Martin Bolt, Illinois

year 1912 in round numbers 59,000,000 short tons, and from the same source we find that the tonnage during the first half of the year 1913 from the same mines was 28,621,330 tons. Assuming that the same relative increase is maintained the approximate tonnage for the calendar year ending Dec. 31, 1913, will be 62,000,000 short tons.

There is a possibility, however, that the mild weather for the past few weeks will reduce the figures slightly, but not to any great extent.

There has been no serious labor trouble in the mines of Illinois in the year 1913, although there have been a large number of temporary suspensions of single mines. These troubles, while much to be regretted, do not materially affect the total output.

Accidents in the mines of the state heretofore have increased at about the same rate as the tonnage. The number of fatal accidents for 1913, based on former years and figures at hand, will probably be nearly 180 and may be in excess of this number, the estimate for 11 months ending Nov. 30, 1913, is 163.

The fatal accidents in the shipping mines for the years ending June 30, 1912 and 1913, are the same for both years, namely, 173; the nonfatal accidents for the same years are as follows: 1912, 792; 1913, 1016, or an increase of 28.28 per cent. As the figures for the fiscal and calendar years vary only slightly, it is fair to assume that the fatal accidents for the calendar year 1913 will be about what they were for 1912, while the nonfatal accidents will show an increase of nearly 28 per cent.

The number of shipping mines will show a slight decrease, but the average production per shipping mine will show an increase.

There have been six large mines opened in this state during the year, as follows: Franklin County has three and all will be large producers of coal. Christian County has two, the Illinois Midland Coal Co.'s Nos. 7 and 8, located at Kincaid, on the Illinois Midland R.R., seven miles from Taylorville. The Nokomis Coal Co. has also put down a large mine at Nokomis, in Montgomery County. All of the foregoing are in the No. 6 seam, while Newsam Bros. have a new mine at Glasford in Peoria County, which is down to the No. 5 seam.

*Chief clerk, State Mining Board, Springfield, Ill.

Iowa

By L. E. Stamm*

SYNOPSIS—The conditions governing the mining industry of Iowa during 1913 were not materially different from those existing in 1912. The production for the fiscal year ending June 30, 1913, was over 7,400,000 tons, and it is confidently believed that the output for the calendar year 1913 will not vary greatly from that of the fiscal year.

The general conditions of the coal industry in Iowa for the year 1913 were very similar to those existing in 1912. Progress in the mines of the state has been, on the whole, fairly satisfactory during most of the year. However, weather conditions in the months of October, November and December were such that there was a general falling off in the demand for coal of all grades. With the exception, therefore, of the large operations having railroad contracts, the mines of the state did not work up to their capacity during the months named above.

Statistics covering the coal production of Iowa are gathered by the mine inspectors' department for the fiscal year ending with June 30 of each year. Those secured for the year 1913 show an increase of 594,929 tons over the amount produced in the state of 1912. The production for 1913 by districts with the number of miners employed in each is as follows:

COAL PRODUCTION OF IOWA FOR FISCAL YEAR 1913.

	Tons of Coal.	Miners employed
First District	2,813,789	6,345
Second District	2,337,708	4,777
Third District	2,264,260	4,563
Total	7,415,757 Tons	15,685 Employes
Coal Production for year ended June 30, 1912	6,820,828	
Coal Production for year ended June 30, 1913	7,415,757	
Gain for 1913	594,929 Tons	
Fatal Accidents for the year 1913	24	
Non Fatal Accidents for the year 1913	176	

*Secretary Iowa Mine Inspectors, Des Moines, Iowa.

Twenty-three counties in the state are listed as coal-producing. In a number of these the mining operations are conducted on a small scale and the few mines that are operating are worked only in the winter to supply the local trade. Monroe County is the largest producer of coal of all grades. Polk County ranks second and Appanosse third. Last year these three counties yielded 5,243,279 tons of coal, or more than two-thirds of all that produced in the state.

New developments in the coal industry are in progress in several of the larger counties in the state, and the mines now started will be in shape to add considerably to the output for the coming year. Some new developments have also been made in Polk County the past year, and all these point to an increase in the coal production of the state for the coming year.

Iowa had fewer fatal accidents in the mines for the fiscal year of 1913 than for many years. The number of tons of coal mined for each fatal accident was much higher than in former years. The number of nonfatal accidents for 1913 was about the same as for 1912. The majority of the accidents occurring in the mines were caused by falls of roof or slate. These were for the most part in the rooms of the miners with but few on the entries.

The next greatest cause of accidents was that of being struck by cars, falling off cars, etc. These occurred chiefly to the drivers in the mine. There were no accidents of great magnitude in the mines during the year, and none in which more than one person met death at once. Iowa will, therefore, compare favorably with any coal-producing state in the Union with respect to accidents, both fatal and nonfatal.

Both the operators and the miners of this state have an organization and a working agreement is entered into every two years by the representatives of these bodies. Therefore, but few labor troubles occur in the mining industry. Those that do take place are chiefly local and last but a few days, the trouble usually occurring over the interpretation of the working or wage agreement. These are generally settled quickly by the representatives of both organizations.

Considerable improvements have been made in the mines of Iowa during the past year, chiefly in the manner of transporting the coal in the mines. Many operations have installed gasoline motors, others use electrical haulage. Some of the mines of the state are equipped with eletrical hoists. Mining machins have also been introduced in some of the mines, and the general tendency is toward lessening the cost of production by better equipment for handling the product.

In conclusion, it may be said that the total production of coal in Iowa for the fiscal year ending with June 30, 1913, was 7,415,757 tons. It is firmly believed that the production for the calendar year 1913 will approximate that of the fiscal year.

Indiana

By F. I. Pearce*

SYNOPSIS—The coal production of Indiana for the fiscal year ending Sept. 30, 1913 is reported as over 17 million tons. The total number of men employed was 21,683 and the average yearly wage was $736.06. There were in all 59 fatalities in and about the mines of the state.

If the number of tons of coal produced and wages paid mine employees is any criterion, the mining industry of Indiana, as a whole, for the fiscal year ending Sept. 30, 1913, discloses a fairly gratifying condition of both miners and mine operators. Notwithstanding the fact that there were a few operations closed down the entire year and practically all of them lost either a few days, weeks or months time on account of no sale, lack of railroad cars, local strikes or other causes, the production is reported as 17,246,565 short tons, or 877,679 tons less than the largest and 3,041,987 tons more than the second largest production in the history of the state.

Of this production, 9,637,901 tons or a fraction less than 56 per cent. was mined with machines, and 7,608,664 tons or 44 per cent. by hand. This, shows an increase of about four per cent., in the production of coal mined by machines over that of last year. And this production would have been even larger had it not been for the difficulty experienced in undercutting the coal in a number of mines in which mining machines were tried out.

In producing this coal there were used, 526,580 kegs of black powder, 283 cases of "permissable explosives" and 52 cases of Hoynsite safety powder.

While it is true that considerable time was lost at some of the mines on account of causes other than those due to shortage of railroad cars, local strikes and the flood in March, yet the major part of the time lost may be attributed to dull trade, resulting from an open winter, an increased production and extremely sharp competition in securing a market.

The following table exhibits the relative rank of the twelve counties in the number of tons produced and wages paid:

TABLE SHOWING THE TONS OF COAL PRODUCED AND WAGES PAID TO MINERS IN INDIANA FOR THE YEAR ENDING SEPT. 30, 1913 BY COUNTIES—THE BLOCK AND BITUMINOUS COAL EACH BEING SHOWN SEPARATELY

County	Production of Block Coal	Wages Paid	Production of Bituminous Coal	Wages Paid	Total Production	Total Wages
Vigo	109,380	$67,875.12	4,367,565	$4,033,962.91	4,476,945	$4,201,838.03
Sullivan	.....	.....	3,238,642	3,152,995.00	3,238,642	3,152,995.00
Greene	.....	.....	2,753,015	2,312,721.32	2,753,015	2,312,721.32
Vermillion	.....	.....	2,104,229	2,063,846.77	2,104,229	2,063,846.77
Knox	.....	.....	1,664,619	1,291,539.33	1,664,619	1,291,539.33
Clay	250,352	390,262.43	378,037	356,733.59	628,389	746,996.02
Warrick	.....	.....	619,614	500,969.93	619,614	500,969.93
Pike	.....	.....	610,623	548,532.72	610,623	548,532.72
Parke	80,265	110,376.96	465,971	426,296.44	546,236	536,673.40
Vanderburgh	.....	.....	288,058	304,288.82	288,058	304,288.82
Gibson	.....	.....	219,552	212,245.70	219,552	212,245.70
Daviess	.....	.....	75,471	67,363.74	75,471	67,363.74
Fountain	.....	.....	15,584	15,228.70	15,584	15,228.70
Perry	5,588	4,758.15	.....	.....	5,588	4,758.15
Total	445,585	$673,272.66	16,800,980	$15,286,724.97	17,246,565	$15,959,997.63

Vigo County, due to the increase of development in that field recently, exceeded Sullivan as the largest producing county in the state by more than 1,238,303 tons.

Distribution of Product

Of the bituminous coal, 10,078,336 tons were consumed in Indiana, and 6,722,644 tons were shipped to other states. Of the block coal, 203,522 tons were consumed in Indiana and 242,063 tons were shipped outside, or a fraction less than sixty per cent. of the total production was consumed within the state. This shows an increase of about two per cent. in the home consumption of the yearly production over that of any previous year, indicating that the consumers of coal are beginning to realize more than ever, the value of Indiana fuel.

Cost of Production

The total wages reported from the bituminous field was $15,286,724.97, making a fraction less than 91 cents



Frank I. Pearce, Indiana

per ton for the labor cost of production. The total wages reported from the block coal field was $673,272.66 or a fraction over $1.51 per ton for the labor cost of production. These figures show a slight increase in the cost per ton for the labor for the total production of bituminous and block coal over that of any previous year.

Besides the many varying conditions to be met and overcome in the operation of a mine that result in a variation of the cost of producing a ton of coal, one year with another, there are many things which now contribute to increase the cost, and to that extent necessarily add to the selling price. Higher wages are an important factor; deeper mining and the increased expense of keeping the mines in proper condition, more efficient safety appliances to protect life and health, the rising cost of timber and all kinds of material used in a mine contribute to increase the cost of production.

Market Prices

The market price for mine-run bituminous coal (except yearly contracts), f.o.b. cars at the mine, during the period from Oct. 1 to Dec. 31, 1912, ranged from $1.15@1.45 per ton; from Jan. 1 to Mar. 31, 1912 from $1.05@1.25 per ton; Apr. 1 to June 30 from $1.05 (with perhaps some selling as low as $1) @ $1.20; from July 1 to Sept. 30, the selling price ranged from $1.10@1.15 per ton. The market selling price for screened block coal, (except yearly contracts), f.o.b. cars at the mine, from Oct. 1 to Dec. 31, 1912 ranged from $2.10@2.50; from Jan. 1 to Mar. 31, 1913, the price averaged about $2.20; Apr. 1 to June 30 from $2@2.10 and from July 1 to Sept. 30, the price ranged from $2.10@2.20.

The total number of employees reported for the year was 21,683, or an increase of 453 over the last year. Of this number 20,441 were bituminous, and 1242 block mine employees.

The aggregate number of days the mines were reported as being in operation was 29,452, and the number of days idle, due to no sales, 10,408; no railroad cars, 2195; local strikes, 273 and on account of funerals, 35; others causes, 3353.

Average Wages

The total wages reported from the bituminous field being $15,286,724.97 makes an average earning of $747.84 for each bituminous employee. The total wages paid to block coal mine employees being $673,272.66 shows an average earning of $542.08. The aggregate wages for the state being $15,959,997.63 and the total number of employees, 21,683 shows an average earning of $736.06 for each mine employee in the state, which is the highest average wage earned per mine employee.

New and Abandoned Mines

Sixteen new mines, all of which, with the exception of two or three will be large producers were opened up, and eleven mines were abandoned during the year ending Sept. 30, 1913.

Fatalities

During the year there were 59 fatalities. The most prolific causes of accidents were the following: Falling slate at the face, 18; use of explosives, (including firing of shots) 15; mine cars and motors, 7; explosions of firedamp, 6; falling coal at the face, 4; falling slate on the traveling and roadways, 4; in all 54 or 93 per cent. of the total number of fatal accidents, may be attributed to these causes.

Of the six fatal accidents due to explosions of firedamp, three were caused by a suddent liberation of gas following the caving in of the roof and three to firedamp that had accumulated in the mine as a result of booster fans (operated by electric power) which have recently come into use in mines of this state, being allowed to stand idle.

The above data do not include figures for about 450 small mines, clay and strip banks which have an estimated production of about 450,000 tons employing from 2500 to 3000 men since these do not come under the jurisdiction of the mine-inspecting department.

Kansas

By Francis Keegan*

SYNOPSIS—The estimated production for 1913 is placed at 7,400,000 tons. This output, which is a decided increase over previous years, has been accomplished with a decrease in fatalities. The steam shovel is beginning to play an important part in the stripping operations in the Kansas field.

The records in the office of the State Inspector of Mines for Kansas, when completed, will show that in

*Assistant commissioner of labor, Pittsburg, Kan.

round numbers 7,000,000 tons of coal were produced during the fiscal year ended June 30, 1913. Basing estimates on the figures for this period, which shows a marked increase in production over former years, there is every reason to believe that the calendar year 1913, will prove to be the most prosperous in the coal-mining industry in the state's history in point of tons of coal produced, number of men employed and number of days worked. In fact there is no hesitancy in saying that a conservative estimate of the production of coal from the mines, including the strip pits, will reach 7,400,000 tons for the year ending Dec. 31, 1913.

Complete figures are not at hand, but it is estimated that at least 12,000 men worked an average of 210 days in and around the mines during the year. This in itself, is a good record, but the most gratifying part of it is that this success has been attained with a decrease in the number of lives lost.

Total Accidents Have Decreased

During the fiscal year ended June 30, 1912, thirty-seven fatal accidents occurred in and around the Kansas coal mines, whereas during the year ending June 30, 1913, twenty-eight men were killed at the same mines and in the year ending Dec. 31, 1913, there were but 27 fatalities.

When we consider the increase in the production of coal in connection with the decrease in the number of fatal accidents which have occurred, the contrast is just cause for elation and while it is conceded that accidents will continue to occur as long as coal is produced and the number will fluctuate from time to time, we are constrained to the belief that a strict observance of the mining laws by miner and operator alike, will have a great tendency to reduce mortality in our mines.

There is at present a strong disposition on the part of the operator and the miner in this field to observe and comply with the mining laws and with their coöperation and the efforts which are put forth by the Mine Inspection Department in regard to the enforcement of the mining laws of the state, it is hoped that the lives and health of the mine workers may in the future be properly safeguarded.

In many cases during the past year, it became necessary for the inspectors in the performance of their duties to resort to drastic measures in order to secure compliance with the mining laws. Several of the largest mines of the state were closed by the inspectors, principally on account of the poor condition of the ventilation found therein. Aside from this and a number of local strikes, work in the mines was not seriously affected during the entire year.

Recent Legislation

The last session of the Kansas legislature amended the Workmen's Compensation Law, which, while not perfect in all respects, is now one of the best measures of its kind in effect in the United States. The Bathhouse Law was also amended. The size of lockers, number of sprays, the kind and condition of the bathhouse to be maintained at all the mines within the state is now specified in the statutes.

A powder law was also passed by the same legislature and was agreed to by the miners and operators. By its provision the powder is delivered to the miner at his working switch in 25-lb. kegs. This latter provision doubles the size of the package and consequently increases the danger from explosives in the mines.

An appropriation of $3500 was made at the direction of Governor Hodges for the purpose of erecting a building at Pittsburg to house the Government Bureau of Mines' rescue car and for the purchasing of mine rescue apparatus.

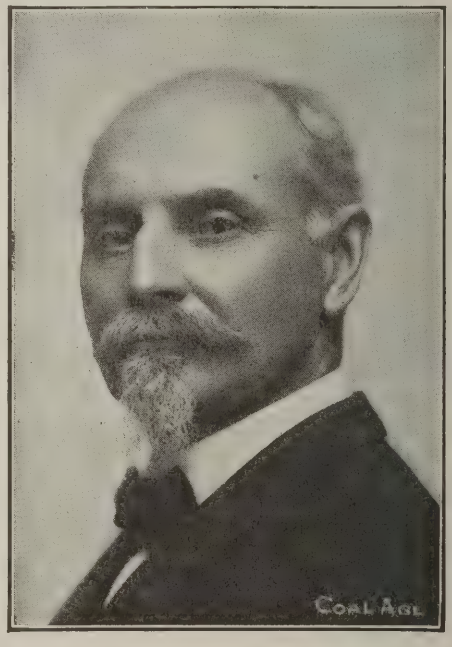
Quite recently a number of steam shovels have entered the field and the stripping of coal by this method is progressing at a rapid rate. The production of Kansas fuel by this means will, therefore, during the next year, reach a large figure.

Kentucky

By C. J. Norwood*

SYNOPSIS—Kentucky has increased its production, due to the opening of new mines, but both cars and labor fail to square with the demand.

Incomplete returns for 11 months of the past year indicate that the output for the year will be about 18,500,000 tons, but the estimate must be accepted with due caution. The increased tonnage is chiefly due to new development. There were no strikes of moment, but the production has been adversely affected by the interruption of traffic resulting from the Ohio Valley floods, and occasional car shortages, especially in the eastern field. There has also been much complaint of labor shortage in that section.



C. J. Norwood, Kentucky

The coke output has increased but I would not hazard an estimate as to the amount produced. There has been a decreased number of fatalities and no explosions.

If the ventilation is defective in any portion of the mine or in the entire mine, the foreman should not hesitate to withdraw the men from the areas affected. It is only by such vigorous measures as this that serious mine disasters may be averted.

*Chief inspector of mines, Lexington, Ky.

Maryland

By William Walters*

SYNOPSIS—It is impossible to state at present the total production of Maryland for 1913, but it is believed that this will be somewhat below that for 1912, which was 4,085,817 tons. There were no serious labor troubles and only nine fatal accidents reported between May 1 and Dec. 23.

In reviewing the coal mining industry of Maryland for the year 1913, it will not be possible to give the exact figures at the present time as to production. The tonnage will be somewhat smaller for 1913 than that for 1912, which was 4,085,817 gross tons, showing a decrease of 80,919 tons from that of the year 1911. The decrease is due to the fact that there were several coal mines idle during the greater part of the year. Some of these mines are good producers and from the best information available at present all the larger coal operators report a decrease, except the Georges Creek Coal Co., Inc., which reports a large increase.

The number of employees in the mines of the state will not be materially changed from that of the year 1912, which was 5703. The average time worked in the mines of the state will be greater than in 1912, which was 245 days.

During the fiscal year beginning May 1, 1913, there have been nine fatal accidents reported up to Dec. 23. Five were caused by falls of rock and coal, and the other four by mine cars. The reports of nonfatal accidents have increased owing to the compensation now paid through the Miners' and Operators' Coöperative Relief fund to employees who lose time on account of injuries received while discharging their duties. Before this act, there was little or no occasion to report minor accidents.

During the year, there were four strikes throughout the state, affecting four different mines, but these were only local at each of the places, and were not general strikes affecting other mines at the same time. Two were to secure the semimonthly pay and only lasted a short time. The other two were on account of trouble at the weigh scales, and were brief as they were settled within a few days after they occurred, and with practically no financial loss to either the men or the companies.

The new child-labor law which went into effect last year is being enforced by the mining companies in the state. Children under 16 years of age who wish to be employed in or about the mines are required to obtain an employment certificate from their parents before they have permission to work.

Michigan

By Thomas Kanary†

There are 22 mines in active operation in the state of Michigan, the majority of these being in Saginaw and Bay Counties. Two new mines were opened in the past year, one at Unionville, Tuscola County, by the Handy Bros. Mining Co., of Bay City, and one in Genesee County by the What Cheer Coal Mining Co., of the same town.

Seven mines were abandoned during the year, four in Saginaw, two in Bay and one in Shiawassee County. There were no strikes of importance. One suspension took place in September over a misinterpretation of the mining scale, but after a week's idleness work was resumed.

There were 169 accidents in and around the mines; two of which proved fatal and six were of serious nature, while 161 were not serious. As a rough estimate, I would figure that 900,000 tons of machine coal and 500,000 of pick coal were mined in 1913 in this state.

*State mine inspector, Midland, Md.
†State inspector of coal mines, St. Charles, Mich.

Missouri

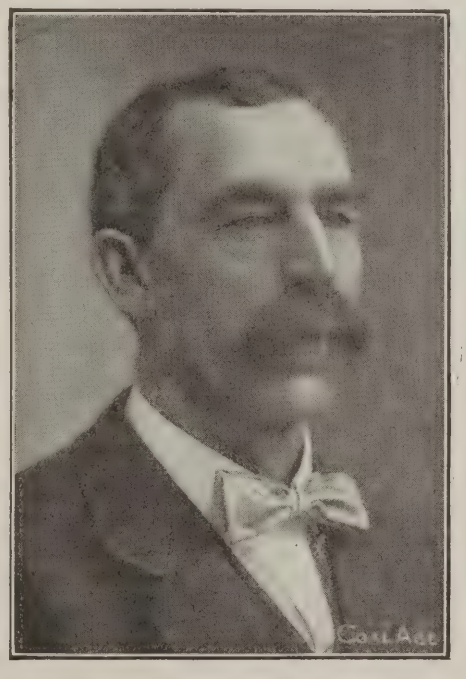
By George Hill* and J. P. Hawkins†

The output of coal for 1913 will be about the same as for 1912, when it was 4,229,907 tons. The labor disputes in the coal fields were unimportant and few in number. The fatal accidents will be 50 per cent. less than last year.

Montana

By J. B. McDermott‡

The reported production of Montana for 1913 is larger than the output of last year, which year produced the largest tonnage on record in Montana. The larger mines were



J. B. McDermott, Montana

operated more steadily this year than last; there were few labor troubles or disputes and those which occurred were adjusted satisfactorily to both parties concerned with little loss of time.

Belt mine, which is the property of the Anaconda Copper Mining Co., was abandoned during this year. It has produced during the last 10 or 11 years some 2,000,000 tons of coal and employed from 200 to 600 persons. All the pumps, engines, rails and cars were pulled out. The

*Chief inspector of state of Missouri, Jefferson, Mo.
†Secretary, Bureau of Mines and Mine Inspection, state of Missouri, Jefferson, Mo.
‡Chief state coal mine inspector, Helena, Mont.

property will be leased for local supply and general commercial use.

New Developments

The Cottonwood Coal Co. is opening a mine in Fergus County near Windham at a place named Lehigh. The shaft, which is to have five compartments, has been in process of sinking since the middle of October. Two compartments of the shaft will accommodate two six-ton skips for hoisting coal; two others will be used for men and materials; and one compartment will be devoted to pipes, etc. The plant is to be modern in every particular, and it is expected to be as large, if not larger, than any other in Montana; James Pearson, manager of the Cottonwood Coal Co.'s properties at Stockett is giving personal attention to this Fergus County operation.

The Republic Coal Co., at Klein, is installing a battery of boilers in addition to those already in use. It is adding a dynamo and generator, electric pumps, and mining machines to its equipment. The shaft in Musselshell County formerly owned by Jacobs & McCleary, who did but little development work in connection with it, has been sold, if all accounts are true.

A rather peculiar condition obtains in our state. Last year 100,000 tons were shipped into Montana from North Wyoming; South Wyoming delivered 400,000 tons to us, and about 300,000 tons were shipped in from British possessions; yet, we are sending coal to Washington, Idaho and Oregon, and competing with these states and Canada in the markets.

Hydro-Electric Plants Compete with Coal

During the present year the Cottonwood Coal Co., at Stockett; the Nelson Coal Co. at Sandcoulee; the Lochray Coal Co. at Tracey; the Sand Coulee Coal Co. at Sandcoulee; James Brodie & Son at Belt; Calone & Johnson also at Belt connected with the hydro-electric line of the Montana Power Co. This power is used to run compressors, pumps, fans, drills, haulage motors, box-car loaders, shaker screens and pneumelectric undercutting mining machines. Not only the mines but the Butte, Anaconda & Pacific R.R., which hauls the ore from the mines in Butte to the smelters in Anaconda has discarded steam engines and runs all its trains, both in freight and passenger service by electric motors on power furnished by the Montana Power Co.

John D. Ryan at the head of "Amalgamated" properties says that the power company has already contracted with the Chicago, Milwaukee & St. Paul R.R. to furnish power for some four or five hundred miles of the line and yet less than a quarter of the possible water power in Montana has been utilized.

This hydro-electric development is a great competitor to the Montana coal mines, yet in face of its continued extension, we have a greater output this year than ever before and production will continue to grow greater in Montana for several years yet. The population in Montana is increasing rapidly; there are over 500,000 people in the state and branch lines are being added to many of the railroads. Our market will, therefore, continue to expand.

COMPARISON OF 1912 & 1913 MONTANA COAL MINES

	1913	1912
Mines reporting production to department	59	48
Machine runners employed	199	181
Loaders employed	506	563
Miners employed	1633	1538
Inside daymen employed	854	746
Outside daymen employed	576	570
Total number employed in and around mines in 1912	3768	3598
Production per man per day employed, tons	4.4	4.3
Total production	3,365,712	3,143,799
Value of output	$5,611,079.72	$5,600,097.00
Tons produced per life lost	224,381	314,380
Tons produced for each serious accident	46,732	66,890
Men employed per nonfatal accident	52.3	76
Men employed for each fatal accident	251	360
Death rate per 1000 employed	3.98	2.78
Serious accidents per 1000 employed	19.1	13.0
Kegs of powder used	80,550	72,740
Pounds of dynamite used	25,765	25,331
Tons of coal mined by machine	1,057,345	1,074,258
Tons shot off the solid and hand mined	2,308,368	2,069,540
Percentage of coal machine mined	31	34

North Dakota

By Jay W. Bliss*

SYNOPSIS—The mild weather of November and December caused a decrease in the production of lignite during the past year. Although 105 mines were in operation, but six fatal accidents have been recorded. The briquetting process, which is now being tried for the first time, is considered the most important event in the lignite industry.

The production of lignite in North Dakota for the year just closed was about 495,000 short tons as against 528,603 for the year 1912. The unusually mild weather which prevailed throughout the state in November and December is responsible for this decrease in tonnage, 30 per cent. of the total output being mined under normal conditions during these two months. It is estimated that not to exceed 20 per cent. of the total output for 1913 has been mined in the last two months of the year.

There have been in operation during the past year 105 coal mines, including a number of strip pits and small underground workings, employing on the average about 950 men during the winter and 350 during the summer. But six fatal accidents have occurred during the year. A number of small new mines were opened up during the fall of 1913, but the demand for coal has been so moderate they have not done a satisfactory business. The state

STATISTICS OF COAL MINING IN MONTANA IN 1913 BY COUNTIES

County	Number of Mines	Operating Days	Total Tonnage Tons	Value at Mines	Hand-Mined Tons	Machine-Tons	Black Powder Kegs	Dynamite Lb.
Carbon	14	198	1,389,640	$2,600,973.24	1,108,816	280,824	30,088	160
Musselshell	4	251	982,516	1,480,046.26	753,376	229,140	30,112	.....
Cascade	16	224	917,148	1,335,536.70	383,362	533,786	17,722	22,624
Park	2	132	27,582	62,085.02	13,987	13,595	359	2,881
Hill	6	220	19,213	51,982.00	19,213	.....	810	.....
Blaine	2	251	8,213	12,055.00	8,213	.....	560	.....
Fergus	6	168	8,067	23,059.50	8,067	.....	200	.....
Sheridan	3	230	5,656	11,151.00	5,656	.....	415	.....
Choteau	3	149	3,996	12,783.50	3,996	.....	166	.....
Custer	1	143	1,983	5,949.00	1,983	.....	100	.....
Missoula	1	100	1,549	6,158.00	1,549	.....	8	.....
Dawson	1	15	150	300.00	150	.....	10	.....
Totals	59		3,365,712	$5,611,079.72	2,308,368	1,057,345	80,550	25,765

† Includes coal shot off the solid.

*State engineer, Bismarck, North Dakota.

as been free from any labor disturbances that could in ny way affect the production.

Much valuable research work has been done at the experiment station maintained by the state under the direction of E. J. Babcock, dean of the State School of Mines. process for briquetting has been worked out that is very romising, and the experiments with lignite as a producer f gas for power, heat and light, have been most satisfactory. It is to be regretted that a recent fire has temporarily crippled the work of the station.

A briquetting plant has recently been completed at Minot, and at this writing, operations have just begun. The success of this plant, which is the first of its kind in North Dakota, will mean much to the lignite industry.



JAY W. BLISS, NORTH DAKOTA

As soon as it is actually demonstrated on a commercial scale that lignite briquettes can be made and disposed of at a profit, abundant capital is ready to be invested in the undertaking. This will result in a development of the lignite mining business that will make it one of the big industries of the state. And North Dakota, having the largest estimated tonnage of workable coal of any state in the Union but one, cannot help but become a heavy coal producer.

The beginning of the briquetting process is considered as being the most important feature in connection with the lignite industry for the year 1913.

Ohio

SYNOPSIS—An increase of 9 per cent. marked the progress of the coal industry in Ohio during 1913. This resulted from the greater steadiness with which the mines in operation and the men engaged worked during that year as compared with former years. The Massillon district is the only section which did not produce as much coal as in 1912.

From all advance reports received from the several coal-mining districts in the state, the output of coal produced bids fair to exceed the output for any previous year. The tonnage for 1913 is estimated to have reached 37,500,000 tons, or an increase of about three million over the tonnage reported for the year 1912, when the output amounted to 34,444,291 tons, which at that time was the largest tonnage recorded; in 12 years the tonnage has almost doubled itself.

According to a summary of mineral production compiled by Edw. W. Parker, of the U. S. Geological Survey, for the year 1912 the value of the mineral resources of Ohio was $111,229,656, an increase of about $14,000,000 over 1911. Of the mineral products of Ohio, coal and clay are rivals for first place in value of production; the production of coal in 1912 amounted to 34,528,727 short tons, valued at $37,083,363, and the value of the clay products was $34,811,508.

Persons Employed

There will probably be very little change in the number of persons engaged in the production of coal during the year 1913. There was a shortage of labor in Jefferson County during the month of November, but this was of short duration as the weather moderated, and there was somewhat of a cessation of the unusually strong demand for coal at that time; this permitted the coal companies to handle with satisfaction the orders they had on hand, and there was, therefore, no coal shortage which, for the time being, seemed to be in store for the users of this kind of fuel.

The majority of large mines worked about full time, and the miners experienced a year of unusual prosperity, not only in time worked, but in wages accruing from the steady demand for the product of their labor.

Car Shortage

The usual draw-back of car supply manifested itself during the months of October and November, and bid fair to prove a severe handicap to the trade. This would undoubtedly have been the result but for the moderating weather which the month of December brought. This condition alleviated what might have been a severe shortage in fuel supply.

Review by Districts

The Hocking district will show an increase in tonnage; the mines of this district worked steadily for the first nine months; about Oct. 1 a car shortage set in, and since that time they have worked about half time up until about Dec. 6, when conditions changed and work was again steady.

The eastern Ohio district will show a large increase as the mines worked full time, and there were no cessations except for repairs and improvements such as the building of tipples, and the installation of larger ventilating equipments.

In Jackson County the tonnage will compare favorably with that of 1912; the supply of cars was better than in former years: the Detroit, Toledo & Ironton Ry., which formerly had its drawbacks, gave better service this year.

Lawrence County will show a large increase in output over the years 1911 and 1912; at that time the large producing mines were on a strike; this was settled in November, 1912, and since that time they worked fairly well; it is estimated that the tonnage of 1912, which was 88,000 tons, will probably be increased to over 200,000 tons. The coal in this county is practically all run-of-mine.

The Massillon district, according to advance reports,

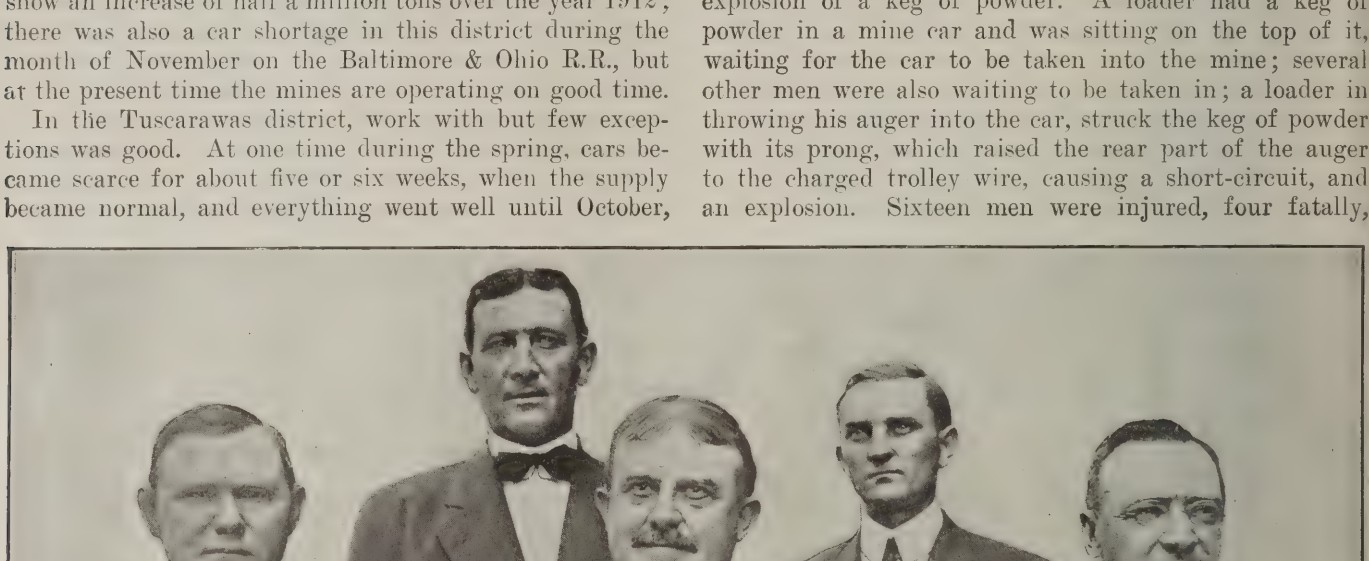
will not come up to the year 1912; there was a car shortage in this district also for more than two months, and the mines as a rule worked about two-thirds time.

The Crooksville district is reported as showing an increase, and the mines worked more steadily than in any other year, but a shortage of cars developed in September, and the mines for two months worked about half time.

The Cambridge district, taking as the standard one of the largest coal-producing companies, will show increases, notwithstanding the severe handicap of the floods, high waters, etc.; it is estimated that this company alone will show an increase of half a million tons over the year 1912; there was also a car shortage in this district during the month of November on the Baltimore & Ohio R.R., but at the present time the mines are operating on good time.

In the Tuscarawas district, work with but few exceptions was good. At one time during the spring, cars became scarce for about five or six weeks, when the supply became normal, and everything went well until October, when a shortage again manifested itself, noticeably on the Baltimore & Ohio. The Pennsylvania gave much better car service, but the mines located on this road only worked four days a week for several weeks. However, it is estimated that the tonnage of this district will show an increase of from 10 to 12 per cent. over the previous year.

The tonnage of Muskingum County is estimated to be about the same as for the year 1912; the car service, with but few exceptions, was good; the flood was a severe handicap to the mines of this county, and caused them to be idle for a long period of time; however, the mines that were not so affected, operated on better time than the previous year.



THE OHIO MINING COMMISSION APPOINTED TO DEVISE AN EQUITABLE PLAN FOR WEIGHING COAL

On the front row, beginning on the left: State Mine Inspector J. C. Davis, Judge Crow and Prof. M. B. Hammond. In the rear: J. M. Roan, an operator, and Morris Albaugh, a miner.

ACCIDENTS

The year 1913 will record a larger number of accidents than any year since the creation of the mining department. While it is true that there will undoubtedly be a much larger increase in tonnage, the accidents have increased out of all proportion to what they should.

An explosion occurred in the Imperial No. 3 mine, operated by the Imperial Mining Co., Noble County, Ohio, on the evening of May 17, 1913, between the hours of six and seven, at which time 27 men were in the mine. Work was being rushed for the completion of a new motor road, and according to testimony given at the coroner's inquest, no inspection had been made of the working places by the fireboss, and a workman is supposed to have entered one of the rooms, igniting a body of gas. The repair work had cut off the ventilation and permitted the gas to accumulate. Fourteen miners were killed.

Another accident of unusual cause occurred at the Jefferson mine No. 3, Piney Fork, Jefferson County, Ohio, on the morning of June 16, which resulted later in the death of four persons who were burned severely, by the explosion of a keg of powder. A loader had a keg of powder in a mine car and was sitting on the top of it, waiting for the car to be taken into the mine; several other men were also waiting to be taken in; a loader in throwing his auger into the car, struck the keg of powder with its prong, which raised the rear part of the auger to the charged trolley wire, causing a short-circuit, and an explosion. Sixteen men were injured, four fatally, their deaths occurring within two weeks after the accident.

The fatal accidents up to Dec. 23 number 163, and by the close of the year they will probably total 170. This would represent an increase of 25 per cent. over the number of fatalities reported during 1912, when 136 occurred. Of this number over 90 will be due to falls of roof and coal; 10 to shocks from electricity; 28 were due to mine cars, an increase of 116 per cent.; six were due to explosions of powder; 15 to explosions of gas; five to mining machines and motors, and seven to miscellaneous causes; at the present writing, falls of roof and coal will show a decrease in number as compared with the year 1912.

MINE FIRES

Mine fires occurred at two of the large producing mines of the state during the year, but with good management and careful judgment, no serious effects were caused by either, except the loss of the operation of both of them, as the fires necessitated the complete sealing of the mines. The first fire occurred at the New Pittsburgh No. 7 mine, and was supposed to have originated from a short-circuit on the trolley line, caused by a fall of roof. Arrangements were made immediately after locating the fire to seal the

mine, which was effectively completed in about four days time. The fire originated on Mar. 30, and on June 7 arrangements were completed for reopening the sealed portion of the fire territory; while no fire was discovered, an excessive heat was found in the fire zone, and it was decided to reseal that section of the mine. On Nov. 29, another inspection was made of this territory, and the fire found to have been entirely extinguished and permission was given to the management to clean up this portion of the mine and operate it with open lights.

The second mine fire occurred on Nov. 1 at mine 301, operated by the Sunday Creek Co., of Columbus, and located in Perry County, Ohio. This fire was located about 1000 ft. from the main opening, and it was considered useless to try to extinguish it, and work was begun at once to seal it and allow it to smother out. While the work of sealing the mine was in progress, several explosions took place, and the work was considered too dangerous and hazardous to continue. Orders were then given to commence to seal the mine from the outside, as it was connected with mine 302 operated by the same company, and was threatening to endanger that property also; this work was temporarily done on the night of Nov. 9, and the permanent stoppings were completed on the inside on Nov. 12.

Mine-Rescue Car

The general assembly of the year 1913, provided funds for the purpose of purchasing and equipping a mine-rescue car for emergency use in case of mine explosions, fires originating in mines, or for any emergency that might arise and the car will probably be ready for use in the early part of 1914.

Legislation

Several new laws were enacted by the same legislature affecting the mining industry of the state, and several amendments to old laws were also passed at that time, the most important of which were one relating to the right of action in case of death in a mine; another to the use of calcium carbide in the mines and a third relative to the approaching of abandoned workings. Another most important act of this legislature was the enactment of a statute creating the industrial commission of Ohio, superseding the state liability board of awards, abolishing the department of commissioner of labor, statistics, chief inspector of mines, chief inspector of work shops and factories, chief examiner of steam engineers, board of boiler rules, and the state board of arbitration, merging certain powers and duties of said departments to said industrial commission of Ohio, and granting said commission certain other powers, and repealing a number of sections formerly in force. This commission took charge of these several departments on Sept. 1, organized the work and will from now on administer and superintend the work formerly done by these different state departments.

Joint Resolution H. B. No. 38

Perhaps no question brought to the attention of the legislature in a number of years so vitally interested the persons connected with the mining industry of the state as Senate Bill No. 23, which related to the method of weighing coal at the mines throughout the state; the agitation both pro and con became so animated, that it resulted in the passage of a joint resolution providing for the appointment of a commission to investigate an equitable method of weighing coal at the mines, and their report to be filed with the governor by Dec. 1. The commission was appointed and on Dec. 17 filed with the governor an exhaustive report covering its investigations of coal mining in this and other states, and recommending that miners be paid on the run-of-mine basis.

This commission also recommended legislation for the purpose of conserving our coal resources; for the appointment of safety mine foremen; for the regulation of solid shooting; to provide for emergency supplies, and to regulate the weighing of coal at the mine. This report, and the other legislation aforementioned, will be placed in the hands of the general assembly by Governor Cox, at a special session to be called in the early part of the month of January. New wage scales are to be made in April, so it would be difficult at this time to give with any degree of accuracy just what the state of the coal trade will be for the year 1914.

Oklahoma

By Edward Boyle*

SYNOPSIS—The closing months of 1913 showed a satisfactory increase over the production of the preceding year. Not only has the total output been increased, but the percentage of pea and slack has been reduced, securing a correspondingly greater amount of the larger sizes.

As the year of 1913 drew to a close the production of the mines became more gratifying, as it appeared to show a substantial increase over previous years. The output was, however, somewhat curtailed by three large producers, located in Haskell County, being idle almost the entire year. These were placed in the hands of receivers in 1912 and declared to be an unprofitable mining venture under the present scale of prices for dead work. Aside from this shutdown a few of the older mines in the McAlester field suffered a loss in production on account of a squeeze which threw them idle so far as coal production was concerned for several months. The total production for the year will reach approximately 4,000,000 tons against 3,600,000 for the year 1912 or a gain of 400,000 tons. The counties producing most of this coal are Cole, Pittsburg, Latimer, LeFlore, Haskell, Okmulgee, Tulsa and Craig. The present indications are that Pittsburg will lead in production, as in the previous year. Okmulgee County, which is known as the Henryetta field, will no doubt take second place in point of production. Okmulgee will, however, lead the state in machine-mined coal. Owing to the measures here being practically level or with but a slight pitch, machine mining is a practicable and successful method of operation in this field.

What is known as the McAlester field, or Pittsburg County, is just the reverse, having a pitch running from 25 to 45 deg., which makes machine mining impracticable or almost impossible. This year, however, will show a marked decrease in pea and slack coal over previous ones with a corresponding increase in lump and nut coal. The miner is, therefore, taking more care and exercising more judgment in preparing his product for market.

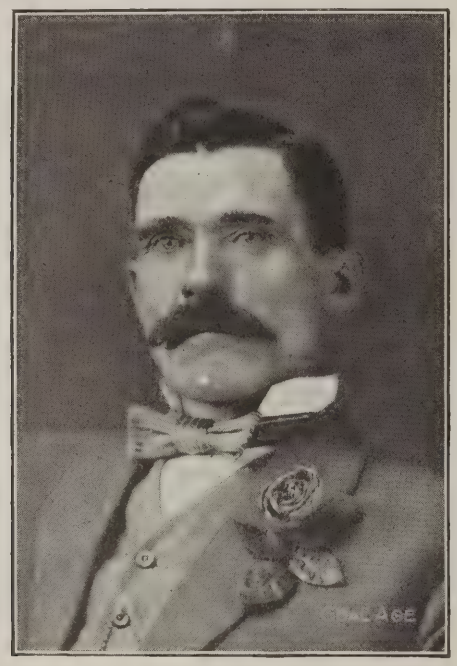
*Chief mine inspector, McAlester, Okla.

The total production of the different grades of coal produced in the last fiscal year which ended June 30, 1913, was as follows:

Lump, 792,995 tons; nut, 194,178; pea and slack, 532,927; run-of-mine, 2,277,799; total, 3,797,899 tons.

The gain and loss of the different grades of coal mentioned above over the year ending June 30, 1912, is as follows: Lump gained, 83,460 tons; nut gained, 13,271; mine run gained, 795,110; total, 891,841; pea and slack loss, 32,927 tons.

Oklahoma is now profiting by the strike in Colorado, which has been in the past, one of Oklahoma's strong competitors. Oklahoma coal is of good grade, which averages about 60 per cent. in fixed carbon. Several veins make excellent coke, many ovens having been built in this field but for several years these have been idle. There is no present indication of resumption of the coke industry



Edward Boyle, Oklahoma

in this field. There has been practically no changes in operating companies in the past year and but few new developments. Almost all land in Oklahoma containing coal is segregated by the National Government and leased through the Secretary of the Interior and for several years the leasing of coal lands has been discontinued.

As this is a very dangerous field almost all mines generating large quantities of gas and the dust being of a highly explosive nature, the decrease in fatal accidents in the past year over previous periods is highly gratifying and indicates better management and regard for the mining laws. The calendar year shows the death list to be 23. These met their death from the following causes: Falling rock, 11; powder burns, 3; windy shot, 1; runaway trip, 1; killed by cars, 4; gas explosion, 1; caught by cave-in in air shaft, 1; electrocuted, 1. The total number of non-fatal accidents was approximately 94. The total number of men employed both under and above ground was 9000.

The present outlook is considered bright and extensive improvements are anticipated during the coming year.

Pennsylvania

By Frank Hall*

SYNOPSIS—The production of the anthracite region has increased 6½ per cent. and of the bituminous fields 4½ per cent. Business has been brisk most of the year.

The great coal-producing territory of Pennsylvania maintained its annual habit of breaking all previous records of production. A careful estimate shows that the output in the bituminous region will reach the vast proportions of 168,000,000 net tons, and in the anthracite region about 90,000,000 net tons, making a total of 258,000,000 net tons. This amount equals about one-half the entire production of the United States and one-fourth the tonnage of the world.

The production in the anthracite region for 1912 was 84,426,869 net tons, and in the bituminous region 160,830,492 net tons.

Production by Districts

The estimated production in the anthracite region for 1913 was as follows:

District.	Anthracite Gross Tons	District	Bituminous Net Tons
1	3,976,000	1	5,000,000
2	4,974,000	2	8,900,000
3	3,217,000	3	3,600,000
4	4,300,000	4	4,800,000
5	3,450,000	5	6,000,000
6	4,580,000	6	6,000,000
7	5,500,000	7	6,000,000
8	4,132,000	8	5,000,000
9	5,116,000	9	7,500,000
10	5,025,000	10	4,750,000
11	5,500,000	11	8,300,000
12	2,883,000	12	6,066,000
13	2,275,000	13	4,000,000
14	3,150,000	14	7,000,000
15	2,790,000	15	6,000,000
16	2,999,000	16	7,000,000
17	4,637,000	17	6,010,000
18	2,750,000	18	4,500,000
19	3,150,000	19	8,825,000
20	2,400,000	20	6,300,000
21	3,516,000	21	7,000,000
		22	5,000,000
		23	6,750,000
		24	6,070,000
		25	6,010,000
		26	5,944,400
		27	4,860,000
		28	5,700,146

The coke tonnage is estimated at about 21,000,000 tons. The number of employees in the anthracite region for 1913 is estimated at 180,000, and in the bituminous region at 185,000.

Accidents

The number of fatal accidents in the anthracite region was 615, and of nonfatal accidents 1238. There were 526 fatal accidents in the bituminous region and 1164 nonfatal accidents. In both regions a regrettable increase in fatalities is recorded.

Two disasters of the year were of a serious character and resulted in the loss of many lives. On Aug. 2 an explosion occurred at the Brookside colliery of the Philadelphia & Reading Coal & Iron Co., in which 20 persons were killed. This explosion has never been satisfactorily explained. Various theories have been advanced as to its cause, but it still remains a mystery. The tragic aspect of this disaster is accentuated by the fact that while only two men were killed by the original explosion, 18 others (including the superintendent, the foreman, nine rescuers and seven tunnelmen) were killed by a second explosion caused by the tunnelmen igniting the gas

*Deputy chief, Department of Mines, Harrisburg, Penn.

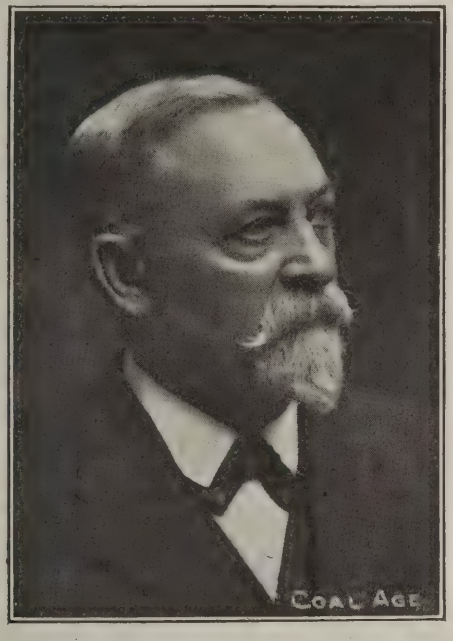
released by the fall of a stump pillar following the first slight explosion.

In the bituminous region a disaster of far greater magnitude occurred at the Cincinnati mine of the Monongahela River Consolidated Coal & Coke Co. on Apr. 23, in which 97 lives were lost. This was an explosion of gas that had accumulated from a clay vein and was ignited by the naked light of a miner.

Labor Troubles and Car Supply

In the anthracite region there were strikes of brief duration in 13 of the districts. Many of these were what is known as "button" strikes. A strike of this kind has for its whole cause the objection raised by some of the employees to the employment of a few men, who do not wear the button, which is worn by members of the United Mine Workers of America as a distinctive badge. In some cases, the failure of even one man to wear a button will precipitate a strike.

In the bituminous region there were slight labor troubles and disputes in 11 districts. In both regions



James E. Roderick, Pennsylvania

the labor troubles and the occasional shortage of car supply probably reduced the production by 500,000 tons.

Safety Conditions

There is a very evident and general desire on the part of the operators to look after the safety of their employees. One prominent phase of this work is the establishment of hundreds of first-aid squads and of many rescue corps, the members of which are selected men, carefully and thoroughly drilled and supplied with the latest and most complete outfits for the successful conduct of this important work.

Outlook for 1914

In making predictions as to the trade in 1914, the inspectors as a rule are optimistic and a majority of them look for an increased tonnage. It is a difficult matter, however, to forecast the future of the coal industry. Its prosperity is so closely connected with the prevailing industrial conditions that a depression in almost any line of commercial activity is likely to prove disastrous. Just what effect federal legislation will have on the great corporations of the country cannot be predicted with any degree of certainty, but undoubtedly there will be a more or less protracted continuance of the present unsettled conditions, and the coal production will naturally be curtailed thereby.

What results may follow from the direct mining legislation recently enacted in other states, is another problem that will confront the mining people in Pennsylvania. But notwithstanding the acknowledged uncertain elements that will be factors in the near future, there is a general feeling of hopefulness pervading the trade.

Pennsylvania, Anthracite

Special Correspondence

SYNOPSIS—It is estimated that the 1913 anthracite production will exceed that of 1912 by about five million tons. Many improvements have been introduced, including cutting machines, steel mine timber, concrete dwellings, etc., that will render the year memorable.

Notwithstanding the popular notion that the number 13 is a "hoodoo," the year 1913 just passed may be considered as one of the most successful in the history of the anthracite-coal industry. In spite of the unseasonable weather during the latter part of the year, which seriously affected the consumption, it is estimated that the production for the entire year owing to the heavy shipments of the early months will pass that of 1912, by at least 5,000,000 tons.

This year will be remembered not so much for its production record, however, as for the renewed endeavor to reduce mine accidents and fatalities. Mine disasters on a large scale have never been common in this region. The past year has been marked by a development of modern practice in mining and the coöperation of the coal companies in bringing to bear concerted action to promote the education, safety, efficiency and welfare of the miners.

The advancement in the science of mining has been marked by the adoption of concrete and other fireproof materials in the construction of breakers and buildings, and in the substitution of steel and concrete for wooden timber underground. For the first time in the history of the anthracite industry, undercutting machines have been put into operation by several companies, and the increased production has proven them to be successful. The installation of several large subterranean pumping plants to remove millions of gallons of water per day in order to reclaim coal that heretofore had been thought irredeemable is another step forward in the development of the industry.

The increased use of electricity in and about the mines is also quite noticeable. Several of the older operations have added generators to their power equipment and some of the new ones to be opened up next year have already been designed to use electricity exclusively.

There have been but few serious labor troubles affecting the production of coal in Pennsylvania during the past year. Numerous local difficulties known as button strikes have occurred, but for the most part these were of short duration. In fact, the number of these petty button strikes during 1913 has been greater than all the similar

cessations during the previous 8 or 10 years put together. The effect of these small strikes on the coal output was noticeable but counterbalanced to a great extent by the slackness in consumption and demand due to the mild winter.

Numerous labor-saving, time-saving and safety devices added during the past 12 months have not only increased economy in production and preparation, but have also materially reduced the number of accidents in and about the mines.

There were more institute meetings, mining congresses and safety conventions held in 1913 than in any other single year in the history of the coal-mining industry. This is strongly indicative of the coöperative spirit of the numerous coal companies to promote their mutual welfare. Though the results already attained by this "get-together" attitude has been gratifying, it is hoped that the progress of the ensuing year will be still greater, for it will not be hampered by the peculiar difficulties which have been recently overcome.

To increase the production of coal without a coincident increase in the number of accidents has been the aim of the extraordinary efforts put forth by the coal companies in promoting the efficiency, safety and welfare of their employees. Some companies have appointed "Safety Engineers" to work in conjunction with their operating staff. Some have established "Efficiency and Safety Committees" to assist their inspecting department; some have increased their supervising force by adding a large number of assistant foremen or sub-foremen whose duties consist of keeping a double lookout with a view to accident prevention.

One firm has taken steps to educate its employees by publishing at its own expense an excellent magazine on mining. Lantern slides and moving pictures have also begun to play a prominent part in the promotion of the "Safety First" or "Accident Prevention" movement that is now popular everywhere. First-aid and mine-rescue work has also made considerable progress, and it is gratifying to note from the many contests that the men engaged in this excellent work have become highly proficient. Outside hospitals have been erected at nearly all the collieries in the anthracite field, similar to those built under ground some years ago.

The bathhouses, messhouses and clubrooms erected at many collieries throughout the coal region have added considerably to the comfort of the mine workers. In one locality concrete dwellings have been built on the Edison plan and are rented to employees at an exceedingly low rate. All these improvements indicate that progress has been made in the right direction and that mining of coal has been made much safer than it has ever been heretofore.

South Dakota

By Otto Ellerman*

SYNOPSIS—South Dakota coal mines are of such little importance that the inspector has no record of their output.

I have received frequent inquiries regarding the coal mines of this state and from what information I can gather, they are as yet few in number and small. Meade, Perkins and Harding counties seem to have small coal properties and these are worked during the winter months only, some employing as many as eight men. The coal is a very poor grade of lignite but it makes a satisfactory fuel for the homesteader and rancher. The price obtained is $4 per ton at the property and there is a ready market for the entire production. As yet I have been unable to gain satisfactory data as to the total output and the number of men employed by the industry.

*State inspector of mines.

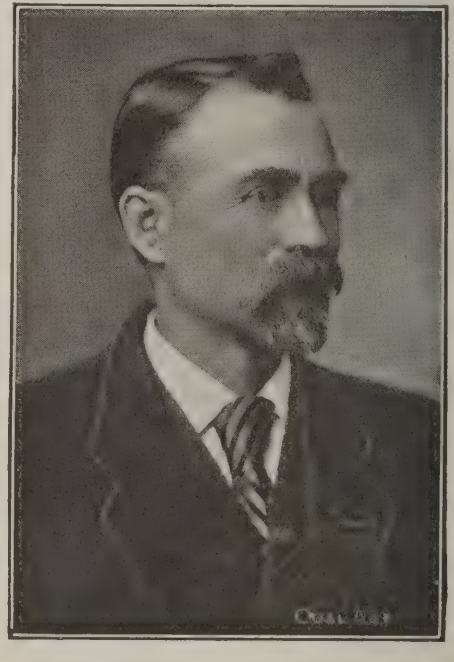
Tennessee

By George E. Sylvester*

SYNOPSIS—Conditions in Tennessee have been about normal and the coal production may be roughly estimated as 6,600,000 tons. There have been no labor troubles, no serious disasters and only 33 fatal accidents during 1913.

As to the coal industry in Tennessee in 1913, it may be stated in a general way that normal conditions were maintained.

With the data at hand at present the output cannot be accurately stated; it probably did not vary materially



George E. Sylvester, Tennessee

from that of the year before, and might be roughly estimated at about 6,600,000 tons.

There appears to have been a slight falling off in the amount of coke produced, but as this tonnage is small, the total is quickly affected by a variation in the output of one or two of the principal operations.

There were no labor troubles reported during the year. Many of the mines, especially in the eastern district, report car shortage, and the time lost for this reason, especially in the busy season, was a serious handicap to a number of the mines.

The coal market in this state is largely local, and the mild weather of the fall and early winter kept the market from being as brisk as usual.

There were no serious mine disasters during the year. The number of fatal accidents which occurred was 33.

*Chief mine inspector, Nashville, Tenn.

The larger part of these were attributed, as usual, to falls of slate or coal. Many were classed as unavoidable, or due to the carelessness of the miner. The number while considerably larger than that of last year, which for some reason was abnormally low, does not vary greatly from that of the average of the state in the past.

There has been increased interest in first-aid work among the miners, more especially in the eastern coal field, and a highly successful first-aid contest was held at Knoxville in the fall. This was promoted largely by the miners themselves, through the Society of Tennessee Mine Foremen.

Legislation was enacted during the year requiring the keeping of first-aid supplies at mines, also in regard to the maintenance of mine-rescue corps. No change was made in the general mining law.

Texas

By Isidore J. Broman*

SYNOPSIS—The higher price of oil has made the coal business phenomenally good. The fatalities number about one per thousand men employed.

The year 1913 has been the most prosperous year in the history of coal mining in this state. The rise in the price of crude petroleum has practically eliminated competition from this source and the growing sentiment in favor of lignite as a cheap but valuable fuel has stimulated its production. In spite of the unsettled conditions on the border, which have caused a temporary decrease in the production at Eagle Pass and Laredo, the output for 1913, generally speaking, will be considerably in excess of that of last year, this increase being due to better market conditions and more uptodate methods of mining.

Bituminous Coal

I estimate the production of bituminous coal for this year to be about 1,300,000 tons, or about 150,000 tons greater than the production for 1912. The mine value of this output will approximate $3,000,000.

The bituminous mines are located in Eastland, Erath, Maverick, Palo Pinto, Webb, Wise and Young Counties, these mines employing about 4000 men. The largest mining company, the Texas & Pacific Coal Co., employs about 1500 miners with an average daily production of nearly 2600 tons. Union labor, exclusively, is employed in the bituminous field. There have been no labor troubles as all differences are settled by arbitration.

Lignite

The production of lignite may be estimated in round numbers at about 1,000,000 tons with a mine valuation somewhat over $1,800,000. About 1600 men are employed. The lignite mines of Texas are located in the counties of Bastrop, Hopkins, Houston, Lee, Leon, Medina, Milam, Rains, Robertson, Titus, Van Zandt and Wood. The largest mines are located in the county last mentioned.

The labor employed in the lignite mines is largely Mexican and negro. There has been a great scarcity of labor in the lignite field and production has suffered from this cause and from the unreliable class of labor employed. Much damage was done to the lignite mines and the railroads by the terrible floods which visited Texas during the fall.

Accidents

As regard the safety of mining the state of Texas can show a very good record. During the year 1912 the percentage of fatalities per 1000 men employed was 1.2. The percentage of fatalities for the present year will



I. J. Broman, Texas

probably not be in excess of one per thousand men employed.

During a heavy rain which caused the overflow of a creek and a cave-in, one mine in the Rockdale lignite field was partly flooded with water, imprisoning eight men. After heroic efforts seven miners were brought out alive after having been entombed six days. This is the only accident of the kind in the history of coal mining in Texas.

The average mine operator in this state is willing to do more than is legally necessary to make his mines safe and the enforcement of the law is accomplished with little difficulty.

Generally speaking, with improved mining methods, better market facilities and increased demand for Texas fuels by the industries of the state the outlook is good for a steady increase in the production of Texas coal.

*State mine inspector, Austin, Tex.

Utah

By J. E. Pettit*

SYNOPSIS—Output of coal increased 6.5 per cent., while coke production fell off 9.4 per cent. New mines made good showing. Sixty mining machines were installed. Outlook is for a banner year.

The coal output for the state of Utah for the year 1913, is 3,289,255 short tons, an increase of 200,899 tons, or 6.5 per cent. over last year. The production of coke is 314,694 tons, compared with 347,356 tons for 1912, or a decrease of 9.4 per cent.

*State mine inspector, Salt Lake City, Utah.

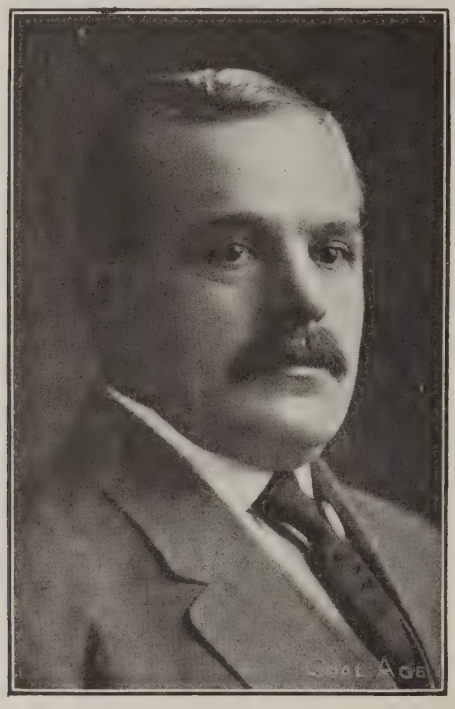
The main factor responsible for the decrease of the coke output was the disastrous fire, which occurred at Sunnyside, on May 26, when the No. 2 bridge and coal-crushing plant of the Utah Fuel Co. was burned. This accident caused a loss to the company of about $60,000, necessitating the working of the two mines, one by day and the other by night shift, and crushing the coal over an improvised bridge. The consequent unhandy manner of handling coal also cut down the output of the Sunnyside mines at least 100,000 tons.

A shortage of railroad cars in the fall also contributed to the small per cent. of increase of coal, but during the winter months no shortage of cars has so far been experienced.

Four thousand, six hundred fifty-nine men have been employed in and around our coal mines and coke plants during the year., showing an increase of six hundred seventy-one men.

New Operations Make Good Showing

While a good increase has been shown in the production of the old producing mines, some of the new operations



J. E. Pettit, Utah

have done well, notably the Storrs mine of the Spring Canyon Coal Co., with an output of 116,000 tons; the Willow Creek, or Castle Gate No. 2 mine, with an output of approximately 54,000 tons, and the American Fuel Co., with 50,160 tons.

Seventy-six new coke ovens have been built at Sunnyside during the past year and are now in operation, making a total of 726 beehive ovens now in operation. Seventeen fatal accidents occurred during the year, or 3.64 men per thousand. Twelve accidents occurred in the mines, and five on the surface at or near the mines. This is one less fatal accident than last year, when 16 men were killed in the mines and two on the surface. As a result of the fatalities this year, there are five widows and six fatherless children. There were also 39 serious and 60 minor accidents.

There were also 39 serious and 60 minor accidents.

The hydrocarbon output was 23,930 tons, a decrease of 9697 tons, or 2.8 per cent., due to the limited demand for this product in the Eastern market.

Coming Year to Show Large Increase in Output

The coming year is expected to show a larger increase than ever before in the production of coal. The Standard Coal Co., situated in Spring Cañon, expects to begin shipments of coal by Feb. 1, their tramroad, tipple, and railroad connections being practically completed. The Carbon mine of the Panther Canyon Coal Co., owned by the Sharp interests, has its tramroad, tipple and side tracks 90 per cent. completed, and will produce a thousand tons per day before the end of the year. The Cameron mine, one mile north of Castle Gate mines, will reach coal through a pair of slopes driven in rock 720ft., by Jan. 15, and will be a steady producer, with F. N. Cameron as owner and manager. The Ketchum Coal Co. will also commence operations during the coming year.

Some 60 mining machines of various standard types have been installed in the mines of the state during the year, and over one-third of the output has been undercut by electric and air machines. No labor troubles have occurred during 1913, and conditions as far as can be judged locally are favorable for a prosperous coal-mining year in 1914.

Washington

By James Bagley*

SYNOPSIS—The production of coal in Washington reached its maximum in 1910 since when it has slightly decreased. There have been but few changes in mine ownership and but 19 fatal accidents during the year.

In the year 1910 the coal production of Washington broke all previous records, reaching a total of 3,979,569 tons. Since that time there has been a slight decrease, owing to the substitution of oil for fuel on the railroads and many of the steamers running out of Puget Sound ports.

The reports received for the first 11 months of the year 1913 and a conservative estimate of the production for December added to this places the tonnage for the year at 3,677,946 tons, an increase over the previous year of 331,000 tons.

Coal is mined in six counties of the state, Kittitas County showing the largest production with King County a close second; Pierce, Thurston, Lewis and Whatcom Counties rank in the order named. Coke is manufactured in Pierce County only and will show an increase of about 25,000 tons over the preceding year, its production being approximately 49,000 tons in 1912.

There has been little change in the ownership of properties, the largest transaction being the purchase of the Summit mine located near Cle Elum in Kittitas County by the Roslyn Fuel Co. This is being reopened.

There have been no strikes of any importance during the year, the mines at Renton and Bayne still working on the open-shop plan. There has been no change in the wage-scale agreement, which runs for two years, and does not expire until Sept. 1, 1914.

*State mine inspector, Seattle, Wash.

There have been 19 fatal accidents for the first 11 months of the year, the largest percentage of these being from falls of rock and from mine cars. The most serious accident was an explosion of gas at the Divide mine in Lewis County on Nov. 6 in which three men met their death

The legislature of 1911 provided for the appointment of a commission to revise the laws regulating the operation of coal mines. This commission compiled a code, which was submitted to the 1913 legislature, which failed to include it among the laws passed. This is to be deplored, as both the miners and operators were represented on this commission, and it was supposed that they had compiled a code that satisfied both.

Most of the large companies are taking an interest in rescue and first-aid work, and most of them have rescue apparatus at their mines. The Bureau of Mines foreman for the Seattle station goes to the different mines to train men in this work and in this way it is believed better results are obtained than by waiting for the men to be sent to the station.

West Virginia

By Earl A. Henry*

SYNOPSIS—In 1913 the production in West Virginia probably increased 8½ per cent. despite the important labor troubles. The development in this state is so rapid that a record increase in output is expected this year.

From the records at hand in the Department of Mines of West Virginia, the total production of coal in 1913 in this state was approximately 71,700,000 tons. There were 3,000,000 tons of marketable coke produced. Thus in the year 1913, the coal production increased about 5,600,000 tons, and the output of coke, 2,000,000 tons. It will be seen from the above figures that the production in this state has materially increased, notwithstanding the general unrest of labor.

Effect of Strike on Tonnage

During a period practically embracing all the first nine months of the year, there was a strike in the Kanawha field in the mines along the Chesapeake & Ohio Ry. Moreover there was a large reduction in tonnage in the New River and Logan County fields because of the unsettled labor conditions arising out of the strike in the Kanawha field proper. Had it not been for this strike and labor troubles of like kind all along the lines of the Chesapeake & Ohio Ry., as well as in other sections of the state, the production of coal for the calendar year 1913 would have been nearly 70,000,000 tons. In other words, the labor troubles caused the production to be about 6,000,000 tons lower than it would otherwise have been.

This increased production of 1913 over that in 1912 resulted from several causes: Increased development of the coal territory, added improvements and an attempt to utilize every opportunity to produce a maximum tonnage in response to the sustained strength of the coal market. The market for West Virginia coal has increased in the last 18 months and the prices for all grades of coal have steadily and substantially increased.

It is somewhat generally believed by the operators that West Virginia coal will never be sold so cheaply in the future as in the past. It is thought that the producers of coal have begun to realize what it costs to produce a ton of their product and they are not disposed to sell it at a figure lower than it costs them.

Remarkable Development in State

The development of new mines in West Virginia in the past 12 months is remarkable. At the present time, in Logan County alone, there are about 25 new mines being opened in the Winifrede, Island Creek, and No. 2 Gas seams, and it is estimated that within the next seven or eight months practically every one of these 25 new mines will be shipping coal, thus adding most materially to the production of 1914.

In Raleigh County, there is also extensive development and the mines in that section, especially those on the Winding Gulf branch of the Virginian Ry. are rapidly increasing their output. The tonnage originating on the Virginian Ry. in West Virginia is now nearing the half million mark and with the new mines being opened the production should in 12 months be doubled. Extensive developments are also being made in the Pocahontas and Fairmont fields.



Earl A. Henry, West Virginia

As practically 90 per cent. of the coal produced in the state passes beyond its boundaries, the prosperity of the coal industry in the state depends entirely on adequacy of transportation facilities. The railroads, especially the Chesapeake & Ohio, have failed in some cases to keep pace with the mining development.

The Coal & Coke Ry., which passes for 200 miles through a rich country, has never equipped itself to handle the traffic which would naturally develop if facilities were assured. For this reason this road, which could have made its contiguous territory one of the most important coal fields of West Virginia, now passes over coal lands the greater part of which are undeveloped.

What West Virginia Might Do

There are working in and around the mines of West Virginia approximately 75,000 men, and there are about

*Chief of Department of Mines, Charleston, W. Va.

900 coal mines belonging to approximately 400 different companies. There is sufficient territory already developed in these 900 mines in which to place 30,000 more men, who could increase the output of coal at least 20,000,000 tons per year. Of course, there would have to be an improvement in the car supply. In my opinion, within the next 18 months or two years, when the mines now developed have been put into completed operation, West Virginia will have place, not only for the 30,000 men to which I have referred, but for 10,000 more. If this accretion of mining force and a like improvement of railroad facilities were secured, West Virginia could double its production in the next four years.

Judging from the figures already on hand, the West Virginia coal-mining death toll will be approximately 310 lives. A little over 200,000 tons has been mined per life lost. There have been no serious mine accidents. The majority of deaths and injuries have been caused by falls of roof. The next most important cause is electricity and the third cause in order of frequency is mine cars. The careless handling of these and the jumping from trips in motion cause many accidents.

Wyoming

By George Blacker*

SYNOPSIS—The production of Wyoming fell nearly 5 per cent. in 1913. The death rate dropped markedly. There were no labor troubles and no disasters.

Though only two less men were employed in 1913 than in 1912, the tonnage dropped from 5,500,253 to 5,229,817. It did not, however, fall below the output of 1911. The number of men killed fell from 35 to 21 and the number of injured from 120 to 65. Even the deaths from falls of roof and coal dropped 50 per cent.

TONNAGE AND MEN EMPLOYED—BY COUNTIES

County	Tonnage	Men employed
Uinta	42,243	101
Lincoln	1,849,113	1,839
Carbon	605,553	577
Sweetwater	2,732,908	3,153

SUMMARY OF COAL PRODUCTION

	1911	1912	1913
Total tons of coal produced	4,865,761	5,500,253	5,229,817
Employees in and about the mines	5,446	5,672	5,670
Fatal accidents	22	35	21
Non-fatal accidents	97	120	65
Coal mined for each life lost	221,170	157,150	249,038
Employees for each life lost	248	162	270
Killed per thousand employed	4.1	6.1	3.7

CAUSES OF DEATHS.

	1911	1912	1913
Gas explosion	1	0	0
Dust explosion	0	7	0
Falls of roof (coal or rock)	14	18	9
Falls of coal not in roof	0	6	2
Mine cars and haulage motors	3	3	7
Premature blasts	3	0	0
Powder burns	1	0	0
Falls of timber	0	1	0
Machines	0	0	1
Electrocutions	0	0	2

The year ending Sept. 30, 1913, was entirely free from labor troubles and disasters. Labor has been in constant and steady demand. The percentage of fatal accidents has decreased to a point lower than at any time during my official term as inspector of coal mines. I am receiving the active coöperation of the mine managements in all precautions I recommend them to take. Not only do they coöperate with me, but many of them go farther and take the initiative in devising means for reducing injuries and fatalities to a minimum. This is notably so with some of the larger companies, which are sparing no expense to bring about conditions of safety.

Concrete Stoppings

The life and well being of a coal mine, might be truly said to depend upon the character of its stoppings. If they are built improperly, if they are frail and leaky, then they cannot answer the purpose for which they were intended. The ventilation, and, therefore, the safety of the mine can only be maintained by building the stoppings in accordance with the best methods, and the material used in their construction should be such as will require no more attention during the life of the mine. Such stoppings can be constructed easily and cheaply, by pouring concrete into a form made of props and boards erected in the crosscut. These can be removed after the mixture has had time to set. These stoppings are being introduced into some of the mines and are proving to be entirely suitable. The Union Pacific Coal Co. has purchased a car, which is being equipped in the same manner as the rescue cars belonging to the government. Should an accident occur in any of the mines along the Union Pacific R.R. this car will at once be available, together with a splendid team of trained workers, under the direction of a capable man.

Explosives

Much experimenting has been done with permissible powders with varying results. When the coal is fragile or brittle, the force of the blast has the effect of shattering it into slack and thereby rendering it unfit for commercial purposes. On the other hand, a hard, tough coal is best mined with such high-powdered explosives, because more force is required.

Some companies are extremely lax in their manner of handling powder. I have seen many kegs of black powder and fully 20 sticks of giant powder together with a box of caps lying in a crosscut, unprotected. Such a practice is reprehensible.

*Inspector of coal mines, district No. 1, Wyoming, Cumberland, Wyo.

The Sydney Coal Fields; Cape Breton, Can.

In his report for "The Coal Resources of the World," D. B. Dowling states that: The Bridgeport mines have galleries on the Phalen seam extending over a mile from the shore of Indian bay, and mines at Table head have workings one and a quarter miles beneath the sea on the Hub seam. On this bed, at a distance of a mile from the shore, small rolls or undulations parallel to the coast were passed through. These are the only disturbances in the regularity of the measures and it therefore seems possible to extend the workings everywhere to the limits of haulage and ventilation. In the estimate of the amount of coal, the limit for probable reserves is fixed at 3 miles from shore and that for possible reserves at 5 miles."

The moisture runs from 2.4 to 5.4 per cent. in the mine and from 1.6 to 4 per cent. after air drying. The dry coal has from 34.7 to 37.3 per cent. of volatile matter and the fixed carbon varies from 53 to 59.5 per cent., while the ash is extremely variable, running from 4.8 to 12.3 per cent., the sulphur being included in the estimate. This sulphur runs between 1.8 and 6.4 per cent., but excluding the Gowrie seam, the average is slightly over 2.4 per cent.

Foreign Coal Production

British Columbia

By E. Jacobs*

SYNOPSIS—The labor trouble in Vancouver Island caused such a shortage of coal in western Canada that the tariff revision failed to deflect the market. The Puntledge River hydro-electric project is now supplying coal mines with power.

Labor troubles in the coal mines of Vancouver Island caused a decrease in their production in 1913 of nearly 40 per cent. as compared with 1912. The coal produced in Vancouver was 1,745,193 tons (1,558,208 long tons) in 1912 and 1,078,134 tons (962,620 long tons) in 1913.

In other producing districts in the province there was an increase in output which in part offset that decrease, so that the percentage of loss in production in the whole province, as compared with 1912, was a little less than 15 per cent., the total for the two years, respectively, having been 3,388,794 tons (3,025,709 long tons) for 1912 and 2,885,313 tons (2,576,172 long tons) for 1913. The quantity of coal made into coke was larger in 1913 than in 1912, 492,902 tons (440,091 long tons) as compared with 444,534 tons (396,905 long tons), which further reduced the net total of coal sold or otherwise disposed of as such. The net output of coal in 1913 was 2,392,411 tons (2,136,081 long tons), as compared with 2,944,260 tons (2,628,804 long tons) in 1912.

The districts in which coal was mined, and the proportions of production of the various mining companies, are shown in the following table:

PRODUCTION OF COAL IN 1913

	Long Tons	Short Tons
Vancouver Island:		
Canadian Collieries (Dunsmuir), Ltd.	562,705	630,230
Western Fuel Co.	218,691	244,934
Vancouver-Nanaimo Coal Mining Co.	100,449	112,503
Pacific Coast Coal Mines, Ltd.	80,775	90,468
Total	962,620	1,078,135
Nicola and Similkameen:		
Inland Coal & Coke Co.	116,000	129,920
Nicola Valley Coal & Coke Co.	110,000	123,200
Princeton Coal & Land Co.	28,780	32,234
Several smaller producers	7,988	8,946
Total	262,768	294,300
Southeast Kootenay:		
Crow's Nest Pass Coal Co.	1,040,374	1,165,219
Hosmer Mines, Ltd.	237,500	266,000
Corbin Coal & Coke	72,910	81,659
Total	1,350,784	1,512,878
Gross production	2,576,172	2,885,313
Made into coke	440,091	492,902
Total production, net	2,136,081	2,392,411

While the foregoing figures for 1913 are subject to revision, owing to the production for the month of December having to be estimated, it is unlikely there will be any considerable difference between the total of output of coal as shown above and that the revised figures will show later.

A Record Output of Coke

The quantity of coke made in 1913 is estimated at 19,323 tons (285,110 long tons), all at collieries in Southeast Kootenay—252,524 tons (225,468 long tons) at the ovens of the Crow's Nest Pass Coal Co. at Fernie and Michel, and 66,799 tons (59,642 long tons) at those of the Hosmer Mines, Ltd. The total quantity of coke made in 1912 was 296,053 tons (264,333 long tons), 245,228 tons (218,954 long tons) by the Crow's Nest Pass Coal Co. and 50,825 tons (45,379 long tons) by the Hosmer Mines, Ltd., so that both companies show an increase in 1913. It is noteworthy that the production of coke in 1913 was the largest yearly output on record in the province, the highest previous total having been that for 1905—of 304,399 tons (271,785 long tons). No information is yet available as to where all the coke made in 1913 was marketed, but it is known that both the Granby Consolidated Co. and the Consolidated Mining & Smelting Co. of Canada, the former having copper-smelting works at Grand Forks, Boundary district, and the latter a lead and copper smeltery at Trail, West Kootenay, both in British Columbia, obtain their coke supplies from Crow's Nest Pass collieries in the province, although the British Columbia Copper Co.'s smelting works at Greenwood are supplied from the International Coal and Coke Co.'s ovens, at the Alberta end of the pass.

Vancouver Island Collieries

The strike forced upon the coal miners of Vancouver Island at the beginning of May by the United Mine Workers of America has continued unbroken ever since and has necessarily interfered with the important mine development, equipment and construction work previously undertaken by three of the Island coal-mining companies. However, much progress was made by the Canadian Collieries (Dunsmuir), Ltd., with its improvements at Comox colliery, and the Pacific Coast Coal Mines, Ltd., also advanced its development and construction work at its Morden colliery, though not to the extent it would have done under favorable labor conditions. The Western Fuel Co. was much hampered by the strike, so that little progress has been made since last April toward bringing into production its new mine situated some 4 miles from Nanaimo.

Canadian Collieries, Ltd.

The Canadian Collieries, Ltd., operates two collieries, Comox and Extension. The hydro-electric power station and plant at Puntledge River was completed and has since been in successful operation. General Electric Co. equipment has been installed; transmission lines have been constructed to several mines and to the company's shops, coal washery, shipping wharves, etc., at Union Bay, and substations have been erected, and connections made at various other places for lighting purposes. A length of new railway, which cuts off the heavy grade on the old tracks, has been constructed, thus admitting of hauling to Union Bay heavier train loads than was previously practicable.

At No. 4 mine, development work has been made with the object of increasing output of coal. A new Sirocco fan was put in and ventilation of the mine improved. The old haulage steam-operated machinery is being gradually replaced by electrical installations. Similarly at No. 5 mine, steam-driven machinery has had to give way to an electrically-operated plant. No. 6 mine is still being worked by steam plant, but at No. 7, compressor, hoist, haulage plant, fan, etc., are all electrically operated; more miners' houses and other buildings have been erected, new railway sidings constructed in the yard, and many other improvements made.

No. 8 is a new line situated 1½ miles east of No. 7 and 4½ miles from the town of Cumberland. Two shafts, the main shaft measuring 11x22 ft., and air shaft, 11x18 ft., have been sunk to a depth of about 1000 ft. and the mine is being opened rapidly, some coal now being produced. A steel tipple, equipped with Marcus screen, has been erected, and 75 miners' houses have been built. The company's sawmill was destroyed by fire, but this is to be replaced shortly.

*P. O. Box 645, Victoria, British Columbia.

At the company's Extension colliery the production of coal is now only about one-seventh that of Comox—300 tons a day as compared with about 2100 tons—but when the new electric locomotives are received, in place of those destroyed by the strikers when they set fire to the surface buildings, a much larger output will be secured.

WESTERN FUEL CO.

Before the strike 1300 to 1400 men were employed at the Western Fuel Co.'s No. 1 Shaft, Protection Island, and No. 4 Northfield mines, but at the close of the year only about one-fourth that number were at work.

At the company's Reserve mine the two shafts, each 10 ft. by 25 ft. 9 in. within timbers, reached the coal at a little more than 1000 ft. Hoisting engines were installed, made by Andrew Barclay & Sons, Kilmarnock, Scotland; the main engine is 30x60 in., with Corliss valves and has two 14-ft. drums, the other is 26x54 in., also with Corliss valves, the drums being 12 ft. in diameter. Both are equipped with special devices to prevent overwinding. Transportation is provided by a standard-gage railway to the company's shipping docks and loading bunkers near No. 1 shaft, Nanaimo.

PACIFIC COAST COAL MINES

Not much change was made at the Pacific Coast Coal Mines' South Wellington mine. A larger compressor was put in, and more houses for miners were built. The output of coal is being gradually increased and it is expected that it will shortly be as large as before the strike.

At Morden, two miles east of South Wellington, the company sunk two shafts, a main shaft 9x16 ft., and an air shaft 9x12 ft. in the clear, and reached the coal at about 600 ft. early in the year, but development of the mine was prevented by the strike of the men, and the shaft was flooded. The high-pressure side of a Canadian Ingersoll-Rand compressor has been put in, also high-pressure steam boilers, altogether 450 hp., and a pair of 24x48-in. high-duty winding engines. The construction of a reinforced steel tipple and coal-washing plant has been commenced, and the installation of a fan, two direct-connected electric units each 150 kw., and the necessary work about the yard are in hand. It is expected this equipment will be completed by Mar. 1. Present development of the Morden mine shows a seam of coal 8 ft. in thickness.

The standard-gage railway track from South Wellington to the shipping docks at Boat harbor, 7 miles, has been relaid with heavier steel.

At the company's Suquash mine, in the northern part of the Island, mine development, construction work, and equipment have been in progress while the miners have been on strike. A new shaft, 11x22 ft. in the clear is being sunk and a pair of slopes being driven to connect older workings with the new. The coal is regular, averaging about 6 ft. in thickness. There are two 150-hp. steam boilers and a pair of 24x48-in. winding engines. A number of new buildings have been erected.

The Vancouver-Nanaimo Coal Mining Co., having conceded the demands of the United Mine Workers of America, worked full-handed the greater part of the latter half of the year. Its production of coal was larger than in 1912, but there is little else of interest to note.

NICOLA AND SIMILKAMEEN

The Nicola Valley Coal & Coke Co. mined less coal in 1913 than in 1912—123,000 tons (110,000 long tons) as against nearly 160,000 tons (143,000 long tons). On the other hand, the Inland Coal & Coke Co.'s production figures are 130,000 tons (116,000 long tons) in 1912 as compared with 35,100 tons (31,300 long tons) in 1912. Diamond Vale Collieries continued of small importance as a producer. The Pacific Coast Colliery Co. is reported to have reached good coal.

In Similkameen district, the Princeton Coal & Land Co. made about the same tonnage as in 1912. The Columbia Coal & Coke Co. called a halt and sold its property, and the new owners are doing development work in another part of this field. The United Empire continued unimportant.

The only company from which information was received is the Nicola Valley Coal & Coke Co.; a summary follows:

Production for the year is estimated at 125,086 tons (111,684 long tons), this being a somewhat higher total than is used in the accompanying table, but allowance is made for a reduction in output in December. The decrease as compared with 1912 is accounted for by unfavorable mining conditions in the first half of the year. These have been overcome. Mines Nos. 7 and 8 were opened; in No. 7 the main slope is being pushed ahead, with working places being opened as progress is made. This is in a 16-ft. seam of excellent coal. No. 8 is promising, with 6 ft. 6 in. of coal, but development is yet too limited for any certainty. Present working conditions allow of an output from this colliery of 750 tons a day, with a gradually increasing capacity, but high railway freight rates so limit the market that output is kept down accordingly. The railway company itself, formerly a good customer, is now burning oil in many of its locomotives instead of coal.

The Inland Coal & Coke Co. has opened a new slope, No. 5, and is active both in developing its property and finding a market for its coal.

SOUTHEAST KOOTENAY COLLIERIES

Generally, the position at Crowsnest district mines shows improvement. Both the Crow's Nest Pass Coal Co. and the Hosmer Mines, Ltd., made a larger production in 1913 than in 1912. The Corbin Co. had to close its No. 1 mine, owing to a fire, from spontaneous combustion; as a consequence this mine was unproductive during the greater part of the year.

At Coal Creek colliery of the Crow's Nest Pass Coal Co., B seam, lying 320 ft. above No. 1 in the Coal Creek measures, was developed to a producing capacity of 500 tons a day. At Michel colliery, two new mines were developed on the north side of the valley, and a skip incline was put in to convey the coal from mines to tipple level. The skips or cages carry eight tons of coal down a grade commencing at 30 per cent. and being 60 per cent. at the lower end. The incline is 1280 ft. in length, and the skips easily controlled by rotary multiple brakes, travel that distance in 80 seconds. These new openings are expected to yield a profitable production throughout the ensuing year. Prospecting on the south side of the valley at Michel resulted in a new seam being found about 150 ft. above No. 3 seam; it shows a working section about 10 ft. thick and the coal is generally of good quality.

The output of coal from Coal Creek mines compares favorably with that of the last good year, while the quantity of coke made at the ovens at Fernie is estimated to exceed the previous highest record by nearly 10,900 tons or 9700 long tons.

There was no new development work undertaken at Hosmer colliery, of the Hosmer Mines, Ltd., during the year. The B incline was double-tracked and another drum added to the engine operating it. An 8-ft. diameter Sheldon Keith wheel fan was provided for ventilating No. 2 B south mine. A steam locomotive was obtained for the rock bank and for hauling boiler coal. The production showed a substantial increase 266,000 tons (237,500 long tons) in 1913 against 210,832 tons (188,243 long tons) in 1912. The coke output was 120,000 tons (107,143 long tons) as compared with 50,824 tons (45,379 long tons) in 1912.

No. 4 mine of the Corbin Coal & Coke Co., known as the "Big Showing," was provided with transportation facilities. This mine is situated nearly 1000 ft. above No. 1, the latter being near the valley level. In No. 1 mine the coal seam is nearly vertical and varies greatly in thickness. W. W. Leach, of the Geological Survey, described it as varying from a minimum thickness of 10 ft. to a maximum of nearly 250 ft. This great difference may be due to compressed monoclinal folding. At the upper mine the coal has been stripped near the top of the hill and it is shown in a synclinal basin about 370 ft. in width, the thickness of the coal near the center having been proved by drilling to be more than 100 ft. During the summer and autumn, coal in No. 3 mine was worked in opencuts by a steam shovel, and sent down the switchback standard-gage railway for shipment. The snowfall being heavy, opencut working is not practicable in winter, but about 150 tons of coal a day is being mined here underground.

No. 4 mine is a new opening made after a fire in No. 1 necessitated the closing of the latter. The seam in No. 4 is a branch off that in No. 1. Present production is at the rate of about 250 tons of coal a day. A Marcus screen has been purchased, but it will not be put in until next spring.

General Notes

Little progress was made toward the extensive development of the newer coal fields in the province, these being without railway transportation. Some development work was done, both in the Groundhog Basin in northern Skeena, and in other fields in the southern part of that district.

The removal of the tariff on coal entering the United States has not yet made much difference in the quantity exported from British Columbia. No doubt later it will favorably affect both the Crows Nest district and Vancouver Island mines, but this year the latter have not been able to supply the British Columbia market, the strike of miners having kept down production. In fact,

much coal has been imported from the state of Washington and elsewhere to supply demands from the coast cities of British Columbia.

Saskatchewan

By Frank B. Smith*

Coal has been mined in the province of Saskatchewan for the past quarter of a century but not till within the last decade has any large operating company entered the industry.

Up to the year 1905 all the published records of coal production in the province were included in the statistics of the public works of the Northwest Territories, which included the new provinces of Alberta and Saskatchewan.

In that year the territory was divided and the records of each province kept separately. The returns made to the government in 1905 showed only 60,000 tons mined, but there is no doubt but that more coal was produced. There were a number of small mines in outlying districts producing a few hundred tons each per year. These failed to send in returns. Since then, however, a better account



F. B. Smith, Saskatchewan, Canada

has been kept of all the mines in operation in the province, the records showing a marked increase of production. The estimated output of coal for the year 1913 will be approximately 350,000 tons.

Small Mines Close Down Owing to Inadequate Equipment

Since the beginning of the mining industry in the province there have been over 50 mines opened, the greater number of them being on such a small scale that as soon as the haulage became an important item, the mines were abandoned. At the present time there are 30 mines in operation, and, of the yearly output, four of these are producing 85 per cent. of the total.

These are: Western Dominion Collieries, Ltd., Taylorton; Manitoba and Saskatchewan Coal Co., Ltd., Bienfait; R. Hawkinson Coal Co., Bienfait; Maple Leaf Coal Mining Co., Shand. Within the past two years there has been much activity in the sale and transfer of coal lands especially to companies which are already manufacturing brick or intend to make it. The clay which overlies the coal is of the finest quality for the manufacture of common and pressed brick and it is shipped all over this province and into Manitoba and Alberta.

Labor Conditions

Accidents at the mines are infrequent, even although the men employed are not the best of miners, the majority being homesteaders who find in the mines employment for the winter months.

A few years ago there was an effort made to organize labor but the conditions not being at all favorable the idea was eventually abandoned. There are a few local disputes between the operating companies and their employees, but these are all amicably settled.

Coal Resources of Saskatchewan

In the "Coal Resources of the World," Saskatchewan is credited with having a coal area of 7500 square miles. The estimated quantity of coal in this area is given as 20,000,000,000 tons.

The coal is a lignite with a high percentage of moisture, which, owing to the variable temperature, is difficult to transport without a loss in weight and condition. The average analysis of this coal is: Moisture, 28.84; volatile combustible matter, 32.15; fixed carbon, 34.61; ash, 4.40; total, 100 per cent.

The lignite coal of the province of Saskatchewan is similar to and of the same geological age with the lignite coal of North Dakota. That state through the mining engineering department of its university has during the past few years been making extensive experiments relative to the use of lignite for the production of gas and briquettes and these investigations have been successful from a commercial standpoint.

With the same idea in view, Saskatchewan has lately established a carbonizing plant at Estevan from which good results may be heard in the early part of next year.

*Inspector of mines, Saskatchewan, Canada.

Nova Scotia

Special Correspondence

SYNOPSIS—Every condition being favorable, the production of Nova Scotia increased 6½ per cent. during 1913. The fatality rate was about 3.6 per 1000 men.

The production of coal in this province in the year 1913 was about 8,400,000 tons (7,500,000 long tons), the largest for any year in the history of our coal industry. This exceeds the previous year's output by half a million tons, and was produced from 39 mines, 27 of which are in Cape Breton Island.

The conditions at the mines were generally good. There were no strikes; the demand for coal was strong; the season was favorable for shipments, and barring a scarcity of labor for a short time during the summer, there were favorable conditions to warrant our largest year's production. The larger coal companies are arranging to secure more men for this year's operations.

There will be a larger tonnage dumped this winter, if

conditions are as favorable as they were last year, and with the continued strong demand for coal, 1914 promises to be another record breaker.

Old Mines Are Being Reopened

The physical condition of the collieries is good. Six mines have been reopened during the past season. The Cape Breton Coal, Iron & Ry. Co. has reopened the Broughton mine, and a small shipment has been made at Louisburg, over the Sydney & Louisburg Ry., the coal company not yet having a shipping wharf. There should be a considerable output from this mine this year.

The Dominion Coal Co. has reopened the old Victoria mine, in the Sydney coal field, which mine, up to 20 years ago, was a good producer. The Emery mine, of the Dominion Coal Co., at Glace Bay, has been placed again in the producing list. The Nova Scotia Steel & Coal Co. will have another mine in operation this year, which makes six for this enterprising corporation.

The Scott pit of the Intercolonial Coal Co., Pictou County, was reopened last year, and the Minudie Coal Co. has added another mine to its operations in Cumberland County.

There is much undeveloped coal land awaiting demand. The area under lease is about 1200 square miles.

There were employed last year, exclusive of railway, stevedore, and clerical staffs, 13,664 men. There were 147 accidents, 49 fatal and 98 nonfatal.

The coke production was 815,401 tons, or 738,037 long tons, exceeding the previous year's production by 139,255 tons, or 124,335 long tons. There were no transfers of important coal properties during the year.

Present Conditions in the Coal Fields of Mexico

Special Correspondence

SYNOPSIS—Practically all the coal plants owned by Mexican capitalists were destroyed. Properties of American and English investors were not molested. If peace should be restored, the plants still standing will not be able to supply the demand of the country.

The troubles in the Coahuila field of Mexico began early in the year 1913 with a strike of the trainmen on the National Lines, which tied up completely all operations through entire lack of train service, and lasted for 15 days. This was followed early in February by the revolution against the Huerta government by Governor Carranza of the State of Coahuila, who declined to honor the authority of Huerta as President after the death of Madero.

The Revolutionists were able to take control of the part of the National Lines running from Eagle Pass, Texas, south to Reata, Mexico, where it connected with the other branch of the National Lines running between Monterey and Laredo. There being no local market between Reata and the border and the Revolutionists not being able to operate this road in connection with the rest of the National Lines which were under the control of the Federal Government, all railroad communication ceased and the mines were not able to ship any coal.

Hoping that this condition would only be temporary and in order to keep their forces together they continued mining coal and making coke until they had stored all that they were able to handle around their mines and coke ovens. It became necessary to suspend operations in April and since that time there has been no coal mined or coke produced in the entire region.

American Mine Not Destroyed

No attempt was made by the Federal forces under President Huerta to recover this railroad until September when an army was sent north along the line of this road, defeating the Revolutionists at Monclova and again at Hermanas. The Revolutionists as they retreated north destroyed the railroad bridges and the coal mines owned and controlled by Mexican capitalists. None of the American or English owned mines in that field were molested.

The first mine property that the Revolutionists came to on their retreat north was that of the Lampacitos Coal Company owned by the same group of Mexican capitalists that controlled the Agujita Coal Company and the Rio Escondido Coal Company near the border. At Lampacitos there were three mines in operation with a battery of 50 Koppers retort coke ovens and washing plant, electric pumps, and several hundred miners' houses and other buildings, including the residence for the assistant manager. Everything was either burned or blown to pieces by dynamite. The electric pumps in the mines are all under water and the estimated loss to this property is over $500,000.

Going north from Lampacitos they reached the junction point of Barroteran where the line to Musquiz leaves the main line and passed by the American owned mines at Las Esperanzas and completely destroyed the mines at Menor, owned by the Northern Coal Company, a subsidiary of the Monterey Steel Company. Here the destruction was complete and there is nothing left of the tipple, machine shop, store and other buildings that were erected on the property, and the mines are filling up with water. As these workings were already quite extensive, it is a question whether they can ever be profitably reopened. This branch line of railroad was also completely destroyed although it is owned by the Mexican Coal and Coke Company, who originally built it and leased it to the National Lines of Mexico for a term of years.

Bridges Also Destroyed

Going north from Barroteran on the main line they destroyed the large steel bridge across the Sabinas River, not only blowing up the piers with dynamite but setting fire to a train of coal cars that were on the bridge, so that the heat from this fire has warped the steel girders and made this $500,000 bridge a complete loss.

Turning northwest from Sabinas on the Rosita Branch

of the National Lines they reached the Agujita plant, which had the largest output of coke in Mexico, and announced that they intended to totally destroy this plant. Arriving, however, late in the afternoon they burned before dark a coal washery, the tipple at the No. 1 mine, machine shop, and a 2000-ton coal storage bin, and set fire to 52 other buildings, including the general office, manager's residence, hospital and school building, and at dark left telling the superintendent they would return in the morning and complete their work, but during the night word reached them that the Federal soldiers were catching up and they went on north without coming back the next day. The result was that the company has all its miners houses, tipples at two of its mines, with 400 beehive ovens in good condition, and all that they will need to start operation will be a new washery and an office building. Estimated loss at this plant is about $200,000 on surface improvements and, of course, there will be a heavy loss underground from the mines not being kept open.

To show the distinction made by the Revolutionists between the Americans and Mexicans; the superintendent and master mechanic of the Agujita Coal Company were Americans and the houses in which they lived were surrounded by the houses that were set on fire; the officer in charge of the Revolutionists detailed a squad of his men to climb on the roof of the two Americans' houses with water and to see that these two houses were not burned by the fire set to the adjoining ones.

A Madero Plant Was Not Molested

At the same time this destruction was going on at Agujita another squad moved on up the Rosita Branch, passing by the English owned mines at Cloete to the mines of the Rosita Coal Company and set fire to two of the tipples there. While these tipples were burning one of the office employees convinced the officer in control that the owners of this property were in sympathy with the Revolutionists, as the property was owned by the Madero family and Ernesto Madero, an uncle of the former President, was the president of this company. The officer thereupon called off his men although the coal washery and storage bin had been saturated with oil ready to set on fire. The Rosita Coal Company, therefore, got off with a loss of a little less than $50,000. There is a very valuable plant here of retort coke ovens and a first-class washery capable of handling over 1000 tons a day that would have been a heavy loss if they had been destroyed.

In the northern field just across the river from Eagle Pass, the Rio Escondido and Phœnix Coal Companies, although both owned and controlled by Mexicans, were not in any way disturbed by the Revolutionists.

The total damage to the mine property throughout this coal field will run into several millions of dollars. The camps are practically deserted with the exception of a few officials and enough men to man the pumps and boilers. Some of the mines are, however, being allowed to fill up with water as it proved too expensive to maintain the pumping.

The coal mines in Coahuila produced during the year 1912 over a million metric tons of coal and 250,000 metric tons of coke. In 1913 only 5000 tons of coal was shipped and very few cars of coke were able to reach the consumers before the railroad fell into the hands of the Revolutionists. There are now stocked at the various mines about 100,000 tons of coal and 75,000 to 80,000 tons of coke, but nothing can be done toward moving this until the railroad situation is cleared up and peace once more comes to that country.

Miners Become Revolutionists

The whole transportation system of Mexico, upon which these coal mines depend, has been torn to pieces.



After Destroying All of the Mexican Coal Plants, the Rebels Dynamited Bridges and Set Coal Trains Afire. This Shows the Sabina River Bridge

All the bridges, track, locomotives and cars in the coal field have been destroyed during this revolution. Even with the restoration of peace and the rebuilding of railroads, it will be many years before the working forces can be brought back into the mining region to equip the mines to produce the tonnage that was formerly obtained from them. Large numbers of these miners have left the country to obtain work in the United States and a great many have been killed in the various battles between the Federal soldiers and the Revolutionists, and such a large number have become professional Revolutionists, an occupation which they find quite congenial and much easier work than digging coal, that it will be many years before the mines of Northern Mexico can produce the coal and coke which they were able to extract and market in that republic during the years preceding this revolution.

With the restoration of peace and the reopening of the smelters there will be a heavy demand for both coal and coke, which should render the operation of the mines that have not been destroyed extremely profitable, as the demand will exceed the supply and prices can be obtained that were not possible when all the mines were in full operation.

Coal Markets and Business Aspects of the Fuel Industry in 1913

By A. T. Shurick

SYNOPSIS—Although a period of continued uncertainties in business, the coal markets developed an unexpected buoyancy and producers controlled the situation most of the year. Substantial increase in production. New legislation affecting the coal industry. Labor supply generally inadequate, though plentiful at the close of the year. The ineffective efforts of Connellsville coke operators to obtain higher prices. Some new problems in the marketing of anthracite.

The national coal market in 1913 was characterized by the highest average price level in the history of the trade. The year will be recorded as one of satisfactory business and substantial profits; it has been a period of rejuvenation, rehabilitation, restored confidence and general optimism.

Even though the close of the year witnessed a discouraging recession in the coal markets, 1913 cannot be regarded other than satisfactory. It was a season of great momentum, replete with readjustments that give tangible evidence of substantial progress to come.

Particular significance attaches to these facts in view of the generally adverse condition prevailing in financial circles, and the restrictive, not to say radical, State and Federal legislation enacted during the year. The situation in the world's money markets has seldom been worse. Standard securities of the most reputable description depreciated to a point scarcely exceeded by the spectacular panic of 1907, while a number of powerful corporations were forced into receiverships, including representative coal operations of national prominence.

In legislative circles a determined renewal of the dissolution proceedings against the Reading Company, the unexpected announcement of the Pennsylvania State Tax on anthracite and the deliberations of the Ohio Legislature regarding the screening law have all been restraining influences adverse to a more general expansion. In national affairs the abrupt passage of the new tariff and the long threatened new currency bill, finally enacted at the close of the year, had a depressing effect on general industrial conditions that must inevitably have been reflected back to the coal industry.

In the face of these grave uncertainties in commercial circles, it is, therefore, particularly gratifying to record such a substantial improvement in the fuel industry. The question arises: How has this been brought about? The self-complacement sales organizations of the large corporations are prone to ascribe it to good salesmanship, a general determination to obtain higher prices throughout the trade and a tendency to curtail production when such figures are not prevailing. The heavy increase in the output for the year does not justify the belief that there has been any important restriction in operations, while the spectacular break in the pool of the Connellsville coke operators seems to prove the faliacy of any concerted action in holding for higher prices.

But whatever the cause, the beneficial effects must not be gauged by a standard of dollars and cents. Of far greater importance is the psychological effect upon the consumer who has been brought face to face with the fact that he must be prepared to meet a constantly increasing advance in the cost of fuel. Higher mining costs, as the depths become greater, the increasing cost of labor, a gradual depletion of our coal reserves, and the necessity for a greater expenditure in mining in order to obtain a higher percentage of recovery will inevitably bring about this condition.

The year was replete with inconsistencies and contradictions. Perhaps the most striking of these was the general softeness and uncertainties which marked both the opening and closing periods, mid-winter seasons which are commonly the most active. On the other hand, a relatively high price level was struck early in the spring and rigidly adhered to through the summer months when business is ordinarily at a low ebb. But while the year was one of unexcelled prosperity, it was none the less a period of great anxieties and uncertainties.

Production

The production in 1913 reached a total of about 562 million short tons, exceeding the previous high record of last year by more than 30 million tons; of this increase about four and half million is credited to anthracite. But while the general production of the country showed an almost normal increase, it is worthy of note that the output of hard coal has not advanced over the past three years. The tonnage in 1913 only just made up the deficiency of six million tons, caused by the strike in 1912, and failed to reach the record mark of nearly 70 million tons in 1911. The falling off was due to the abnormally mild weather prevailing over the closing months of the year, which are usually the most active of the season.

The shortage of miners in Pennsylvania tended to restrict the production of bituminous coal there, but the acute labor troubles in West Virginia materially broadened the market for the Pennsylvania product, and the output was heavy. Ohio produced 38 million tons, showing an increase of 10 per cent. Virginia, West Virginia and Maryland all made substantial increases in spite of the labor difficulties and unprecedented floods in the Ohio Valley which interfered with West Virginia shipments to the Lakes. Dumpings at the Hampton Roads piers exceeded a million tons several months during the year. The output in the Southern States was not, as a rule, so good, although Alabama scored an increase of a full million tons.

Illinois had a substantially larger production, but without any material improvement in the unsatisfactory market conditions there, while Indiana, although passing her 1912 production still failed to reach the record of 1910 when a long suspension occurred in neighboring states. The Southwestern States show a satisfactory increase with the exception of Missouri where a slight falling off is noted. The acute strike in the Colorado fields reduced

the output while all the other Rocky Mountain States either held their own or showed fair increases.

Transpotration Statistics

Thirteen Leading Coal Roads—A study of the statistics of the performance of the 13 leading bituminous coal roads presents some interesting comparisons. For the first 10 months of the year these lines (which handle about 35 per cent. of the country's production) reported a movement of 145 million tons as compared with 132 million for the same period last year. With the exception

COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during October and the first ten months of 1913 in comparison with 1912, in short tons:

	October		Ten Months	
Anthracite	1912	1913	1912	1913
Baltimore & Ohio[1]	184,252	166,214	1,267,222	1,226,938
Chesapeake & Ohio[1]	1,440	1,645	20,711	14,639
Erie[3]	761,360	794,528	6,202,725	7,283,826
Pennsylvania[1 3]	970,880	1,046,703	8,358,717	8,711,723
Virginia[2 1]	77	50	97	909
Total 5 roads	1,918,009	2,009,140	15,849,472	17,238,035
Bituminous				
Baltimore & Ohio[1]	3,038,407	3,401,618	28,431,931	30,652,147
Buffalo, Roch. & P.[1 2]	812,418	985,223	6,827,271	8,037,988
Buffalo & Susq.[1 2]	157,493	168,148	1,246,422	1,507,341
Chesapeake & Ohio[1]	1,362,680	1,570,072	14,480,895	14,188,105
Erie[3]	14,609	13,298	220,070	319,764
Hunt. & Br'd T. Mt.[1 2]	129,111	127,898	1,011,737	1,135,294
New York Central	814,144	889,153	6,667,903	7,658,720
Norfolk & Western[1 3]	1,939,772	2,098,241	19,048,864	20,037,498
Pennsylvania[1 3]	4,113,550	4,887,840	38,227,609	42,662,163
Pitts. & Lake Erie[1 3]	1,158,203	1,144,112	9,527,976	10,812,407
Pitts. Shaw. & North[1 2]	218,387	270,174	1,619,271	2,307,343
Virginia[1 2]	338,518	476,482	2,950,100	3,768,423
Western Maryland	207,829	248,858	2,322,620	2,459,414
Total 13 roads	14,305,121	16,281,117	132,582,669	145,546,607
Coke				
Baltimore & Ohio[1]	433,547	388,337	3,932,524	3,667,855
Buffalo, Roch. & P.[1 2]	57,673	32,059	442,220	445,162
Buffalo & Susq.[1 2]	29,184	30,965	227,664	255,503
Chesapeake & Ohio[1]	25,060	33,035	213,087	299,921
New York Central	7,812	.....	72,937	36,207
Norfolk & Western[1 2]	131,007	111,020	1,197,943	1,287,622
Pennsylvania[1 3]	1,211,620	1,152,950	10,882,963	12,012,363
Pitts. & Lake Erie[1 2]	587,638	567,661	5,171,735	5,750,552
Pitts. Shaw & North[1 2]	.....	.....	5,155	9,383
Western Maryland	5,986	4,892	57,624	64,115
Total 10 roads	2,489,527	2,320,919	22,203,852	23,828,683
Coal and Coke, 13 Roads				
January			16,421,839	18,936,646
February			17,787,331	17,546,496
March			19,483,025	17,631,345
April			13,429,367	16,850,690
May			15,635,568	18,986,796
June			16,702,153	18,580,363
July			16,635,448	18,704,710
August			18,396,247	19,718,856
September			17,432,358	19,046,247
October			18,712,657	20,611,176
November			17,815,767	.....
December			17,929,632	.....
Total, 12 months			206,381,392	

[1] Includes coal from connecting lines.
[2] Includes company's coal.
[3] Does not include company's coal hauled free.
Note.—The Southern Railway hauled 351,220 short tons of coal during September, 1913, and 3,127,282 short tons during the nine months ending September 30, 1913.

of February and March the roads show a consistent increase in shipments for each month of the year as compared with 1912.

Anthracite Coal Roads—The shipments over the eight leading hard-coal roads for the year of 1913 totaled slightly over 69 million tons as compared with 63½ million in 1912. Because of the curtailment in mining in 1912, due to a suspension of six weeks pending the fixing of a new wage scale, production that year was six million tons behind 1911, so that the 1913 shipments do not show any substantial gain.

Pennsylvania Railroad—Total shipments of coke, anthracite and bituminous coal over this road for the first 11 months of 1913 amounted to nearly 70 million tons as compared with 63½ million for the same period in

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for November and first eleven months of 1912 and 1913 in short tons:

	November		Eleven Months	
	1913	1912	1913	1912
Anthracite	987,487	916,914	9,699,210	9,275,631
Bituminous	4,509,375	3,934,876	47,171,538	42,162,485
Coke	999,500	1,245,500	13,011,863	12,128,463
Total	6,496,362	6,097,290	69,882,611	63,566,579

1912. The movement shows a consistent increase throughout the year with the exception of February and March, during which time the tonnage fell off materially.

Baltimore & Ohio Railroad—For the first 11 months of 1913, the B. & O. handled [illegible] million tons of coal and coke as compared with 33½ million in 1912. A

BALTIMORE & OHIO

The following is a comparative statement of the coal and coke movement over this road for November and the first eleven months of 1912 and 1913:

	November		Eleven Months	
	1913	1912	1913	1912
Coal	2,939,975	2,864,734	32,091,742	29,140,169
Coke	343,387	435,001	4,350,800	4,318,122
Total	3,283,362	3,299,735	36,442,542	33,458,291

steady increase in the shipments is noted for each month with the exception of February and March, the increases being particularly noticeable during the mid-summer period.

Atlantic Coastwise Freights—Water rates on the Atlantic coast, Hampton Roads to Boston, were about 75c. per ton, or 5c. above the average for 1912. As high as 95c. to $1 was paid in January and February. The Reading rate, Philadelphia to Boston, was decreased 10c. per ton Mar. 15, but again restored Nov. 1. As a rule, tonnage was comparatively easy during much of the year. The most notable feature in coastwise shipping is the steadily increasing proportion of steam vessels going into this service each year.

Lake Shipping—The total receipts of bituminous coal at Milwaukee, Wis., amounted to a little over four million tons as compared with three and a half million in 1912. The combined bituminous and anthracite tonnage was four and a half million in 1912 as compared with over five million in 1913. Shipments of anthracite from Buffalo, which handles four-fifths of the Lake movement, amounted to over five million tons in 1913, as compared with less than four million in both 1912 and 1911.

Sault Canal Shipments

The movement through the Sault Canals for 1913 was as follows:

Month	U. S. Canal	Canadian	Total	Total 1912
Anthracite				
April	214,814	.....	214,814	.....
May	294,912	116,433	411,345	17,848
June	288,036	89,833	377,869	207,060
July	334,516	87,010	421,526	280,317
August	308,497	75,350	383,847	228,083
September	249,783	51,750	301,533	394,526
October	237,723	54,967	292,690	360,903
November	239,691	52,077	291,768	382,530
December	32,982	16,200	49,182	77,600
Bituminous				
April	378,490	135,894	514,384	46,779
May	1,878,482	497,921	2,376,403	1,606,243
June	2,043,001	558,301	2,601,302	2,062,375
July	1,971,380	523,410	2,494,790	2,265,837
August	2,044,782	521,538	2,566,320	2,081,865
September	1,463,861	593,495	2,057,356	1,392,911
October	1,309,245	388,576	1,697,821	1,392,914
November	1,007,432	338,021	1,345,473	1,466,563
December	174,560	49,955	224,515	385,506
Total	14,742,207	4,150,731	18,622,938	14,931,594

The movement through the Sault Canals in 1913 totaled 18½ million tons as compared with 15 million

in 1912. Lake shipping was much restricted by the disastrous storm at the close of the season. Receipts at the Twin Points, at the head of the Lakes, were 11 million tons as compared with 8½ million in 1912. While arrivals have been heavy it is noted that the movement out was light and as a consequence there is a large supply on hand.

Holding the High-Price Level

As already noted, the salient feature of the 1913 coal market was the abnormally high average price level. The year opened relatively strong, but the market gradually declined through January, occasionally touching a point below the 1912 season's prices. Spot quotations were hammered severely by consumers, but in the face of these adverse conditions the trade showed a disposition to hold together on prices, and the market developed unexpected recuperative powers. Production was restricted through February and March, as reference to the railroad shipments will show, and as a result accumulations at the distributing centers were reduced and quotations held in an unprecedented manner.

When the contracting time arrived, Apr. 1, it was found that business was being closed at prices ranging from 10 to 25c. above last year's figures. While many of the large conservative buyers did not feel that conditions warranted such an abnormal advance, the possibility of serious labor troubles in West Virginia strengthened the position of the sellers, and the new prices were well maintained. The outlook was indeterminate for some time, but consumers were not disposed to take any changes and much business was closed, although usually with a guarantee protecting the purchaser against a serious decline. The buying interests gradually became the aggressor, and producers showed an inclination to be cautious about heavy commitments for the distant future.

The opening up of the Lake season, with indications of a heavy demand from the Northwest, had a further tightening effect upon the situation. The potential strength of the trade was conceded by all. In June, buyers, not yet covered, realized they had overstayed the market, and as a result there was a gradually increasing rush for coal which put the new prices on a firm basis with operators thoroughly in control. The further development of the labor difficulties in West Virginia tended to aggravate the situation, and many producers obtained prices that they had entertained little hope of ever receiving again.

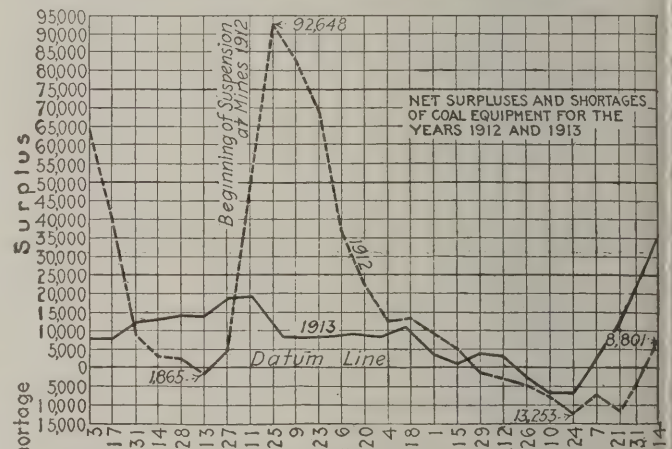
It is interesting to review the conditions leading up to this abnormally high-price level. Large consumers have, in the past, had little difficulty in buying their entire requirements at almost any period of the year. As a result they have shown little inclination to bind themselves by contracts and even where such business has been done, the obligations were not usually regarded seriously.

During the winter of 1912 and 1913, however, an inflated condition developed and buyers in the spot market were forced to meet an excessively high-price level. The physiological effect of this experience was obvious, and when the contracting season arrived, there was a general rush to close. Those who failed to cover at this time found it difficult to do so later. Operators, on the other hand, were reluctant to sign contracts, anticipating another profitable season for spot coal. The Ohio Valley floods, involving a shortage of some ten million tons, and heavy requirements from the West, particularly in the Lake trade, also had some bearing on the situation.

New Channels of Trade

One of the most important changes in established channels of business was the large increase in the Pennsylvania grades in the New England market. The remarkable stability of these coals there occasioned great surprise in trade circles. This was due essentially to a broadening of the market for the Pocahontas, New River and Georges Creek fuels which are increasing rapidly in popularity, and are being more closely held for export and government use. There are numerous instances where the Pennsylvania varieties succeeded to the West Virginias, and they were even used, in some instances, in the export business.

With the possible exception of the extreme Northwest, it is not probable that the reduced tariff on coal will ef-



fect any important changes in the North American markets. The only foreign competition to be anticipated in the East is from Cape Breton coals in the coastwise trade. Since these are of rather inferior quality, as compared with the better grade domestic product, and as they also carry a high freight burden, it is improbable that they will be able to enter aggressively into the local situation.

The adverse conditions in the Middle Western markets were further complicated during the year. Many mines found themselves in financial difficulties while the big flood the early part of the period had a disastrous effect. The market for the Illinois product seems to be narrowing in all directions, due to competition with the non-union fields. There was also a gradual shrinkage in the tonnage of screenings over the close of the year as the effects of the water power developed by the new Keokuk dam became evident.

In general there has been a notably increased discrimination on the part of buyers during the year. Consumers have, in the past, been consistently governed by prices, but they are now awakening to a realization of the fact that a discrepancy of 5 or 10c. per ton in the mine price is scarcely perceptible in the cost at destination, whereas an important economy may often be effected.

Anthracite

The year opened with a shortage of some six million tons in the production of anthracite, due to the suspension in the early part of 1912. But the abnormally mild

emperatures, prevailing through the winter of 1912-1913 nabled the operators to pull through the season without ny difficulty.

The most notable feature in the hard-coal market dur- ng the year was the acute shortage of stove coal. So evere did this become that many of the operating com- anies put their egg coal back through the breaker in rder to make more stove. Egg coal proved the heaviest n the domestic sizes and the problem of moving this rade has developed into quite a serious one. Under xceptional pressure, as noted, this grade has even been ut back through the breaker, but, owing to the large pro- ortion of steam size resulting, this cannot be considered s practical.

Western shipments via the Great Lakes materially elped the situation and eliminated what would otherwise ave been heavy overshipping. Buffalo handles four- ifths of the anthracite movement by lakes to the North- vest. Shipments for last three years were: 1911, 3,917,- 29 tons; in 1912, 3,925,583 tons, and in 1913, over five nillion tons.

As had been anticipated, individual coal failed to fig- re prominently in the market. In spite of the fact that ubstantial concessions from the regular circular were reely offered in February and March, most consumers howed a consistent loyalty to the companies who had so dequately provided for their needs when a shortage eemed inevitable in 1912. Many instances of this kind ould be pointed out.

The unexpected passage of the Pennsylvania State law roviding for a tax on all the anthracite mined, proved disturbing element in the trade. Because of the un- ertainty as to the constitutionality of the procedure, ost of the companies refused at first to add this in- rease to the regular circular. As a result the customary hannels of business were disarranged, many consumers ithdrawing orders from companies charging the in- rease, and placing them with those that did not.

Since the matter could not be carried to the courts un- il the first collections were due, Jan. 1, 1914, it was im- ossible for many to determine just what stand to take in he matter. Where the tax was added the increase was itterly denounced by consumers on the ground that they ere being compelled to carry a portion of the Pennsyl- ania taxes. The close of the year found most companies aking the addition. The tax amounted to 2½ per cent. n the mine price of coal, which was figured at 10c. per n on the prepared sizes and 5c. on pea size. No addi- on was made to the steam grades.

In the Middle Western market hard coal has not been vorably received in recent years due to various causes. favorable business was anticipated this season until a rice war was precipitated in St. Louis which resulted in ch reduced prices that dealers were compelled to carry loss. One favorable result, however, was an increased opularity of the coal, due to the lower figures.

New rules and regulations regarding the movement at dewater and demurrage charges there were put in af- ct, some of which were severely condemned by the local ealers. The customary increase in both demand and rices occurred early in the fall, but the unseasonable eather experienced over the closing months caused a eavy slump and anthracite rounded out the year in poor rm, with collieries working under a heavily restricted roduction.

Connellsville Coke

The year in coke was marked by severe fluctuations and strenuous fights between buyers and sellers of the Connellsville product. The opening prices were high, but declined sharply in sympathy with pig iron. In July the market struck a $2.50 level, and held determinedly until October when it broke violently at first, gradually easing off to a $1.75 price. It developed later, however, that this quotation was mostly on off-qualities, and the close of the year found better prices prevailing generally.

While pig-iron production for the year showed some increase, the output of Connellsville coke did not share proportionately, due principally to the incursion of by-product coke into the Connellsville market. The future of this field will be determined principally by the rapidty with which the iron manufacturers adopt furnaces suitable for using byproduct coke. The trend is certainly in this direction, and many think the last of the Connellsville coal will be shipped to byproduct ovens.

Labor

Although the year was replete with labor troubles of all descriptions, it is gratifying to record a termination of the long drawn-out difficulty in West Virginia. On Apr. 25 the West Virginia miners voted to accept Governor Hatfield's proposition for a settlement, this having already been agreed to by the operators. A new precedent was also established in West Virginia, when President John P. White and 18 other officials of the United Mine Workers were indicted in the Federal Court on a charge of violating the Sherman anti-trust law by controlling prices. That President White and his lieutenants were scheduled for their full quota of trouble during the year was evident when a Federal Grand Jury in Colorado again indicted he and 24 others on a charge of maintaining a monopoly of labor by precipitating a strike there that continued over the close of the year.

The labor supply was an important factor in the market. Complaints were general in all the mining districts at the inadequate supply during the mid-summer period. Few companies had a full complement of men, while the uncertainties prevailing before the settlement of the West Virginia troubles did much to establish prices at the high level, already noted. As the market eased up toward the close of the year, and it became necessary to restrict production, a surplus supply developed and the year closed with more men than the operators could use.

In Legislative Circles

While no spectacularly radical legislation was enacted during the year, it was, nevertheless, a period of perincious activity among Government officials that was most disconcerting to the operators at times. That the tendency of both State and Federal legislatures is toward paternalism is no longer to be denied; while ultimate Government ownership in the coal industry is not even being considered in the present day, it is none the less apparent that the Government will no longer be denied the privilege of regulating and investigating commercial and industrial affairs that affect the prosperity of the country.

A notable development of the year was the enactment of a measure by the commonwealth of Pennsylvania providing for a state tax of 2½ per cent. of the market value, f.o.b. mines, of all the anthracite produced. The tax

proved a disturbing element in trade circles because of the lack of uniformity in collecting it, some companies refusing to add it to the circular until near the close of the year. It was asserted in some quarters that the tax would prove unconstitutional for the reason that it is not permissible for a local commonwealth to levy assessments on a commodity used in interstate commerce. Since the issue could not be tested until the first collections were due, Jan. 1, 1914, the measure is still in question. Pennsylvania also enacted a law requiring the anthracite companies to maintain hospitals, both above ground and in the mines.

The year in Ohio was marked by some anti-capitalistic legislation. In the early spring, a committee was appointed by the governor to investigate a measure presented by the miners of the state providing for a wage scale arranged on a mine-run, instead of a screen coal basis. Late in the fall the commission reported favorably on the measure with certain restrictions. A workmen's compensation law was also enacted. During the last month of the year, investigations were instituted with a view to effecting a reduction in freight rates from the Hocking district to the Lakes. The present tariff as compared with that from West Virginia is adverse to the local operators and the evident determination of the Ohio executive to protect local industries was received with much optimism.

Not the least important of the year's legislation was the passage of the Sundry Civil bill carrying a "rider" exempting labor from prosecution under the anti-trust laws. This measure was regarded as adverse to capitalistic interests and was returned to Congress for reconsideration by President Taft during his tenure in office. Organized labor has yet to prove that only the unionists shall have the privilege of working and certainly interference with the production of a commodity used in interstate commerce is clearly an infringement upon the basic intent of the Sherman act.

Conditions in General Business

While the coal markets were developing an accumulative strength with the approach of the fall buying season, the outlook in industrial circles became steadily more ominous. As early as May there were evidences of a congested condition in the world's investment market, and standard first-class securities could only be floated at a substantial sacrifice. The origin of the trouble was ascribed to the European war, following which came an abnormally large flotation of state, government, municipal, and corporation securities. Since it is mandatory on many of the foreign banks to subscribe for the issues of their respective governments, a heavy liquidation of American securities was precipitated.

The enactment of more or less radical legislation by the national government at about this time, still further aggravated the situation. Large business interests instituted retrenchment policies, manufacturing was curtailed and general industrial activities much restricted.

Thus in spite of a year of unprecedented prosperity, the unsatisfactory financial conditions prevailing resulted in some of the largest bituminous-coal corporations becoming insolvent. Following the announcement of financial difficulties involving the First-Second National Bank of Pittsburgh, controlled by the Kuhn interests, the United Coal Co. and several affiliated subsidiaries were placed in receivership in July. The O'Gara Coal Co. was the next to feel the pinch, a receivership being announced for this concern Sept. 15. Internal dissension among stockholders appears to have been the indirect cause of the difficulty, charges of mismanagement and misappropriation of funds being made. The early part of December brought the announcement of the insolvency of the powerful Pittsburgh-Buffalo Co. in Pittsburgh. The difficulty was due to strikes, floods and a shortage of liquid assets.

An important development of the year in business circles was the appearance of foreign capital in the local fields, particularly in West Virginia. As early as last January, D. A. Thomas, one of the leading figures in the British coal industry, and a specialist in export business, appeared in the United States with the avowed intention of investing. He made a rapid survey of the Eastern coal fields, and on a subsequent visit purchased a small West Virginia property, and further extended his inspection into British Columbia. There is no tangible assurance that he will become an active figure in the American coal industry as yet, but indications are highly favorable that such will be the case.

Toward the close of the year there were persistent rumors of a consolidation of the leading operators in the New River district, with a view effecting a sale to British investors. Reports indicate that the consolidation would be at a figure which would net present owners a handsome profit. A six-months' extension of the options was requested at the close of the year, indicating that difficulties were being encountered in the financeering.

The Fall Decline

It was inevitable that the combination of adverse conditions which developed in commercial circles must ultimately be reflected back to the coal industry. A feeling bordening on hysteria seemed to prevail among consumers during the closing months of the summer, with the result that they continued to drive operators for heavier shipments until, in September, surplus stocks began to accumulate.

The first definite break occurred in coke, when the pool of Connellsville operators, who had been holding firmly at the $2.50 level through July, August and September, lost control of the situation and the market fell off sharply. It was soon plain at this time that stocks were abnormal in all lines, and by the last of October the situation was definitely reversed; it was clear that there would be plenty of supplies for winter and the market became dull with spot prices only fairly well maintained though offering a stubborn resistance to any decline.

The closing down of navigation on the Lakes and the gradual awakening to the fact that the West had been overshipped, threw heavy surpluses on the Eastern trade, which could not be absorbed. The customary fall car shortage failed to develop, thus permitting a continuation of the heavy movement, while temperatures were abnormally mild during the closing months, and constructive element rapidly disintegrated. The demand fell off, premiums were quickly wiped out, and even cuts were made in the regular circular. The market slowed down steadily throughout the fall and the end of the year found practically no business being negotiated. This failure to round out the year in good form was the greatest disappointment of the season.

Review of the Export Coal Trade in 1913

By F. R. Wadleigh*

SYNOPSIS—More attention is being paid to the possibilities of foreign markets. American companies have had agents abroad surveying the ground. A number of fairly good contracts have been closed. American coal in South America.

The year 1913 saw the greatest awakening of the United States coal trade to the possibilities of the foreign markets that has yet developed; much systematic and continuous work was done to secure business in the Mediterranean and South American countries. While the actual shipments during the year did not show a great increase, it was not spasmodic and the efforts made will undoubtedly show gratifying results in 1914.

There has never been a better time to enter foreign markets. Freights are more nearly normal and enough local coals have been shipped and used to show that they can compete successfully with the better grade British fuels. The demand for coal in South America and abroad is steadily growing, prices are being maintained or raised, while the United States exporter is learning more about his competitors and the conditions under which he must compete, buying and selling methods, etc.

New River and Pocahontas have hitherto made up almost the entire volume of coal exports, but now gas and coking coals are also finding their way into the foreign markets. It has been found that there are large markets for these fuels, especially in Italy, and trials have proved that our product of this description is quite equal, if not superior to, the British and German coals that have hitherto had a monopoly of this trade.

There seems to be every prospect, then, that the steps taken in 1913 to increase our foreign trade, will lead to an increased tonnage and regular contracts. We now have a surplus of coal over home consumption and must find a market for it if prices are to be maintained and the business remain on its present profitable basis. But we are still facing the problem of variable ocean freight rates and supply of ship tonnages, as well as the return-cargo difficulty; until these obstacles are overcome, our efforts to secure an established coal trade abroad can never be entirely successful.

The visits to the West Virginia and Kentucky coalfields of D. A. Thomas, the most influential figure in the British export coal trade, president of the great Cambrian colliery group and director or chairman in some 21 mining, shipping and selling companies, gave rise to much speculation as to the possible effect of his visits on our exports of coal. It was thought that he had decided to make more or less large purchases or investments in coal lands on this side, with the South American trade in view especially and that his companies would handle United States coals abroad, just as the Westphalian Syndicate of Germany handles British coals. As yet neither coal-land owners or export agencies have been helped, whatever may be the ultimate outcome; the purchase, at a bargain price, of a small New River property, was the only actual investment made as far as is known though he is said to hold options on several large properties and has a permanent representative in this country.

*44 State St., Boston, Mass.

British Eyes on West Virginia Field

There is no doubt that some of the largest British coal interests, especially those interested in foreign bunker agencies, have given close attention to the West Virginia coal fields this year, probably on account of the near opening of the Panama Canal, which will undoubtedly open new markets to these coals. The British coal interests have probably not given more attention to the United States fields because their own business has been, and still continues, in such a prosperous condition, both as to prices and tonnages. The exports of British coals have been greater and the prices obtained higher in 1913 than in any previous year.

The Pocahontas Fuel Co., the largest shippers of Pocahontas coals and probably the largest exporters of coal in the country at present, have shipped during the year, about 250,000 tons of coal abroad; it is also stated by one of their officers that they have closed contracts for some 700,000 tons of export coal for shipment in 1914.

The Consolidation Coal Co. have their own offices in Genoa and have shipped a few cargoes to Italy during the year, mainly Georges Creek coal; this fuel has not, however, the heating value or low ash of the best Welsh or Monmouthshire coals. This company has shipped about 125,000 tons of screened Fairmont coal to the Egyptian State Rys. during the past 18 months, but does not seem to have secured any of this business for 1914, for reasons variously stated, but probably because it did not pay as well as the home markets.

It has been rumored that a large Pittsburgh coal company has secured important contracts for gas and steam coals abroad, some 5,000,000 tons being the total given; this amount is obviously incorrect; 500,000 is more likely the correct figure.

During the last two or three months much space has been given in the daily papers to the operations of a syndicate which had acquired options on most of the desirable New River coal lands and was said to have secured the necessary capital for purchase in England. Five million tons of this coal was to be shipped abroad and the United States export trade revolutionized. While there is no doubt that options had been secured on a large tract of New River land, although not nearly so much as was claimed, evidently the cash was not raised, as the return of their representative from England was followed by a request for six months' extension of the options and a further 90 days' grace.

American Coal Abroad

During the year several of the larger coal-selling agencies have had representatives abroad, with a view to future business, but it is not as yet evident what they accomplished as to future deliveries.

A small privately owned railroad in northern Italy has closed a contract for about 22,000 tons of United States coal, 1914 delivery, said to be Pocahontas coal, at a price of about $5.63 per gross ton, which, at prevailing ocean freights, will net the shipper about $2.72 f.o.b. Hampton Roads.

An opportunity was given one of the larger New River selling agencies last spring to supply a large tonnage, 240,000 tons, to one of the foreign state-owned railroads, but the deal fell through partly on account of the scarcity of suitable coal and partly because of price.

As yet the United States coals have made but little inroad into the foreign markets for manufacturing and railroad fuel, most of the coal shipped abroad having been for ships bunkers.

So far, the efforts of the United States shippers seem to have been largely centered upon Italy and with reason. While France imports more coal, a large part of such imports is made up of Northumberland and Durham coals, as well as Welsh, and the receiving ports, with two exceptions, are on the North French coast, where the United States coals cannot compete, owing to the short distance from the British shipping ports.

Exports to South America

The year's coal exports to South America have shown a healthy increase; it is in this direction that the greater possibilities lie for United States coals, as the consumption is already large and increasing every year with the development of the country, while the possibility of return cargoes is more likely. It is true that the British and Australian coals are holding their own in this direction, yet coals from this country have been tested with excellent results and some steady business been secured, especially in Brazil and the Argentine Republic.

Shipments from Hampton Roads to Para, Manaos and the Amazon have been kept up under existing contracts and the buyers have not only obtained good results from the use of the coals shipped, but have made money from their sales to users.

Although there have been rumors afloat during the year that United States exporters were to build colliers for the foreign trade, no steps have been taken, so far as is known, beyond the making of inquiries as to costs, etc.; the largest exporting company seems content to get into the foreign market and to await the return of lower ocean freights, with an increased supply of tonnage available, although the same firm is said to have lost an important trial order from the French Admiralty through inability to charter at the right time.

The building of new coal piers by the Norfolk & Western and Chesapeake & Ohio R.R., to be put in operation shortly (the Norfolk & Western pier in January and the Chesapeake & Ohio pier in March) will undoubtedly give an added impulse to the export trade, as these piers will ensure quicker despatch to ships and less breakage of coal in dumping.

An Awakened Interest in Export Business

The awakening of interest in the foreign trade during 1913 has been shown by the attention given the question by several of the coal-trade papers. But, with the exception of the Coal Age, none of these papers have paid much attention to the crux of the whole situation, namely, ocean transportation, nor have they discussed the proper methods of selling and handling our coals in foreign countries or the necessity of proper preparation to meet conditions. Yet these are the very rocks on which many of the efforts to enter the foreign markets have wrecked themselves; our so called modern and efficient business methods have often been ridiculed by our foreign competitors and foreign buyers.

It would seem far better to adapt our methods to suit existing conditions and possibly change gradually their ways to ours than to try, as we have done, to thrust upon them what they do not desire; the mere fact that their customs and ways are different from ours does not prove that theirs are wrong.

Notwithstanding all this and our past failures, the year 1913 has brought forth enough success to show that the United States coal exporters are in earnest and intend to persevere until their coals become a permanent and growing factor in the world's coal trade.

Marketing and Shipping Conditions on the Atlantic Coast in 1913

By G. G. Wolkins*

SYNOPSIS—The year just closed was distinguished by the highest average prices that ever prevailed; $2.85 was the base price for Pocahontas, New River and Georges Creek, and this remained firm into December. The sustained high level for the better Pennsylvania grades was a striking development of 1913, as well as the increased foothold they secured in this market. A surplus of all kinds of water transportation the last of the year. Anthracite was generally firm and in a satisfactory position. Independents were little heard from the second half-year. The Pennsylvania state tax was a feature of anthracite trade.

Although 1913 early sagged off from the panicky conditions of November and December, 1912, yet in the main it was a satisfactory year. It was particularly so to operators as they netted higher average prices than had ever been obtained before. There was a pronounced labor shortage in most of the districts that somewhat curtailed output; here and there as in the New River field labor difficulties cropped out, and there have been weak spots in the market; but as a whole, the coal trade has enjoyed 12 months of flourishing and remunerative business.

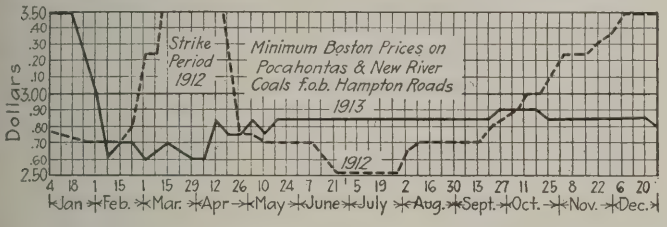
Labor Troubles and Coal Prices

The only conspicuous flare-up was along the Chesapeake & Ohio Ry., centering in the Kanawha and New River districts, but the actual suspension in New River lasted only about five days and some of the mines were not affected. Settlement came through concessions largely on the part of the operators, and July 7 practically all the

*50 Congress St., Boston, Mass.

mine workers were back at their places. Since then a shortage of men has been the rule in West Virginia and in many parts of Pennsylvania, but as it turned out, very little more coal could have been absorbed than was mined, without seriously affecting prices.

Since July 1 the market has largely turned on the output in West Virginia. That was for several weeks a matter of much anxiety with consumers in New England, but at length in September, as advance stocks began to pile up and fears were correspondingly allayed, the scale turned, and late in October it was apparent production would be ample for all needs. Thereafter market conditions were as easy as normally in June and July. Spot coal sold down to the season contract figure through the fall and while several times it seemed as if the $2.85 price was on the point of wobbling, it safely cleared all obstacles and remained firm to the end of December.



It took months, however, for the situation to clear and the market settle down. After February, when the last echoes of the tight winter market had faded away, there was a long spell of dullness. The spot market was less than the announced contract price by quite a margin, but beginning in March a more hopeful spirit took hold and through the rest of the spring there was a firmer, though tempering market. By June some of the large buyers realized they had over-stayed, and there was enough quiet hurrying to cover to lift most of the operators out of the slough and put them in position to command the prices that up to then they had only hoped for. Then came the strike talk in New River and business was plentiful for all grades until well into the fall.

Increased Demand for Pennsylvania Coals

The high average price of the better Pennsylvania grades was a notable feature of 1913. For these coals to command the figures they did, month after month, with no particular shortage of cars, or anything more than threatened upsets in West Virginia, has certainly been a remarkable development. Instances could be multiplied where coals from Clearfield, Somerset and Cambria Counties have made inroads on tonnage that has always been considered "fixed" for Pocahontas and New River. There has been a great light in this respect in New England during the past year. A considerable quantity of these coals of known origin has found its way into the bunkers of off-shore freighters and liners, a thing practically unheard of here except in stress times.

In general, 1913 has helped bring home to consumers some plain facts. It has shown them they must year by year face a constantly mounting fuel cost; it has shown that the very highest grade coals like Pocahontas, New River, and Georges Creek are each year growing more susceptible to an increasing demand for export and for Government use, and that New England must depend more and more upon the quality coals of Pennsylvania. It will be interesting to see the developments along this line in 1914.

From "free coal" in the new tariff there is little help for the New England consumer. Cape Breton coal is the only grade imported to any extent, and it is enough inferior to the better American coals, while mining and trans-shipment are so expensive, that cutting out the 45c. duty is expected to have practically no effect. The use of provincial coals is confined to special cases and no marked change is looked for in that respect.

Pocahontas and New River

The most marked feature of the Pocahontas and New River situation was the remarkable strength shown by the season price of $2.85 f.o.b. Hampton Roads ($1.45 at the mine). For a time in the early spring the prospect was at least doubtful, but in March, when spot prices began to be hammered hard the rival interests got together and tidewater accumulations decreased. Thenceforth the market was held in impressive fashion and 1913 was a banner year so far as returns were concerned.

The year opened with slow loading at the piers and prices firm at $3.50@3.60 f.o.b. and $4.50@4.75 on cars Providence and Boston, but with the actual movement pretty well confined to contract business. Later there developed a receding market, and in late January signs of the new contract season appeared in rumors of a $2.85 price. In 1912 the top season price had been $2.70, and by far most of the tonnage had been closed at $2.50@2.60, so among buyers there was small faith in the stability of the new price. This was emphasized when some of the shippers, pressed with coal, let the spot price down to $2.60 and $2.70, but as March went by and the old contract season ended, the market inspired more confidence. Seasonable weather helped steady prices and gradually it appeared that a volume of inland business had been covered at 15c. over the 1912 basis. But the large corporations were slow entering the market; it was felt conditions did not warrant so sharp an advance, and it was not until the Chesapeake & Ohio labor situation began to be talked about, and restriction became effective, that purchases were made to any extent, and then only with a clause protecting the buyer against a decline.

A Firm Market to the Close of the Year

The recognition granted in the Kanawha district made it seem sure the New River operators must either concede important points or face a more or less serious strike. For several months the issue was in doubt and as usual buyers pretty generally took the worst view of the outlook and made the $2.85 contract figure so firm that by June not only were the agencies comfortably supplied with business, but most of them were so cautious over futures that they declined accepting additional orders for any form of deferred shipment. Certainly for a time there was much apprehension, and it was only after mining was resumed that New England settled down to breathe easier.

Prolonged detention was then the rule at Hampton Roads for several weeks and heavy demurrage bills were paid. Pocahontas output was practically sold up for months to come, and New River was down to 50 per cent. normal; $3.15 was the emergency price. The contract price, therefore, looked sure for the balance of the season and about Aug. 1 there was another, although mild, period of anxiety. It was soon plain, however, that a quiet time would follow and late in August $2.85 was

in view as the spot figure, the agencies that had been shy of taking contracts leading the way.

Demand and supply were well balanced, although most of the coal at tide was applied to old obligations. It was hard to rouse interest, but New England manufacturers continued to drive for deliveries on contract until their stocks were well beyond what they have come to regard the safe point, that is, the utmost they can store.

So with varying prices and an upward tilt once in awhile on spot coal, now to $2.90, now to $3.10, the market went mulling along until in November the larger consumers sought rather to have deliveries postponed, and, taking into account the tonnage of Pennsylvania grades that was taken when Hampton Roads shipments were slow, it was plain New England had absorbed all the advance supply that could be comfortably cared for. Then, too, general business conditions were slackened and consumption had decreased materially. A dull market ensued, "market cargoes" appeared although in a fugitive way, the on-car price at Boston dropped to $3.70, a price that would net $2.70@2.75 f.o.b. Hampton Roads, but the contract price continued to the end of the year without wavering on the part of any important shipper.

Price shading was the exception in 1913, and after March the market had throughout a strong undertone, for even though in the late fall, when things promised to be slack, the export trade came to the relief of the larger agencies and they pulled through in easy shape.

Georges Creek Coals

As in the case of Pocahontas and New River, Georges Creek had a favorable year. The tonnage coastwise was less than in 1912, but the contract price effective Apr. 1 was 15c. in advance of 1912. More than any other grade that reaches this market it is sold on contract and is less subject to the fluctuations of the open market. By far the largest volume of it is placed in transportation owned or controlled by the shippers who are also operators and that is an element in attracting tonnage.

January was a month of slow loading, and few shipments, but into February Georges Creek came down freely on orders. Through the spring it was only intermittently in good supply, for Government colliers last year seemed to play a larger part in Baltimore and Philadelphia loading; $2.85 f.o.b. Baltimore ($1.67 at the mine) was named the net contract price and a comprehensive business was soon taken on. There was some hesitation by large buyers over the differential asked above other noncoking coals, but in this market especially the coal is popular and as it turned out the shippers had all the orders they could manage. In June began a slowing up of deliveries in sympathy with the situation at Norfolk and Newport News, a labor shortage began to be felt, and the district was pushed to keep up with requisitions in hand. Late in July the shippers were far behind on obligations, and only dribbling amounts came through to Philadelphia and New York. Through September and October there was little available at any of the ports, but Nov. 1, Georges Creek, from being the scarcest coal in the market, once more came into adequate supply. The demand was light through November and December and the year closed with only moderate inquiry. So much Pennsylvania coal had been purchased in this section that late in the year Georges Creek for spot sale rather went begging.

The season price was $2.92@3.02 f.o.b. Philadelphia and $3.22@3.32 f.o.b. New York, the year beginning Apr. 1, 1913.

RECEIPTS OF BITUMINOUS COAL BY SEA AT BOSTON, SHOWING PORT OF SHIPMENT*

	Baltimore[1]		Norfolk[2]		Newport News		Philadelphia		New York		Totals		Foreign[3]	
	1912	1913	1912	1913	1912	1913	1912	1913	1912	1913	1912	1913	1912	1913
January	100,198	88,653	122,696	168,131	77,108	50,171	9,148	33,702	....	....	309,150	340,657	21,450	37,391
February	124,610	77,186	114,579	221,436	71,958	78,265	6,986	15,161	....	....	348,133	392,048	39,820	25,200
March	125,943	94,407	163,033	227,697	58,555	81,359	12,201	22,433	....	1,094	359,732	426,990	29,449	26,445
April	125,585	95,767	116,909	232,210	89,787	88,530	20,520	16,255	893	....	353,694	432,762	18,700	27,500
May	119,187	105,849	185,600	195,931	101,416	77,750	59,991	33,950	4,440	800	471,634	414,280	27,800	13,300
June	106,506	112,934[1]	151,609	179,936	90,563	80,834	29,882	53,195	....	....	378,560	426,899	25,500	15,750
July	105,320	123,784[1]	159,866	160,515	53,042	56,445	19,298	62,506	....	....	339,256	403,250	25,250	21,876
August	128,054	110,795[1]	163,995	222,974	120,663	57,646	20,752	74,903	....	....	433,464	466,318	26,300	15,750
September	129,114	71,577	156,038	242,290	97,836	57,571	30,737	59,458	600	....	414,325	430,896	21,450	13,300
October	92,340	86,444[1]	158,609	205,438	106,765	19,144	49,925	65,835	1,064	1,380	408,703	378,241	20,600	15,247
November	86,843	89,554	164,019	208,275	29,173	38,438	39,081	46,769	1,100	....	320,216	383,036	27,600	24,000
December	114,564	107,564	149,797	213,573	48,937	53,450	23,813	67,464	1,542	....	338,653	442,057	25,207	33,900
Total 1913												4,937,428		
1912		1,361,994		1,836,750		945,803		322,334		9,639		4,465,520		309,126
1911		1,576,397		1,218,391		921,220		381,961		3,776		4,101,745		263,861
1910		1,595,554		795,475		1,243,857		292,636		25,515		3,954,251		296,564
1909		1,302,729		561,388		1,088,412		436,164		4,730		3,393,423		228,297
1903		481,111		314,505		596,439		595,824		93,940		2,081,819		1,226,134

* Courtesy of the Boston Chamber of Commerce, Statistics Department.
[1] Includes small shipments from Washington and Georgetown. [2] Lamberts Point and Sewalls Point. [3] Almost exclusively from Louisburg, Cape Breton, except during 1903 when a large part came from Great Britain.

The Pennsylvania Grades

Besides the stronger hold acquired by coals from the Pennsylvania districts on consumers in New England, the increased differential between the better and the inferior grades was another marked development of 1913. They more than held their own, although the extreme caution of Baltimore and Hampton Roads shippers helped to a considerable degree for more than half the year. There are signs that many of the better grades made significant gains in tonnage, and it will be hard for Southern coals to displace them.

The market was more even than has been the rule in recent years. After the slump in late January, the situation was rather slow developing; $1.25 at the mine was a fair price for the less favorably known Clearfields, and from that up to $1.50 was asked on the more popular grades. Generally, 10c. more than in 1912 was quoted for season business, but with an ample car supply and not a particularly encouraging outlook for manufacturing, buyers were slow committing themselves. Soon, however, the 15c. advance at Hampton Roads made a broader demand for Pennsylvanias, and through the spring and summer months there followed a healthy activity for practically all the desirable varieties.

In April most of the high-priced grades had been closed on staple contracts, and thereafter until November there was only a small volume offering from time to time on

spot sales. Many of them were withdrawn from the market and operators put so much dependence on the West Virginia labor complications that up to July they were reluctant to accept orders for deferred delivery. Prices were 5@10c. higher in May than in April, and there was complaint at the slow loading on account of accumulated orders. In June it took no effort to sell all the good Pennsylvania coals that came to tide. A mild stringency appeared and an increasing tendency to decline orders was shown. Cambrias and Somersets touched $1.70, and most operations were under reduced output, the lack being due to small labor difficulties and a general shortage of men. But just as a wide market was opening and the trade was right at the point of buying with not so much regard to quality, the news of the collapse in the New River strike came and the demand in New England sank to more nearly normal. From July on for three months or so there was a moderate market, with now and then a short spurt in response to tight conditions on Pocahontas, New River and Georges Creek, but in the main with prices quite even.

There was still a deal of caution over futures, operators hoping that somehow there would come a turn, but the only turn that came was in November when it appeared that even the producers of the choicest grades were quietly looking for milder business. Unexpectedly enough hand-to-mouth buying developed to tide over, and only in late November and early December did the choicest grades appear in any volume at tidewater points in excess of contract requirements. There was a time in October when inquiry was active for Cambrias and Somersets suitable for bunker use and prices again reached $1.65, but the ordinary low-priced Clearfields were hard to sell at a dollar flat. The Atlantic seaboard was more discriminating than was formerly the case.

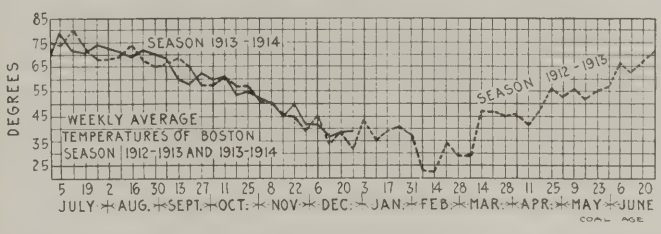
Transportation

There was decidedly less fluctuation in water freights in 1913 than for several years past. Except for the 95c.@$1 rate that obtained on large vessels, Hampton Roads to Boston, in January and February and soon sagged off, freights were on a basis of 5c. up from 1912, or 75c. to Boston. A number of season charters were closed at that rate, and it was the exception when a spot schooner or barge got a higher freight after Mar. 1. The tonnage situation was easy thereafter, the latter part of the year showing a surplus of steam as well as sail and barge transportation. Most of the coal to New England is in steamers or over tonnage that is under contract and the current demand was light throughout the year.

The Reading barge rate on bituminous was reduced about Mar. 15 from 90c. to 80c., Philadelphia to Boston, and this rate obtained until Nov. 1, when to most Eastern points the 90c. rate was resumed. On Long Island Sound for New York loading the market has see-sawed from 40@50c. the whole season. The advance of 10c. in October on certain of the anthracite barges, making the rate to Providence 60c. from lower harbor ports instead of 15c., has made it easier for outside boats to command the 50c. rate.

Anthracite

Hard-coal trade on the whole enjoyed a satisfactory year in New England. The mild weather in January and February enabled dealers to get through to the end of the previous season very comfortably, and while in March the market was spotty, April was not at all the disappointment that was predicted. Numerous consignees failed to get the share of minimum-priced coal that they were counting on. The originating companies proved to be well supplied with orders, and some sizes, notably broken and pea, were in relatively short supply. The larger sizes like broken and egg were in many cases put back through the breakers to help meet the tremendously increased demand for stove.



May showed a further shortening up. Receipts were far behind those of April and slow dispatch was the rule at the piers of those companies that have the call for this market. Shipments had begun in April with a rush and buyers feared for a time they would be swamped, but in May there was ample business and enough left over to run the mines full through June. From then on there was a steady demand for the rest of the year, broken and stove especially being the sizes in shortest supply. As early as May orders for broken were declined and the proportion of stove in any one cargo was cut down to such extent that it became embarrassing to dealers who were in no position to take the amount of egg and nut necessary to get their requirements of stove. This situation grew more drastic as the season advanced and in November premiums of 50c. up were offered for cargoes mostly stove.

Individual coals did not continue so important a factor here as was looked for. Low prices were made in February and March to draw business to these coals; at one time in March egg was offered at a discount from the April circular, but sales were only of small tonnages. Dealers for the most part confined their barges to the companies who looked after them during the hard times in 1912. Instances could be multiplied of retailers who placed their April and May orders with certain of the originating companies when they could have saved 15@25c. a ton by buying of independents; the feeling against the shippers of "premium" coal in 1912 was that strong. In early January as high as $7.60 was paid alongside Boston, $1.90 in excess of the circular. Water freights and a stronger demand in other directions soon eliminated all the scattering cargoes through the summer. By fall they had practically disappeared from the market.

Anthracite mines were worked only four days a week during July and August, and this curtailment had the effect of keeping inquiry active through what are ordinarily the dullest months. To the end of December there was hardly a let-up in the urgent call for deliveries all through the fall. Large storage depots in the East were practically bare the whole season. Retail trade was exceptionally good until November when it eased off into a weather market. Boston prices were advanced three times, 25c. each time, until Oct. 2 they were at $8.25 for nut, the 1912 high price for that size. Dealers have held closely to the policy of keeping storage as well filled as possible and those who were far-sighted enough to take extra quantities of stove when such could be had deserve credit for protecting their customers.

New York Market Experiences a Period of Unusual Prosperity

SYNOPSIS—The year was a period of satisfactory business all along the line, but particularly in bituminous. Prices ruled well above prevailing figures of 1912 on both spot and contracts. Anthracite was characterized by an almost year-around shortage of stove coal and heaviness in egg. The new Pennsylvania state tax on hard coal and a readjustment of demurrage rulings in New York Harbor were among the important developments of the year.

Bituminous Market

By J. W. Whiteley*

For some years past the bituminous market (barring short periods of abnormal business, due to labor trouble) has been almost continuously weak and prices have ruled at figures which showed little or no profit. The summer months, more especially, showed particularly sluggish conditions. About the only relief was the usual car shortage along in the fall months, which temporarily affected prices; but following the close of navigation on the Lakes quotations usually sagged to somewhere near the summer level.

Cause of the High Price Level

During the winter of 1912-13, however, we ran into an inflated market, prices reaching their highest point about Christmas time and receding thereafter to more nearly normal figures. Some of the large buyers of bituminous have for the last few years become more or less indifferent about closing up contracts, experience showing that they could buy at reasonable figures throughout the year causing a tendency toward laxness in meeting contract obligations. Last winter, however, many of those who had not closed found themselves paying exorbitant prices and as a result this class of buyers learned the wisdom of contracting. This developed a more healthy demand last spring for contract shipment.

There were a number of consumers who did not close at the usual contracting season and later on found it more or less difficult to cover their requirements on a satisfactory grade of fuel. The high prices of last winter furnished an incentive for operators to keep a considerable portion of their tonnage free; in fact some operators made no contracts, feeling that there would be recurrence of the conditions prevailing last year. The fact of their holding aloof undoubtedly had a considerable bearing on the market; it will also be remembered that in the spring of 1913 the Ohio Valley was visited by severe floods which seriously interfered with the operation at the mines. It is estimated in some quarters that the shortage caused by this disaster would run somewhere between 5,000,000 and 10,000,000 tons.

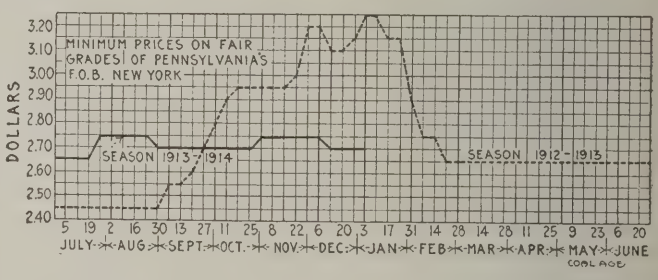
The requirements in the West were unusually heavy, tonnages being closed for Lake shipment at good figures early in the season. The facilities on the Lakes were taxed heavily, and with the large demand in this direction, considerable tonnage of coal tributary to the Eastern market was diverted West. Notwithstanding the generally pessimistic feeling regarding the new legislation on the tariff and the currency question, the coal business at least has been exceptionally heavy, the coal-carrying roads reporting a movement in excess of any former year.

*Whitney & Kemmerer, 143 Liberty St., New York City.

Labor Conditions and the Strong Market

Labor conditions throughout the regions have been a potent factor in the situation. There have been few companies who have had sufficient miners to operate full capacity. While there were no disturbances of any moment in Pennsylvania, the strike in West Virginia fields was serious and of considerable duration. The car supply for a considerable period during the summer months was also short and the combination of these conditions had a noticeable effect on the market.

Perhaps one of the most notable features in the trade during the past year has been the action of quotations on slack. In former years the heavy demand for screened coal, particularly for Western shipment, has resulted in slack being a drug on the market, selling in some cases at less than 25c. at the mines. When compared with $1.10@1.20, which figures were realized this year, it will



be seen just how stiff the situation on slack was; the price was about the same as that asked for run-of-mine.

While indications pointed to a higher bituminous market during the late summer of 1912, the signs of the early fall of the past year were to contrary conditions. The failure of the railroads to secure an advance in freight rates and the increase in wages they were compelled to meet made it necessary for them to practice more or less economy in other directions; as a result orders for steel equipment were consequently smaller. The noticeable decrease in construction in the building trades, in which a considerable amount of iron and steel is used, also had its effect and with the slowing up in this field of endeavor, the demand for cars was naturally less and the production of coke was necessarily reduced.

This served the double purpose of improving the car supply and placing more free coal on the market. The West became over-supplied, and at the close of navigation there was a considerable tonnage available for Eastern shipment. Not only that, but the coal which had been diverted West came back into the Eastern markets. Anticipation of a reduced tariff at about this time and the uncertainty of the proposed currency legislation caused more or less hesitation in the business world. The net result was, of course, a drop in the price of coal.

Sundry Comments

The Pocahontas and New River coals which cover the major portion of the East, from Fall River to Providence around the cape, were maintained at reasonably steady prices throughout the season, and were in short supply from time to time. As a result a considerable tonnage of Pennsylvania coals moved in that direction.

A feature of note in the trade is the gradual education of the bituminous consumer. Buyers are no longer governed by the price alone, but have become quite discriminating. They realize that a difference of 5c. or 10c. per ton on the mine price is, after all, a more or less negligible quantity, more especially when the freight to destination is added. A few cents per ton at destination represents but a small percentage on the delivered price. This trend of conditions is unquestionably advantageous to both the operator and the consumer. The producer feels and knows that by giving his coal the proper preparation and attention it will be appreciated by the consumer and bring a better return. The buyer, on the other hand, gets a better product and is able to select the coal which may be best adapted to his particular requirements.

On the whole, even though the market has taken a considerable slump, the year cannot be considered other than a most satisfactory one for the bituminous trade. Now that the legislation, about which there has been so much apprehension, has become a law, it is believed that after a readjustment to the new conditions has been effected, the business of the country will go ahead again without interruption.

The normal annual increase in the demand for bituminous coal in this country is estimated at about 10 per cent. The increased production for 1913 over 1912 was probably less than the normal increase, which accounts, in a large measure, for the satisfactory returns to the operators. There is no reason to doubt that the demand will show a normal increase with the year 1914, and business should continue for that year on a satisfactory basis.

The Anthracite Market

By G. W. Seiler*

Conditions in anthracite during the past year have been quite satisfactory, both as to output and prices, although it is doubtful whether this year's production will exceed 1911. No comparison can be made with 1912, due to the suspension in mining in the earlier part of that year.

Mining continued throughout the year without any noticeable interruption. Labor troubles occurred during the summer months at some of the collieries controlled by the Lehigh & Wilkes Barre Coal Co. and the Lehigh Coal & Navigation Co., but these disputes were quickly settled.

During January, February and March, the market was overloaded with all sizes of anthracite, due to an exceedingly mild winter. No doubt some of the large profits enjoyed by speculators during the close of 1912 were greatly reduced during the earlier months of 1913, in disposing of high-price coals at low figures. Steam sizes of the poorer grades during this period had an exceptionally hard time in finding prompt disposition.

The Wyoming grades enjoyed a steady output and prices held firm throughout the year. Occasionally a surplus of these good grades in No. 1 and 3 buckwheats would accumulate, but no exceptional difficulty was experienced in moving them where a slight inducement in price was offered.

In the Schuylkill & Lehigh coals, No. 1 buckwheat usually was long and prices sacrificed accordingly. Most shippers from the lower regions avoided shipping large tonnages of No. 3 without specific orders on hand.

The average prices throughout the year on the poorer grades of steam sizes were: No. 1 buckwheat at $2.30; No. 2 buckwheat, $1.85; No. 3 buckwheat, $1.45.

April brought a decided change in conditions; this was naturally expected as the usual deductions from winter prices on the prepared sizes were effective Apr. 1, and also renewal of contracts on steam sizes usually takes place about that time.

The companies issued a circular on Apr. 1 wherein the prices on anthracite were as follows:

Broken	$4.50	Buckwheat (Wyoming)	$2.75
Egg	4.75	Buckwheat (Schuylkill and Lehigh)	2.50
Stove	4.75	Rice (Schuylkill and Lehigh)	2.00
Nut	5.00	Rice (Wyoming)	2.25
Pea	3.50	Barley (all grades)	1.75

Contract prices on the cheaper grades of barley, particularly Reading coals, were made at $1.50 f.o.b. Port Reading. The regular increase of 10c. each month on prepared sizes from May 1 until Sept. 1 was applied. During April, May and part of June the companies, also individuals, were overloaded on orders for prepared sizes and collieries were working full time during that period.

The Pennsylvania Tax and Heaviness in Egg Coal

On July 1 several of the companies found themselves compelled to charge a state tax of 2½ per cent. on the mine prices of all sizes. This act was evidently accepted as being constitutional because there seems to be no difficulty with the companies in making the dealer pay. The 2½ per cent tax averages an increase of about 10c. on prepared sizes and 5c. on pea size. The operators have not been charging the tax on the junior grades.

During July some difficulty was experienced by the individuals in moving egg and nut sizes, but in most cases a reduction of 10 to 25c. soon relieved the situation. In fact the tremendous demand for stove coal starting in April and continuing up to the middle of December was a great help to the individuals in moving their long sizes. Undoubtedly this unusual demand for stove was brought about by the difference in price between this and nut. In former years nut was usually the popular size in the domestic coals and for that reason an increase in the price of 25c. was made over a year ago.

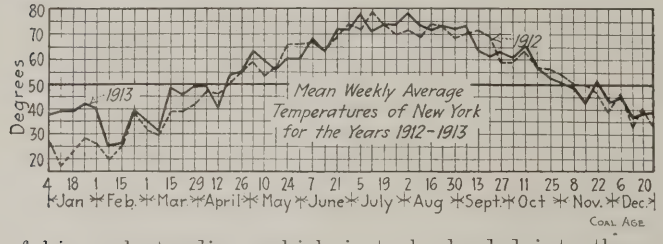
The disposition of egg size is quite a problem with the operators, as the only time this size seems to move promptly is in the early spring months when the low price prevails or in unusually cold weather. This is probably due to the fact that the largest users of this size are the apartment houses who fill up their bins in the spring months while the coal is not used until cold weather arrives. Unfortunately the collieries cannot avoid making this grade unless egg is broken down into smaller sizes and as that would simply increase the tonnage of steam sizes, it is impractical.

Rail Movement and New Demurrage Rules

All-rail shipments, particularly to Western points *via*

*Sales agent, A. W. Hillebrand Co., No. 1 Broadway, New York City.

the Great Lakes, materially helped in preventing overshipping tidewater points during the period from August up to the close of navigation. Individuals are now adverse to sending any surplus coal to tidewater points, due to the demurrage charges caused by detention at the railroad docks. Since March the Delaware, Lackawanna & Western, the Ontario & Western and Lehigh Valley railroads have added demurrage charges of $1 per car for each day of detention after a free time of five days. Their tariffs also include a clause which most shippers contend is unfair. This provides that if a vessel reports at the coal piers on an order calling for two or three sizes of coal, the shipper is not released from demurrage on any



of his coal standing, which is to be loaded into the reported vessel unless the entire cargo is immediately assembled. This has stirred up quite an agitation among large shippers who propose to bring the matter to an issue before the Interstate Commerce Commission at the next hearing.

The Lehigh Valley R.R. tariff on coal to the Perth Amboy piers does not allow the shippers to stock coal in bins on their piers for an indefinite period, as heretofore unless the shipper agrees to pay demurrage charges on the stocked coal the same as if it were loaded on cars. This ruling is quite a handicap to large shippers. Heretofore the permission to stock coal at the Perth Amboy piers avoided the disposal of individual grades in a crowded market at cut prices. This new ruling has changed conditions in such a way that the individual shippers are confronted with quite a serious situation. Some of the collieries situated on the Lehigh Valley have also other railroad connections, which permit them shipping their products to various points of distribution, and, therefore, are not affected to any large extent.

On the other hand, these new rulings also have their good points as they will do much to prevent an accumulation of large tonnages at the various piers and a consequent general embargo. When an embargo is established at any pier it always has a tendency to break prices as the shipper is forced to either move his coal promptly or shut down until the embargo is removed. Of course, this serious situation does not confront the shipper unless line trade is unusually dull, but a crowded condition at tidewater points is a sure indication that all-rail shipments are lax.

An Easing Up in the Fall

During August considerable tonnage kept moving to all-rail points with the exception of egg coal, and the large companies were compelled to stock this size, while individuals sacrificed at cut prices in order to keep their production moving. September and October brought on the usual stiffening in demand and prices, and during November stove size was selling at premiums ranging from 25 to 50c. above the circular.

On Dec. 1, the state tax was being charged by all the large companies. The unseasonable weather experienced during the last month of the year brought about a heavy slump in the market. Stove coal was easy, and the companies found themselves compelled to stock 10 per cent. of their output. The shutting down of collieries three days per week during the last two weeks of the month helped to give a better tone to the market at the close.

Looking forward to the coming year, there seems to be a general pessimistic feeling among manufacturers that an exceedingly dull period is ahead of them, due to the tariff changes. While there are some in the coal trade that express this same feeling, others seem to be optimistic as to the future. The latter are of the opinion that if the country in general has confidence in the present administration and if business adjusts itself to the new conditions, there is no reason why the coal trade should not have a reasonably good year during 1914.

Connellsville Coke and the Pittsburgh Coal Markets in 1913

By B. E. V. Luty*

SYNOPSIS—A heavy Lake and manufacturing demand in the Pittsburgh region created an active coal market. Circular prices well maintained, with occasional premiums, until the cessation of Lake shipping. Connellsville coke market fluctuated sharply with prices generally adverse to the operators. Further incursions of byproduct coke noted and many believe that the last of the Connellsville coal will be shipped to byproduct ovens.

The year 1913 was one of heavy coal production in the Pittsburgh district, and in addition the market afforded much more satisfactory prices than the average. Of the two preceding years, 1911 had been poor both as to tonnage and prices, while 1912 was bad as to prices if not tonnage.

Several circumstances combined to make 1913 a good year. The manufacturing demand was exceptionally large, as the industries were prosperous and the iron and steel mills tributary to the Pittsburgh district turned out the largest tonnage in their history. The railroads enjoyed a heavy traffic in the raw materials and finished product of the iron industry, and had a good business in general merchandise. The lake trade was exceptionally heavy, partly because the previous season had left the Northwest with very light stocks, and partly because there was a general expectation that the wage scale settlement for the two years beginning Apr. 1, 1914, would prove an unusually difficult matter, possibly involving a long suspension of mining, with a consequent late opening for lake shipments in 1914.

The Pittsburgh district operators, therefore, enjoyed a

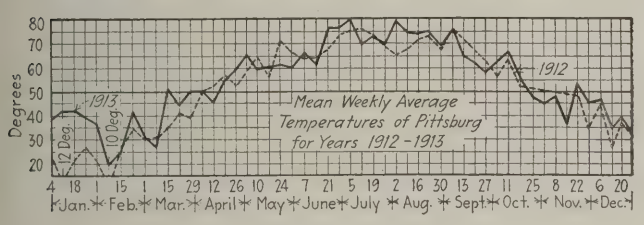
*627 Oliver Bldg., Pittsburgh, Penn.

heavy demand in 1913, which helped to make good prices, but that was not the only factor. The human element entered very largely. For several years the Pittsburgh district operators have felt that coal prices were too low. At the opening of the season quotations would be named predicated upon full operation and a moderate margin of profit, and then it would develop that under curtailed operation, due to lack of demand, and of men, or shortage in car supply, the cost of production would mount. Usually full allowance was not made in advance for the constantly increasing cost of mining due to governmental restrictions and safeguards thrown around mining by the voluntary act of the operators. Before the opening of the selling season for 1913, on Nov. 4, 1912, the Pittsburgh Coal Co. promulgated prices on a basis of $1.30 mine-run. It was then that a new element appeared, for instead of the prices being cut generally in competition for contracts and spot orders, as had almost invariably been the case in immediately preceding years, the circular quotations were quite well maintained, and indeed still higher prices were obtained for a short period toward the close of the lake-shipping season.

Premium Coal and the Fall Recession

Prices were thus in sharp contrast with those in 1912; that year opened with mine-run at $1.15, but after the wage-scale settlement of Mar. 29 an advance was made to $1.22½, covering the 5c. advance in the mining rate, but the market was cut deeper than ever, so that for weeks mine-run was easily obtainable at a dollar a ton.

The 1913 basis was: Slack, 90c.; nut and slack, $1.05;



nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50; 1¼-in. domestic, $1.55. These were the regular circular prices, with the customary 10c. concession to dealers, making lake coal $1.30. There was some cutting, but very little, and the average realized price on mine-run and lake coal was probably all of $1.25. In August coal began to grow scarce and the condition became rather acute by the beginning of September. Premiums could be obtained, but operators, as a rule, had nothing to spare after meeting contract obligations, and these they did meet as faithfully as physical conditions permitted.

On Oct. 1 a 10c. advance was made, and adhered to as long as there was little coal to sell. Later, demand fell off and the market began to decline. The 10c. advance was quickly lost, and the old prices began to be cut. The end of the lake-shipping season seemed to promise a demoralized market, but the situation was met by a great restriction in output. Monday, Dec. 1, the mines began operating at an average of about 60 per cent. capacity, when during the first 11 months of the year operations had averaged from 80 to 90 per cent. of full rated capacity.

Coal operators have rather studiously avoided making definite statements or predictions regarding the impending settlement of a new wage scale to replace the scale which expires by limitation Mar. 31 next. However, it is quite generally understood that they contemplate a serious contest, if necessary, to shake out much that has accumulated in the scale through several successive settlements in which the men have had things decidedly their own way. Industrial conditions and prospects will, of course, govern to an extent, but it seems certain that the operators will approach the next settlement in a different mood, and with more harmony of action.

Connellsville Coke

There were lively conditions in the Connellsville coke market throughout the year, caused by the earnest effort of a group of operators to secure better prices, relative to the selling price of pig iron, than they had ever obtained before. For many years Connellsville coke had sharp ups and downs. Owing to the practice of making semiannual and annual contracts, based largely upon what chanced to be the spot market at the time, and the spot market of a commodity which is not stocked to any extent is naturally one of wide fluctuations, it has frequently been the case that furnacemen paid high prices for their coke when they were getting low prices for their pig iron, and *vice versa*.

CONNELLSVILLE COKE STATISTICS FOR 1913*

1913 Week Ending	Production: Merchant Production	Production: Furnace Production	Production: Total Production	Shipments: Output: Cars	Shipments: Output: Tons
Jan. 4	156,382	227,822	384,204	11,397	384,831
Jan. 11	164,893	239,504	404,397	11,934	404,397
Jan. 18	175,847	253,981	429,828	12,662	429,097
Jan. 25	170,225	246,057	416,282	12,296	416,369
Feb. 1	172,755	249,998	422,753	12,482	422,932
Feb. 8	166,590	240,779	407,369	12,040	406,793
Feb. 15	177,049	256,392	433,441	12,911	436,902
Feb. 22	179,974	261,671	441,645	13,056	441,629
Mar. 1	176,854	255,791	432,645	12,780	432,127
Mar. 8	168,903	244,382	413,285	12,389	412,740
Mar. 15	182,313	263,181	445,494	13,236	445,459
Mar. 22	175,717	255,168	430,885	12,175	410,387
Mar. 29	145,060	208,873	353,933	9,681	326,068
Apr. 5	153,360	220,274	373,634	11,056	372,194
Apr. 12	158,058	212,618	370,676	11,530	392,273
Apr. 19	157,041	251,366	408,407	12,188	412,660
Apr. 26	160,759	254,989	415,748	12,146	413,788
May 3	158,948	244,121	403,069	11,840	403,703
May 10	163,678	250,808	414,486	12,085	412,096
May 17	162,850	246,578	409,428	11,921	406,294
May 24	154,936	241,968	396,904	11,651	394,492
May 31	158,079	243,242	401,321	11,808	403,070
June 7	160,484	248,531	409,015	11,900	407,157
June 14	161,400	249,208	410,608	11,962	409,693
June 21	159,024	243,281	402,305	11,691	401,866
June 28	162,217	247,782	409,999	11,981	411,499
July 5	121,045	212,313	333,358	9,665	332,528
July 12	138,207	252,263	390,470	11,274	388,876
July 19	145,924	253,780	399,704	11,534	399,848
July 26	145,389	247,944	393,333	11,320	393,634
Aug. 2	141,623	243,442	385,065	10,560	366,053
Aug. 9	144,883	247,942	392,825	11,408	397,362
Aug. 16	148,927	247,690	396,617	11,419	398,277
Aug. 23	146,809	222,667	369,476	10,755	369,323
Aug. 30	150,627	252,403	403,030	11,631	405,115
Sept. 6	144,496	224,963	369,459	10,609	371,270
Sept. 13	135,750	239,060	374,810	10,740	374,911
Sept. 20	140,388	238,049	378,437	11,137	389,742
Sept. 27	146,474	239,020	385,494	10,965	383,336
Oct. 4	141,850	216,448	358,298	11,095	388,347
Oct. 11	136,168	250,722	386,890	11,016	389,945
Oct. 18	139,382	240,223	379,605	10,879	384,013
Oct. 25	137,935	247,735	385,670	10,997	389,068
Nov. 1	138,430	236,800	375,230	10,088	356,546
Nov. 8	137,975	216,070	354,045	10,304	367,479
Nov. 15	137,858	219,694	357,552	9,328	333,609
Nov. 22	142,450	212,790	355,240	10,658	378,904
Nov. 29	133,170	210,938	344,108	10,001	356,785
Dec. 6	132,382	189,545	321,927	8,904	321,631
Dec. 13	133,250	174,540	307,790	8,447	305,745
Dec. 20	130,324	154,640	284,964	7,705	278,355
Dec. 27	125,030	111,055	236,085	6,425	233,581
Dec. 29-31	65,428	74,789	140,217	4,025	140,875
Totals	7,917,263	12,161,316	20,078,579	582,071	20,097,901

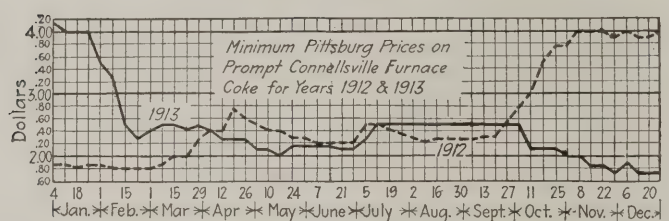
*From the "Weekly Courier."

At the beginning of 1913 prompt furnace coke was bringing $4 a ton and more, and contracts had been made at various prices ranging up to $3.50. The pig-iron market began to decline at once, and prompt coke fell with it. A group of operators who were allowing the Producers' Coke Co. to act as their selling agent, and had contracts ending June 30, determined that coke for the second half

ought not to sell at less than $2.50. Much other coke was sold at slightly less, but eventually, for July, August and September, the $2.50 operators did succeed in selling a considerable tonnage, month by month, at the $2.50 figure. It became increasingly difficult to get the price and late in the year, when prompt coke was down to $1.75, or possibly $1.70, a $2 price was named for the new year.

Renewed Strength at the Close of the Year

In view of the previous market history, and the great decrease in coke consumption, it seemed rather improbable that the price would be obtained, but in the closing fortnight several sales at the full price were effected, indicating that coke offered at lower figures was limited in quantity or not satisfactory in quality to many consumers. Pig iron was then selling at approximately as low prices as in November, 1911, at which time prompt coke was $1.40@1.45, and six-month contracts were made at $1.55 @1.60. The comparison indicates that while the operators who held to a definite price have been much criticized they really have elevated the level of the coke market.



While pig-iron production, and consequently coke consumption, was somewhat greater in 1913 than in 1912, by about 5 per cent., the production of Connellsville coke was less, owing in part to there being heavier production by other and competitive regions, but chiefly because of greater production of byproduct coke, made at the point of consumption with shipped coal.

The contention of the Connellsville coke operators for a relatively high price, $2@2.50, is based upon a relatively high valuation for the coal acreage. The Connellsville seam has sold at $2000 an acre and more, and producing 7000 tons of coke per acre, carrying enough acreage for a 10- to 20-year life for the operation, this price for coke is necessary. There is the question, of course, whether the coke market should establish the value of the coal seam, or the market value of the coal seam should establish the coke market. With the operators it is a condition rather than a theory, for many of them have bonded their operations on the basis of a high value for the acreage and the bonds must be taken care of if the market can be so conducted as to do so.

In the final outcome the average price of coke and the actual realized value from the acreage will be determined by the rapidity with which consumers adopt byproduct coke. The trend is strongly in that direction, but coke consumption is also on the increase, and as the Connellsville seam has a life of only about 20 years or less, at the present rate of exhaustion, an interesting contest is promised. There are those who predict that the last of the Connellsville coal will be shipped to byproduct ovens, instead of going through beehive ovens at the pit mouth, but the average Connellsville operator will not admit such a probability.

Anthracite Shipments by Lake and the Buffalo Market in 1913

By John W. Chamberlin*

SYNOPSIS—Lake shipments of anthracite break the previous high record by more than a million tons. No important changes occurred in hard coal circles. Bituminous operators experienced a period of unprecedented prosperity, though the year closed with the markets dull. Heavy tonnages were the rule and prices were maintained at an abnormally high level.

Buffalo ships about four-fifths of the anthracite that is handled by lake and has increased shipments during the season of 1913 by nearly one-third. The shipment for the past season is a trifle more than five million tons, net, while the amount for 1912 was 3,925,583 tons and for 1911 it was 3,917,429 tons, this latter being the record up to that time. The cause of the slight increase in 1912 was that the mining suspension in that year cut off the supply till well into June. This means that there is a strong tendency to increase the movements by lake into the Northwest, and the limit is likely to be reached only when the maximum output of anthracite is obtained. At the same time there is a steady increase of shipment from Lake Ontario ports, most of which is confined to that immediate territory.

*90 Johnson Park, Buffalo, N. Y.

The Situation in Anthracite

There has been no important change in the anthracite trade in Buffalo during the past year, either in personnel or equipment. The effort of the Government to dispossess the Delaware, Lackawanna & Western Co. of its shipping trestle at the mouth of Buffalo River, made at various intervals during the past 20 years or more, has again been laid aside temporarily, without apparently arriving at a definite settlement. The Government claims to own the site and also that the mooring of craft at the trestle to load coal is a menace to navigation. The public is divided on the question. There is a move to replace the old wooden shipping trestle with a modern car dump, and one company has about concluded to make the change immediately as these frame structures are expensive to maintain and occupy excessive space.

Water shipments of anthracite for the past season will be divided about as usual among the four companies, Lackawanna, Lehigh Valley, Erie and Philadelphia & Reading. The Ontario & Western did not ship anything by water, as it occasionally does, confining its operations to Oswego. A few cargoes were shipped by Whitney & Kemmerer, who reopened an office in Buffalo more than a year ago.

As to the anthracite trade the outlook is for continued dullness till there is steady winter weather to stimulate buying. At no time during the past year has the consumer been enough concerned about his supply to clamor for immediate delivery. This is due to the fact that there has not been any really cold weather, for an unusually long time, including a great part of last winter. The Buffalo anthracite buyers and sellers now gage the trade by the prices obtained for independent anthracite, of which there is much more on the market since the suspension of the old practice of turning most of it over to the railroads at an accommodation price. When this coal sells at a premium over the regular circular the trade is brisk; it has not done so lately.

ANTHRACITE SHIPMENTS FROM BUFFALO

Destination	1913	1912	Destination	1913	1912
Superior	1,697,445	1,243,450	Menominee	5,300	8,500
Chicago	1,445,422	1,195,350	Washburn	5,200	.....
Milwaukee	612,528	381,550	Byng Inlet,Ont.	3,800	1,175
Ft. William Ont.	395,048	281,756	Hubbell	3,200	.....
Duluth	320,963	160,930	Dollar Bay	2,100	.....
Pt. Arthur, Ont	161,092	168,900	Cheboygan	2,050	1,900
Sheboygan	109,500	135,500	Parry Sound, Ont.	2,000	1,200
Waukegan	43,000	40,325	Sturgeon Bay	2,000	2,650
Green Bay	37,000	16,700	Kewaunee	1,647	.....
Racine	30,200	31,150	Michipocoten, Ont.	1,500	.....
Manitowoc	26,400	2,460	Pt. Washington	1,200	1,300
Marquette	21,500	18,775	Bay City	1,000	8,950
Hancock	17,430	16,800	Marinette	850	800
Houghton	13,200	5,800	Pt. Colborne, Ont.	811	1,600
Kenosha	12,510	9,300	Alpena	600	725
St. Ste. Marie, Ont.	12,000	10,499	Blind River	550	600
St. Ste. Marie, Mich.	10,900	13,200	Marine City	400	450
Lake Linden	9,600	3,000	Thessalon, Ont.	350	890
Depere	7,250	5,250	Minor ports,		23,897
Ashland	6,750	18,100			
Port Huron	5,450	2,900	Total tons	5,033,606	3,925,938

There has been much disturbance in the anthracite trade since the Pennsylvania tax law was enacted. The companies complied with the law with much reluctance, as they could see the argument of consumers in their effort to escape the payment of what they called the Pennsylvania taxes. At length most of the companies have added it to their bills, though they still appear to hope that it will be nullied by the courts.

The Bituminous Trade

In the local bituminous trade there has been more change and news generally. While this market is mostly a jobbing or an agency one, there are about ten concerns that mine their own coal in the Allegheny Valley and neighboring districts. In 1912 they produced about 4,000,000 tons of coal. The output last year should be considerably more, on account of the great activity of the trade during the summer. There has been no particular change in mine ownership here during the year.

The chief change in the city offices was occasioned by the death of Cyrus H. Polley, who was at the head of the Seneca, Falls Creek and Francis mines, in the Clearfield district or vicinity. The vacancy was filled by the election of Harry Yates as president of the companies, and the appointment of W. M. Campbell, general manager. The retirement of Charles T. Faulkner from the management of the office of the Sterling Coal Co. was followed by the withdrawal of the agency. Mr. Faulkner is now at the head of the Western New York Fuel Co. J. Fred Morlock gave up the agency of W. A. Stone & Co. and organized the Morlock Collieries Co.

A new agency is that of the Baker Coal Co., of Boston, with F. L. White from the Boston office as the northern sales manager. This agency proposes selling the coal mined at the Pine Run and Cobaugh collieries in the Allegheny Valley, of which Mr. Bader is part owner. The output includes considerable cannel coal, which is found along with the bituminous. The consolidation of the offices of the Pittsburgh Coal Co. and the Monongahela Co. gave occasion for the manager of the latter, J. Q. Clark, to organize the Monongahela-Youghiogheny Coal Co.

Bituminous Market Conditions

The bituminous year as a whole has been more active and more prosperous than ever before, in spite of the dullness of the market during December. For some reason, hardly understood by even the oldest member of the trade, the demand continued strong all through the warm months, so that it was difficult to get miners to produce or cars to transport the coal as fast as it was sold. Allegheny Valley operators, who had almost despaired of ever again seeing prosperous days, sold a largely increased output at prices 30c. above the ordinary.

This continued till well into the fall, in spite of the weakness of the iron trade and other industries. Then it was found that the consumers had an overstock of coal, the big shipments to the lakes were cut off at about this same time, while an effort to curtail mining failed. The car shortage, which had controlled the output all summer also disappeared and it became impossible to sell anything like the amount handled during the summer.

Still it would be impossible to cut out all the profits of the summer if nothing at all had been done in December, as coal was still sold at a profit, though a small one. Operators who had not made many contracts were highly pleased to be able to accept the high prices, which were sometimes more than 30c. a ton above the ordinary; mines under contract were pushed to meet their obligations.

When the reaction set in there was a complete reversion to former conditions. As soon as the mines had a surplus to dispose of they sent out their salesmen and called on the jobbers to come to their assistance. The word "demurrage," which had for some months been unknown to the trade, was again a grim specter from which there was no escape, for the mines were not flexible enough to curtail their output promptly, as they should do every fall when the lakes are about to close, no matter what other conditions may be. During December there was much unsold coal on track.

Natural gas is coming rapidly into more general use; this alone about absorbs the natural increase in demand for heat and power and is much more a competitor of coal than Niagara Falls hydroelectric power, though the rates on this latter have been materially reduced during the year by order of the Public Service Commission. Some coal shippers are so careful in looking after what they consider their rights in this field that they voted against the amendment to the state constitution last fall, which proposes to develop water power over the state for general use.

It should be said in closing that figures showing the amount of coal received in Buffalo are not obtainable. Some of the rail shipping interests keep them for the purpose, chiefly of allotting cars to the mines in time of shortage, but they steadily refuse to make them public. A rough estimate of the receipts makes the anthracite 6,000,000 tons, of which all but about 400,000 tons is shipped out again and the bituminous receipts 7,500,000 tons, of which half to two-thirds is reshipped.

The Ohio Coal Markets and Progress in Mining during 1913

By J. W. Lehman*

SYNOPSIS—Ohio production for 1913 showed an increase of about 10 per cent., making a total of 38 million tons. General softness prevailed in the markets during the early part of the period. Situation firmed up at the beginning of the lake season and gradually improved till near the end of the year. Lake business the largest on record. Labor conditions favorable throughout the period.

The year 1913 was a good one in every department of the coal industry in the Buckeye State. Records so far compiled show the production to be greater than in any former year and prices on the whole have been better. Taking it all in all, the year has been satisfactory to producer, shipper and retailer alike, although there was a general slowness at the close which had a depressing effect.

Production in the Various Fields

It will be several months before complete records of the production in 1913 are available, but estimates have been made by attachés of the office of the state mine inspector and others showing a large tonnage in most fields. At any rate every field held its own with the possible exception of some of the smaller districts, while many of the larger ones will show a substantial increase over the previous year. The total production in 1912 was 34,450,104 tons, which was a record breaker up to that time. It is believed the output in 1913 will be at least 10 per cent. more or possibly 38,000,000 tons.

The eastern Ohio district will show up the largest increase over the figures of the previous year. In that section, which includes Belmont, Jefferson and Harrison Counties, a number of new mines were opened and the equipment in others was increased. Thus the production of 9,316,000 tons in Belmont County last year will undoubtedly be advanced to more than 10 million tons and the other counties in the district will show like increases. There was also a good advance in the production in Guernsey County, known as the Cambridge district. Last year that county produced 4,333,966 tons and the total this year will be more than 5,000,000 tons.

In the Hocking Valley the output has been satisfactory for the greater part of the year, but the gain in this district will not be as much as in some other sections. This is accounted for by the abandonment of a number of operations which have been about worked out and the dearth of new mines to make up the loss. The tonnage of 4,886,476 in Athens County will likely be increased to a certain extent, but other counties are not expected to show any gain. The Pomeroy Bend field has been quite prosperous and the tonnage will be equal to if not more than that of the previous year. The production in Meigs County in 1912 was 635,640 tons. Some development work was done during the year in Pomeroy Bend fields principally in electrifying several mines.

The Jackson field is holding up well but there is not much hope for increased production because of the fact that many of the mines are completely worked out. The output in 1912 was 783,334 tons, and it is doubtful if that amount will be reached this year. In the Tuscrawas and Massilon fields there has been fairly active operation during the greater part of the year. The same is true of the Coshocton district, where the output was fair but not as large as in some former years.

Prices and the Car Supply

The price situation was fairly good throughout the year. In December, 1911, prices for domestic lump in the Hocking Valley district ranged around $2, but softness followed early in January, and the circular was reduced to $1.50. It remained at that figure during the spring and early summer when the lake season opened and then July 1, a circular advancing domestic lump to $1.60 was issued, followed by another Aug. 1, to $1.70, and $1.75 was reached by Sept. 1. Finally on Oct. 20 the price was raised to $2, where it remained during the balance of the year.

Other grades of coal generally followed the fluctuations of domestic lump. The various mining districts advanced the prices about the same time as the Hocking Valley. Pomeroy Bend quotations for lump were generally 15c. to 25c. more than those in the Hocking Valley. In eastern Ohio prices also increased, ¾-in. selling around $1.75. Fine coal throughout the year was in good demand and prices ranged high.

The car situation toward the latter part of the summer had the effect of strengthening the market. There was an acute shortage of equipment and deliveries were much delayed as a result. But later on with the coming of mild weather cars became more plentiful and at the close of the year the supply was adequate for all needs.

The Lake Trade

The lake season was one of the most prosperous, if not the best, in the history of the Buckeye State. The tonnage of Ohio coals shipped to the Northwest *via* the lakes was large. The demand for fuel from that section was active during the entire year and lake shippers and dockmen made every effort to get a large tonnage shipped. Little congestion interfered with lake shipments. Vessels were generally plentifully and were kept in service until the close of navigation.

The records of the Toledo docks of the Hocking Valley R.R. show a large increase over last year. The tonnage loaded by the Toledo docks was not all produced in Ohio and thus is not a true index of Ohio business. By districts the tonnage shows an increase in most cases over the records of 1912, as follows:

The Hocking Valley district shipped 750,689 tons in 1913 and 634,260 tons in 1912; the K. & M. district shipped 709,939 tons in 1913 and 590,944 tons in 1912; the C. & O. district shipped 1,010,841 tons in 1913 and 986,092 tons in 1912. The N. & W. district shipped 104,362 tons in 1913 and 72,398 tons in 1912. Reports from other scattering districts show that the Toledo docks

*60 Ruggery Bldg., Columbus, Ohio.

paded 2,613,819 tons in 1913, as compared with 2,288,419 ons in 1912.

A great calamity of the year was the storm on the kes in October. It was one of the worst in the history f lake traffic, and since it occurred before the close of avigation all boats were in service. Half a dozen of the rge freighters besides many smaller craft and a large umber of lives were lost. This caused a great decrease n the lake business as many boats were put out of comission. Shipbuilders along the lakes have received rders for four large 10,000-ton freighters to take the lace of vessels destroyed in the storm.

One of the bad features of the past year was the disstrous floods which swept Ohio from east to west late in Iarch. All of the rivers of the state were overflowed and ntold damage was done. The flood was the worst in the estern part of the state, but some sections in the east, specially those along the Muskingum River were ffected. A number of mines in the Pomeroy Bend district were closed down because of flooding and several n the Hocking Valley were put out of commission.

One of the results of the flood was the demoralization of ailroad traffic in every part of the state. This caused shutdown of most of the mines as the railroads were low in getting communications established. The net esult, outside of damage to mines and retailers, was a serius curtailment in the production.

Eastern Ohio did not fall behind in the lake trade, and he unofficial reports from the large operators show that he tonnage shipped in this business was from 25 to 40 er cent. more than the previous year. The bulk of this onnage was shipped from Cleveland and Lorain, while ome found its way to other lake ports. Dock prices hroughout the year were satisfactory and held up well.

Labor Troubles

Steps were taken during the year to enact legislation vhich was adverse to the interests of operators in the tate. At the session of the Ohio general assembly the Green antiscreen bill was introduced and passed by the senate. Before it reached a final vote in the house of representatives it was sidetracked by the appointment of a commission of five to investigate the method of paying for coal mined. This commission was headed by Judge Crow, of Kenton, and contained several members of the United Mine Workers of America.

After taking evidence from both sides on the controversy and visiting all of the coal fields of the state the commission recommended the passage of five laws which would provide paying for coal mined on the mine-run basis with provisions protecting the operators in most cases. This report will be taken up by the Ohio legislature. It is not assured that a mine-run law will be passed but the indications point that way.

During the year labor troubles were generally scarce. In a few cases several mines were closed down temporarily, but the net result was not noticeable. One of the important incidents along that line was the settlement of the trouble at the Trimble mine of the Hisylvania Coal Co., at Glouster, which had been in progress for about six months.

Preparations are being made for the usual biyearly controversy with miners over the renewal of the wage scale. The present scale expires Apr. 1, and it is believed that the miners will submit new demands asking for an increase. Operators are not disposed to advance the mining rate at this time.

There was some litigation started during the year to separate coal companies from railroad management and several important decisions were rendered. Toward the latter part of the year steps were taken to secure a more equitable freight rate for Ohio producers from the Hocking Valley to Toledo, or other lake ports.

Negotiations were in progress about the middle of the year for the merger of the Lorain Coal & Dock Co. and the Youghiogheny & Ohio Coal Co., but after some bargaining the deal was called off. Both properties are located in the eastern Ohio district.

Hampton Roads Market Strong and Has a Record-Breaking Year

By J. W. Bunting*

SYNOPSIS—Hampton Roads market shares in the general prosperity in the coal industry. Car shortage and labor troubles complicate the situation at various times. Coastwise movement heavy. New dumping records established, the total crossing the million-ton mark several months during the year. British invasion of the New River district.

The year 1913 has been one of the most trying to the coal shippers from Hampton Roads ports, although it has at the same time been one of the most profitable.

During the first few months of the year there was considerable difficulty experienced in getting coal forward from the mines and a number of shippers were forced to pay demurrage on vessels held up waiting for coal. Shippers were hardly over this trouble before some of the mines were idle because of the strike. This, however, lasted only a short time and effected but few of the New River operations.

The demand for coal has been good practically all the year. During the summer and fall there was a scarcity at all piers and this, of course, kept prices up. The largest shippers had great difficulty getting coal to take care of contract tonnage. The railroads attributed the shortage at tidewater during the fall to the fact that a large number of cars which had been sent West with coal for lake shipment had been tied up in the congestion on the Western roads and that great difficulty was experienced in getting them back to the mines. Car troubles during the early fall and winter are one of the greatest difficulties which the shippers at tidewater have to contend with, and this seems to be a yearly occurrence.

With the demand steady prices have also remained good particularly on run-of-mine coal. Prices for the entire

*P. O. Box 872, Norfolk, Va.

year have been on an average of from about $2.85@3 for cargo coal. Bunker rates for the year have been $3.30, and $3.15 for foreign steamers and $3.15 and $3.05 for American owned or operated vessels.

Export shipments were heavy with cargoes moving to several new ports to which American coal has previously been unknown. Outside of the coastwise movement which was largest to Providence and Boston, the Canal Zone will rank perhaps as the best market to which coal has moved from Hampton Roads. Of course, this has been for use on the canal work and when this is completed the demand for coal from this source will be reduced, even should coaling stations be established in that section.

New Dumping Records and Improvements

Records for heavy dumpings have been made at all Hampton Roads piers during some month of the year, the best record made by the Virginian Ry. was at Sewalls Point when it dumped during the month of November a total of 340,769 tons. This fell behind the Norfolk & Western dumpings for that month by only about five thousand tons. The Norfolk & Western Ry., of course, has always led in the monthly tonnage, but for the month of November it experienced a car shortage, which considerably handicapped it; otherwise the Virginian Ry. could not run it so close a race. Several times during the year the monthly movement amounted to over a million tons; in August, when a light movement is naturally expected, the total dumpings amounted to 1,030,434 tons.

Work on the new steel piers of the Chesapeake & Ohio Ry. at Newport News and the Norfolk & Western at Lamberts Point has been progressing all year, and both these piers will be put in operation early in 1914. The Norfolk & Western Ry. has already given its machinery, cars, etc., a test and found everything working satisfactorily. It is only waiting now for some of the minor work to be finished when it will start dumping. It will probably be some months before the Chesapeake & Ohio pier is ready for operation. With these two new piers working, facilities at Hampton Roads will be greatly increased and 1914 should see some further records made by the railroads with terminals at tidewater.

On account of the mild fall and winter the demand for coal for domestic use was comparatively light and retailers are complaining of a generally dull year. Prices for anthracite coal have averaged about $7.75, splint, $5.50@5.75, with Pocahontas and New River steam run-of-mine in small quantities at $4@4.50 per ton.

Considerable uneasiness has been felt by some of the smaller selling agencies at tidewater on account of a report to the effect that practically the entire New River coal field had been sold to a British syndicate. The owners of the largest interests have emphatically denied these rumors and stated that while some small operations may have been sold, that the $50,000,000 reported to have been paid for the mines, would not purchase the number mentioned as having been included in the deal.

A new enterprise put into operation in connection with the handling of coal from Hampton Roads is the storage plant recently completed at Sewalls Point. This is expected to take care of over 200,000 tons and should the occasion demand, it could be enlarged with little cost to take care of over half a million tons, with practically the same machinery now in operation there.

While there has been considerable improvement made during the year in the facilities for handling coal, 1913 has gained little credit in the matter of tonnage with these improvements, and it remains for the coming year to show whether the dumpings over the new piers will be increased in proportion to the increased facilities.

The Chicago Market and Trade Conditions in 1913

By Herbert Waters

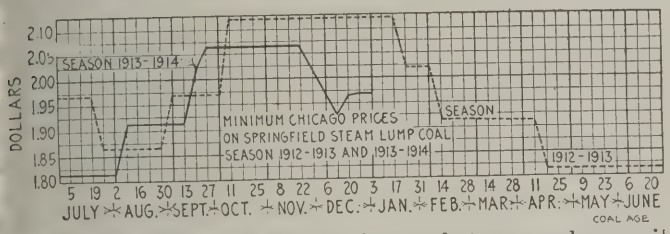
SYNOPSIS—After passing through a year fraught with many vicissitudes, Chicago coal dealers are looking forward to a greater prospecity in 1914. Few regrets were heard with the passing of the old year; it was a period of erratic prices, and while there were a number of bright spots, the 12 months were not satisfactory. Many features entered into this situation, the most important, perhaps, being unfavorable weather conditions. Prices would be advanced one week only to take a downward course the week succeeding.

The year opened with the Chicago domestic market technically in the weakest position it had occupied for several months. Coal of almost every variety was on track without immediate buyers. Soft weather was one of the chief factors in the situation. Anthracite was in good demand, but the strength of that fuel comprised the entire virility of the market. Springfield domestic lump was selling at $2.32, Franklin County egg at $2.55@2.80, and Clinton screenings from $1.57@1.62.

During the week ending Jan. 11 there was a sharp drop in temperature, which had a beneficial effect upon the market. An abundant supply of coal among dealers, however, prevented the price list from moving upward. Warmer weather soon followed and dealers again complained. Scarcely a branch of the domestic fuel trade escaped the depressing influences. Coke was saved from a bad break because some of the ovens diverted a part of their productive capacity to the making of furnace and foundry coke instead of the crushed variety. In many branches of the coal trade there were cancellations of orders and reductions in prices. Toward the end of the month there was weakness in domestic coal and the demand for steam fuel was far from heavy.

With the advent of February there was a sharp curtailment in production owing to the unfavorable market. Many of the mines in Illinois and Indiana closed down two or three days a week. The price list at this time placed Franklin County domestic lump at from $2.45@2.55, Springfield steam lump at $2.02, Clinton mine-run

t $1.97, and Franklin County screenings at from $1.90@ 2.05. Smokeless lump and egg was quoted at from $3.55 @3.80. Even anthracite coal went begging. Toward the middle of the month colder weather stimulated buying sufficiently to absorb accumulations of unsold coal as well as regular shipments from the mines. A marked reaction soon followed, however, and the market became demoralized on account of warmer weather and unusually heavy shipments. It was a period of easy prices. Springfield coal was cut 15c. a ton and a similar drop occurred in the Indiana varieties. There was a decline in the price of Hocking Valley coal of 25c. a ton.



At the beginning of March the market was as low as it customarily is in June or July. Some operators sold coal at a loss in order to dispose of it. A slight improvement in conditions soon followed, but it was only temporary. Toward the end of the month the floods in Ohio and Indiana tied up mines and transportation with the result that the market for Western coal was tightened.

Prevailing prices at this period were:

Harrisburg quotations were: Domestic lump and egg, $2.40; steam lump, $2.45; mine-run, $2.20; screenings, $1.90@1.95; No. 1 nut, $2.40; No. 2 nut, $2.40; No. 3 nut, $2.30.

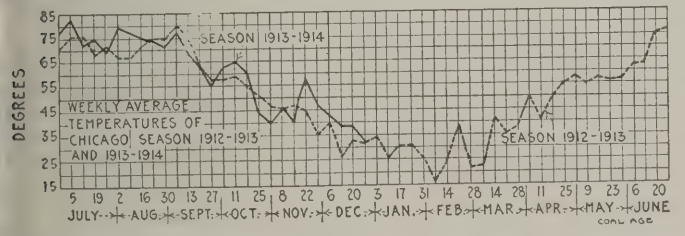
Carterville prices were: Lump and egg, $2.40; No. 1 washed, $2.55; No. 2 washed, $2.35.

Coke—Connellsville and Wise County, $6@6.25; byproduct, egg, stove and nut, $4.45; gas house, $4.75@4.85.

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic Lump	$2.07	$2.40	$2.27	
Steam Lump	1.92@1.97		2.17	
Egg		2.40		$3.95
Mine Run	1.87@1.92	2.20@2.30	1.97	3.90
Screenings	1.57@1.62	1.90@1.95	1.67	

Second Quarter

The effect of the disastrous floods in Ohio and Indiana became more noticeable at the beginnig of April through a reduction in the supply of coal and an advance in prices.



Screenings were boosted 10c. a ton. The buying of steam coal at good prices became active soon after with the domestic business unsatisfactory. Activity in contracting developed, buyers showing a strong tendency to strike sharp bargains. At the opening of May contract prices were variable, but the general tone of the market was strong. Early in June a shortage of Eastern coal on contracts caused a stronger demand for the Western product.

Prevailing prices at this time were:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$1.97@2.07	$2.55	$2.27	
Steam lump	1.82@1.87		2.07	
Egg		2.55		$3.94@4.30
Mine-run	1.77@1.82	2.20@2.30	1.87	3.30
Screenings	1.62@1.67	1.90@1.95	1.62@1.67	

Harrisburg quotations were: Domestic lump and egg, $2.40; steam lump, $2.30@2.38; mine-run, $2.20@2.25; screenings, $1.90@1.95; No. 1 nut, $2.40; No. 2 nut, $2.40; No. 3 nut, $2.30.

Carterville prices were: Lump and egg, $2.30@2.45; No. 1 washed, $2.45@2.70; No. 2 washed, $2.30@2.40.

Coke—Connellsville and Wise County, $5.25@5.50; byproduct egg and stove, $4.85; byproduct nut, $4.75@4.85; gas house, $4.50@4.60.

Third Quarter

An improvement in the demand for anthracite was noticeable early in July. Domestic call for Western coals, however, was light. Throughout the week ending July 12 the spot market on coal was dull and the steam trade erratic. At this time retail dealers found themselves unable to compete with farmers for labor and were obliged to resort to their own efforts in unloading coal or go without.

The price of almost every kind of domestic coal advanced. Smokeless was selling at a premium of 15c. a ton over the circular, and eastern Kentucky coal was increased to 10@13c. ton. As the end of the month drew near the Chicago steam trade reported better buying as did retail dealers in outlying districts. A wide spread of prices and conditions prevailed.

At the beginning of August, Springfield domestic lump was quoted at $2.07, while that from Franklin County commanded $2.45@2.65. Clinton steam lump was selling at $2.07. The price for Springfield mine-run ranged between $1.82@1.92. Screenings prices were $1.52@1.57 for Springfield, $1.85@1.90 for Franklin County, and $1.52@1.57 for Clinton.

A slow improvement in domestic coal was noted during the opening week of September. Producers asked better prices because the market and the time of year warranted it. Fine coal was under steady pressure. Toward the middle of the month there was greater demand for lump with production below normal. The amount of coal in the hands of retailers was far less than is customary even in the middle of summer.

Within the week ended Sept. 20 there was a perceptible picking up in domestic orders from country districts. The screenings market held reasonably firm, due to a growing belief among operators that they were selling their coal too cheap. Some producers advanced prices for domestic sizes as much as 25c. a ton. At about this time the appointment of receivers for the O'Gara coal properties had a pronounced influence upon the Chicago market. Strife among contending factions tied up various properties and withdrew their productive capacity from the market with the result that the general tone was strengthened.

Prevailing prices at the end of September were:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.57	$3.05@3.30	$.252	
Steam lump	2.07		2.07	
Egg		3.05@3.30		$4.30@4.45
Mine-run	1.97	2.30	1.87	3.45@3.55
Screenings	1.27@1.32	1.75@1.80	1.22@1.32	

Quotations for Harrisburg coal were: Domestic lump and egg, $3.05; steam lump, $2.65@2.80; mine run, $2.30@2.40; screenings, $1.75@1.80; No. 1 nut, $1.75@1.80; No. 2 nut, $2.55 @2.80.

Carterville prices were: Lump and egg and No. 1 washed, $3.05; No. 2 washed, $2.65.

Coke—Connellsville, $5.50; Wise County, $5.25@5.50; byproduct egg, stove and nut, $4.85; gas house, $4.65@4.75.

Fourth Quarter

The first days of October found the market in better shape than in four years. Starting with anthracite, the strength ran through every grade and size, including

Illinois screenings. Carterville operators, especially, handled a large volume of business. During the week ended Oct. 18 the market continued strong and prices held steady at the top notch. Transportation difficulties were one cause for a stiffening in the market. The movement of Hocking coal was limited to the supply of cars. A cold wave reached Chicago during the closing days of October and aided in giving virility to the price list. Western mines were in a better position than those in Eastern territory so far as the car supply was concerned.

Satisfactory conditions prevailed during the early days of the following month. Springfield domestic lump sold at $2.57 and Franklin County egg at $3.05@3.30. Clinton mine-run was quoted ta $1.87, and smokeless mine-run at $3.45@3.55. During the middle of the month the domestic market softened. There was an advance, however, to $2 a ton at the mines for 1¼-in. Hocking lump, due to the demand for this coal and a shortage of cars. At the end of November the domestic trade was light in all grades of coal. A drop in prices was averted by the action of the railroads in buying heavily for storage purposes.

December was a dull month, owing to mild weather and a continued decline in the manufacturing business. With the closing of factories there was a sharp recession in the steam business, and the anthracite and coke markets were soft.

Prevailing prices at the end of December were:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump	$2.32	$2.45@2.80	$2.27	
Steam lump	1.97		1.97	
Egg		2.45@2.80		$4.30
Mine-run	1.87	2.30	1.87	3.45
Screenings	1.42	1 75@1.85	1.37	

Harrisburg prices were: Domestic lump and egg, $2.55@2.65; steam lump, $2.25; mine-run, $2.25; screenings, $1.75@1.85; No. 1 nut, $2.55@2.85; No. 2 nut, $2.55.

Quotations on Carterville were: Lump, egg and No. 1 washed, $2.55@2.65; No. 2 washed, $2.55.

Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; byproduct egg, stove and nut, $4.90@5; gas house, $4.75@4.85.

Marketing Conditions in the Mississippi Valley in 1913

By E. J. Wallace*

SYNOPSIS—The St. Louis market continues the one pessimistic section of the National trade. Year has been a lean one due to mild weather and industrial depression. Financial difficulties were more numerous and the big flood aggravated the situation. Keokuk power dam restricted the market for screenings, while competition with outlying nonunion fields is constantly narrowing the range of Illinois coals.

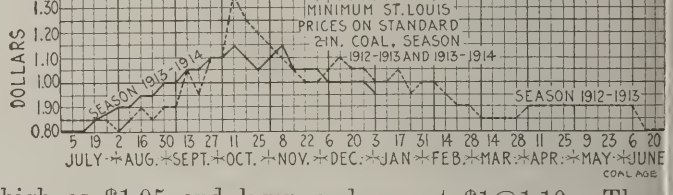
The year opened normal; that is, with such prices as netted the operators a fair margin of profit. Screenings were in demand and sold at what is always considered a good price, 55@65c. for Standard and 75@85c. for Carterville. The screened size market was in good condition, Carterville lump and egg bringing $1.40@1.60, and Standard 2-in. lump about $1.

The Bituminous Market in St. Louis

Warm weather and an extremely mild winter played havoc with business from about the middle of January on. Winter in St. Louis usually begins about Jan. 1, but at no time was there over 2 in. of a snowfall, and while the mercury dropped low enough to make a record, yet it was only for a few days and brought forth no unusual demand.

As the spring months advanced, domestic coal dropped while steam sizes went up and this condition existed well up into the summer months—as late as the middle of August. The year in the coal fields of Illinois has been a disappointment to the most optimistic and a disastrous one to the small operator. About the middle of January mines began shutting down on account of the heavy overproduction. The only cause for profitable prices at any period was the car shortage, and when relief came in this direction there was too much coal and the usual cutting of prices resulted. Far-sighted operators figured that they could keep the mines idle at a lower cost than they could operate and meet competition, and some mines in both the Carterville and Standard fields have not worked since last January.

In April the screenings price went up to around $1 in all fields, while mine-run sold for 70c. and lump at 75c. from the Standard field. Carterville screenings held at as



high as $1.05 and lump and egg at $1@1.10. These conditions lasted until about August, when the scale began to settle the other way, and in October the high price was reached on Standard lump at $1.40 (2-in. size is quoted all through), the screenings went down to 5c. and some were given away for the freight charges. The high Carterville lump price was $2.25, as an average, and the screenings price went down to 20c.

In November a change occurred and the screened-size market began dropping until at the end of the year it was below where it had started. The cause of the poor finish of 1913 as a coal year is laid to the mild open winter of 1912-1913, and the first half of the current season. Only for a few weeks in the fall of 1913 was the car shortage serious in the Illinois fields.

During the latter part of the year there has been a gradual shrinkage in the tonnage of screenings for steam in the St. Louis market and extending north along the Mississippi River, caused by the power furnished from the new dam at Keokuk. The use of the power will continue to grow from this time on.

The past year has been an unsatisfactory one for the majority of the operators in southern Illinois. Many

*Wright Building, St. Louis, Mo.

mines are in the hands of receivers and others are carried by banks that keep them up in the hope that the coming spring will bring more hopeful conditions. From the retailers' standpoint, business has been fair—better on Illinois coals than on other fuels.

Anthracite, Smokeless and Coke

The year opened with Pennsylvania anthracite at a premium of about 25c. over the circular, sometimes more. Such coal as did come in was a sorry disappointment to the consumer, for it was off size and carried a vast amount of impurities. In February the demand fell off and the supply became plentiful. In April prospects opened up good and the retailers started a price war that lasted throughout the year, entailing a loss of from $40,000 to $60,000 that they would have had if the retail circular had been maintained.

Anthracite lost some ground here in the 1912-1913 season, but the price war brought it back again, and this year saw a record movement at times. On the whole the coal was satisfactory, but occasionally large quantities of poorly prepared independent coal showed up.

The year ends with the market in a deplorable condition, caused by jobbers over buying and coal is selling at more than 50c. below the circular, with no demand.

Smokeless coal was at its zenith the early months of the year, on account of the anthracite shortage. It became a popular fuel even at the high price of $5@5.50 wholesale, and as high as $7 retail. While this did not last long, the price kept up well, and there were times during the spring months when smokeless was at a premium. The strike in the smokeless field kept the tonnage down here, and this fuel lost ground. At the end of the year the price for lump and egg was about $4.75@5.

As with other fuels, so with coke, in the early part of the year. The price on byproduct and gas house was from $5.50@6. This market broke early and for the entire year in a general way coke has been plentiful and dropped to as low as $4.50. There has been a persistent effort made during the closing months to keep the price between $4.75 @5, but the supply exceeds the demand and the price drops.

General Conditions

In the industries to which the coal trade looks for the movement of a large tonnage, the past year has not been as prosperous a one as 1912. The lumber business was fairly good the first half of the year, but went to pieces in the summer months for various reasons, the chief of which was the tariff issue.

The lead and zinc mining in southeast Missouri, which industry consumes an enormous tonnage of coal, has been above the average the past year, but no new plants went into operation, and for a short period of time the entire district was idle on account of labor troubles. The iron and steel mills in and around St. Louis have not prospered to the extent that they have in other sections of the country.

Some interesting data on the amount of coal coming into St. Louis were made public at the recent hearing before the Interstate Commerce Commission:

	Tons
Total coal shipped into St. Louis	6,457,683
Delivered on Terminal rail in St. Louis	1,733,278
Delivered by other roads in St. Louis	2,404,105
Delivered for railroad use only	1,136,733
Delivered for points beyond St. Louis	1,183,621

The Terminal Association is paid 20c. a ton, so its earnings on the coal tonnage for the year ending June 30, 1913, were $1,291,536.

Southern Illinois

The increasing wage scale in Illinois will continue to bring a decreasing market. Again, there is ever an overproduction—some mines go bankrupt, etc., but there are always new ones being developed. Seven or eight mines went out of operation in the Williamson-Franklin County field. No new mines were sunk in Williamson County, but three or four new ones were started in Franklin County. In Saline County the floods in the spring put a few mines out of existence, and seriously affected others. The year started off fairly well, but financial difficulties overcame the big operations.

In the Jackson County Big Muddy mines the year was a disappointment, although the fall and winter months proved good ones and some new producing records were established. Perry County suffered a set back in the destruction of the Paradise mine, and other plants found it more economical to stay idle than operate. The Standard field did not improve this year. No new mines were opened and a few old ones were abandoned. The tonnage will drop heavily in this field.

There were no serious mine disasters during the year in southern Illinois. A few mishaps brought about a smaller number of deaths, it is figured, than usual and injuries will fall below the average.

The year was an aggravating one in labor circles. There were many petty grievances and strikes without number. Different locals lost their charters for failure to obey the State United Mine Workers officials.

Milwaukee Market in 1913

By Herman Blyer*

Coal constitutes the leading commodity in the rapidly-growing lake tonnage at Milwaukee. The annual receipts have increased steadily for the past ten years, and have now reached proportions which warrant that city's aspiration to the distinction of being known as the greatest coal-distributing center of the Middle West.

For the ten years previous to 1903 the total receipts of coal at Milwaukee from all sources averaged a little over 1,600,000 tons annually. Since that period the gain has been remarkable. The year 1912 rolled up a total of 5,172,257 tons, which was the highest figure reached up to that time; but the year just closed established a record far beyond this, the receipts by lake and rail being 5,571,-704 tons, or a gain over the year previous of 698,919 tons. The sources of receipt were as follows:

	Tons.
By Lake	5,553,357
By Rail	308,785
Total	5,682,142
†Deduct 90 per cent of carferry receipts	290,438
Actual receipts at Milwaukee yards	5,571,704

†Arrivals by carferry figure in the receipts by lake, but only 10 per cent of this coal is delivered in Milwaukee, the greater proportion going direct to the interior. The receipts by carferry during 1913 aggregated 322,708 tons.

Soft coal makes up the bulk of the receipts at Milwaukee. The average annual shipments of hard coal during the past ten years has been 925,884 tons. The lowest record during that period was made in 1906, when only 756,-

*Milwaukee Press Club, Milwaukee, Wis.

646 tons of anthracite coal were received. During 1908 and 1911 the receipts of hard coal slightly exceeded the million-ton mark. The year 1913, with a tonnage of 1,220,906, established the highest record at Milwaukee thus far.

The gain in shipments was practically all made during the first six months of the year. At the close of that time the total exceeded that of the same last year by over 850,000 tons, due principally to the suspension in mining during 1912. Favorable rates on grain also attracted carriers to the head of the lakes towards the close of the season, and vessels for coal were hard to get. The backwardnes due to this condition was augmented by the disastrous November gale, which swept the Great Lakes and brought the season to a premature close.

Coal moved out to the interior briskly during the spring and summer months, but there was a slowing up in the fall and the season closed with a dull market. As a result all the yards are heavily stocked. The remarkably warm winter thus far has cut down the sales of anthracite coal to a considerable extent, but weather conditions during February and the spring months following may more than make up for the falling off thus far. The future of the soft-coal market will depend largely upon the rapidity and extent of the industrial revival.

Milwaukee, being a manufacturing city, and having several busy suburbs, is a great consumer of soft coal. One large coke and byproduct plant alone absorbs close to a million tons annually.

The wholesale prices f.o.b. cars at Milwaukee as reported by the Lehigh Valley Coal Sales Co., ranged as follows:

Months	Wyoming and Cross Creek Anthracite Egg, Stove and Nut.	Pocohontas Screened	Kentucky Cannel.	Steam Coal Screened Hocking.	Steam Coal Screened Pittsburg.	Mine-run Pocahontas
January.....	$6.75@7.00	$5.50	$6.25	$3.75	$3.75	$3.50
February.....	6.75@7.00	5.50	6.25	3.75	3.75	3.50
March.....	6.75@7.00	5.00	6.25	3.75	3.75	3.50
April.....	6.25@6.50	4.75	6.25	3.55	3.55	3.50
May.....	6.35@6.60	4.75	6.25	3.55	3.55	3.50
June.....	6.45@6.70	4.75	6.25	3.55	3.55	3.50
July.....	6.55@6.80	4.75	6.25	3.55	3.55	3.50
August.....	6.65@6.90	5.25	6.25	3.55	3.55	3.50
September....	6.75@7.00	5.25	6.25	3.55	3.55	3.50
October.....	6.75@7.00	5.25	6.25	3.55	3.55	3.50
November....	6.75@7.00	5.25	6.75	3.55	3.55	3.50
December....	6.75@7.00	5.25	6.75	3.55	3.55	3.50

The New Anthracite Rules

SYNOPSIS—The following letter has been sent to anthracite mine superintendents by James E. Roderick, chief of the Department of Mines of Pennsylvania. As the suggestions embodied herein are the result of a conference of inspectors, they should represent a consensus of opinion.

DEPARTMENT OF MINES

Harrisburg, Penn., Dec. 20, 1913.

Mr. ——— ———,

General Manager,

Dear Sir:

You are aware that the Department of Mines through its inspecters has constantly endeavored to reduce accidents in and about the anthracite coal mines, and I am pleased to say that in this work the managers, superintendents and foremen have heartily coöperated; but notwithstanding our united and unremitting efforts, accidents, fatal and otherwise, have occurred with great frequency. Still hopeful, however, that some means might be found by which the lives of the mine workers could be better safeguarded, I called a general meeting of the anthracite inspectors at Wilkes-Barre on Oct. 28 and 29 at which time there was a thorough discussion of the causes of accidents inside and outside the mines. The unanimous opinion was that, to meet the existing conditions, additional safeguards beyond the requirements of the present law must be adopted.

The most prolific causes of accidents inside the mines are falls, cars, blasts, gas, falling into shafts or slopes, suffocation and explosives. During the first 11 months of the present year 510 lives were lost inside the mines as against 463 for the first 11 months of 1912.

If accidents inside the mines are to be reduced, and they should be reduced by one-half, special care and attention must be given to the causes above enumerated. In all mines, but especially in mines where the pitch of the seam is less than 35 deg., accidents from falls must be given the greatest consideration.

Suggested Precautions

I ask you in the interest of the safety of the mine workers to put in practice the following suggestions:

1. *TO REDUCE ACCIDENTS BY FALLS.*

(a) That in addition to the work of the fire bosses or assistant foremen before the employees enter the mine, as provided by law, you will order that two daily inspections of every working place (except in mines where breasts are being worked full) be made by the mine foreman or an assistant mine foreman, one between 7 a.m. and 12 noon, and one between 1 p.m. and 5 p.m., while the men are or ought to be at work.

(b) That each mine shall be divided into districts of suitable size and each district shall be placed in charge of an assistant mine foreman.

(c) That the mine foreman shall each day enter plainly and sign with ink, in a book provided for that purpose, a brief report stating the general conditions as to safety of the portion of the mine examined by him, describing briefly but clearly any dangerous conditions that may have come under his observation and the methods adopted to remove them.

(d) That each assistant mine foreman shall each day enter plainly and sign with ink, in a book provided for that purpose, a report stating the general conditions as to safety of the working places visited in the portion of the mine allotted to him, describing briefly but clearly any dangerous conditions that may have come under his observation and the methods adopted to remove them.

(e) That the mine foreman shall read carefully the daily report of each assistant mine foreman not later than the following day and shall countersign the report with ink.

(f) That the mine foreman and assistant mine foremen on their daily inspection tours shall see that Gen-

eral Rule 12 is being complied with, and in addition see that props are properly placed and fastened securely at top and bottom, so that they cannot be displaced by flying coal unless broken, but if displaced or broken, they shall be replaced before any other work is done.

(g) That the miners be provided with a sufficient number of sawed cap pieces of suitable length, width and thickness.

(h) That the mine foreman and assistant mine foremen in their daily examinations shall insist that the miner remain at work with his laborer in every place where, in their opinion, danger is to be apprehended from falls of roof or coal, and at all times where pillars are being removed.

2. *TO REDUCE ACCIDENTS BY THE CARS.*

(a) That all gangways and main haulage roads driven after Jan. 1, 1914, where employees travel and coal is hauled thereon, shall have a clear space of 2½ ft. from the top rail of the car to the rib, and also to the timber, which shall be made and continued throughout on the same side of the passageway, if, in the judgment of the inspector, the conditions will permit; and all such space shall be kept free from obstructions. However, if it is found impracticable by the inspector to provide such spaces, then safety holes of ample dimensions shall be made on the same side, and not more than 100 ft. apart, which shall be kept clear of obstructions and whitewashed.

(b) That the distance between props and top rails of cars used in breasts shall not be less than 2 ft. and said space shall be kept free from obstructions.

(c) That the height of gangways and traveling-ways wherein employees have to travel into and out of the mines, shall not be less than 5 ft. 6 in. from the top of sill to roof.

(d) That no person under the age of 17 years shall be employed as runner or driver in any mine.

(e) That no person except the driver shall ride on the front end of the car, and no person shall ride between cars, and upon the request of the inspector a seat shall be provided for the driver.

(f) That in slopes where persons are lowered or hoisted, special cars shall be provided for that purpose, the cars to be approved by the inspector of the district.

(g) That in gangways where platforms are used, platforms shall not extend over the top rail of the car.

(h) That where chutes are used they shall not extend more than 12 in. over the top rail of the car, unless they are at least 16 in. above the top rail.

(i) That when a breast is finished or abandoned for over 30 days, all chutes and platforms that may extend over the top rail of the car shall be removed.

3. *TO REDUCE ACCIDENTS BY BLASTS.*

(a) That wherever practicable, all blasts inside the mines shall be exploded by an electric battery.

(b) That all such batteries used shall be approved by the mine foreman, and he shall instruct the miners as to their use, so blasts can be exploded with greater safety.

(c) That only one kind of explosives shall be used in the same hole.

(d) That all shot holes in coal shall be tamped to the mouth.

(e) That a charge of high explosive in coal that has missed fire shall not be withdrawn nor shall the hole be reopened.

4. *TO REDUCE ACCIDENTS FROM EXPLOSIONS OF GAS.*

(a) That the superintendent shall, as far as practicable, see that the provisions of General Rules 4, 5, 6, 7, 8, 9, 10 and 11 are complied with.

(b) That crossheadings between inlet and outlet airways in each split of air when closed permanently shall be substantially shut with walls of concrete, or of stone or brick laid in cement or lime mortar. Provided, however, that the inspector may give written approval of other suitable material in mines with heavy pitches.

(c) That crossheadings between breasts, except those nearest the face, shall be closed, and a brattice from the last crossheading shall be erected so as to conduct the air to the face. Provided, however, that the closing of such crossheadings and the erection of a brattice may be omitted on the written consent of the inspector.

(d) That each breast when finished shall have a crossheading driven at the face to prevent an accumulation of explosive gas.

(e) That every permanent overcast or undercast built hereafter shall be substantially constructed of incombustible material.

(f) That in each mine there shall be telephone connections between the surface and all important parts of the mine, and an attendant shall be on duty at all times at the telephone on the surface.

5. *TO REDUCE ACCIDENTS IN SHAFTS.*

(a) That every shaft and also every slope with an angle of over 35 deg., wherein men are lowered and hoisted, shall have safety gates at the top and also at each intermediate lift thereof, which shall be controlled by cage, gunboat or car.

(b) That where men are lowered or hoisted in such shafts or slopes, a safety device that will prevent overwinding and also control the speed of cage, gunboat or cars at all times shall be attached to the engine.

6. *TO REDUCE ACCIDENTS BY EXPLOSIVES.*

(a) That not more than 5 lb. of high explosive shall be taken into a mine at any one time by any one person, unless more is required for use in that shift.

(b) That high or permissible explosives shall not be sold for use in mines, unless the name of the manufacturer and name and grade of explosives are stamped on each stick.

(c) That detonators shall at all times be kept separate and apart from other explosives until required for use.

(d) That no frozen explosives shall be sold or given to any employee.

(e) That no person shall thaw explosives inside or outside the mines, except by the method recommended by the manufacturer.

(f) That black powder shall not be sold loose in kegs, cases or packages, but shall be sold in cartridges, and shall not be taken into the mine, except in nonconductive receptacles.

(g) That detonators shall be sold in boxes of ten in a box, and not more than one box shall be sold to any one person at one time unless more are necessary for a day's work.

7. *TO PREVENT ACCIDENTS FROM ELECTRICITY.*

(a) That when electric power is used in and about the mines, it shall be cared for in accordance with Article

XI of the Bituminous Mine Act of June 9, 1911, so far as it can be applied to anthracite mines.

8. *GASOLINE AND OIL.*

(a) That six months after Jan. 1, 1914, locomotives using coal, gasoline or oil shall not be used inside of any mine, and the use of gasoline or oil for generating power for any other purpose shall also be prohibited.

9. *TO REDUCE ACCIDENTS BY CARS ON SURFACE.*

(a) That railroad and other cars shall be handled with care.

(b) That safety switches shall be placed above all breakers, so as to safeguard the loaders, and at any other place when requested by the inspector.

10. *TO PREVENT ACCIDENTS FROM SUFFOCATION IN CHUTES.*

(a) That no person shall shovel coal in any pocket until the loader is notified.

(b) That the loader shall not load from any pocket until he is informed that such person or persons are out of the pocket.

11. *RESCUE AND FIRST-AID CORPS SHALL BE ESTABLISHED.*

(a) That rescue and first-aid corps shall be established at each colliery or at each group of collieries, as agreed upon between the superintendent and the inspector.

You are kindly requested to order that the suggestions given in this letter be carried out, as it is the sincere desire of the department, and I know it to be your desire also, to make a record for the year 1914 in the way of reducing accidents in the mines.

The Kemmerer District of Wyoming

Of the three large operating companies in this district the Kemmerer Coal Co. has slowly forged into the lead and is now by far the most important factor in the district. As its name signifies, the company is affiliated with the powerful Kemmerer interest in Pennsylvania.

Unlike most coal districts, operations in the Kemmerer field are confined almost entirely to large corporate interests. Three such are represented in this field: The Union Pacific Coal Co., operating the southernmost extension of the workable coal; the Diamond Coal & Coke Co. controlling the central district and the Kemmerer Coal Co. the northern.

The Kemmerer company is producing about 4000 tons per day, and has a monthly payroll of nearly $90,000; it employs about 1100 men. Development work for the year was confined mostly to their No. 6 mine, although improvements were also made at other of their operations. It is interesting to note that the central-power plant idea is not being neglected in this district. The Kemmerer company is installing a large turbine-driven generator capable of developing 1025 kw., which will be used for pumping at all the mines of the company, some eight or nine miles distant.

The Diamond Coal & Coke Co. operating three mines at Diamondville, Oakley and Glencoe, is the second largest producer in the district. This company is a subsidiary of the Montana copper interests and most of the output is used at the company's mines and smelters at Butte and Anaconda. The Diamond mines are producing about 2200 tons per day, employ between 600 and 700 men and have an average monthly pay roll of about $70,000.

With the exhaustion of the Kemmerer coal, operations are being gradually extended into the lignites lying to the west. There are a large number of these seams, some of enormous thickness, but all of rather a low grade.

Coal and Coke Production in the United States for 1913

The following tables have been compiled largely from data communicated by the several state mine inspectors, estimates having been made only where no such statistics were available, but in all cases upon the basis of reliable information.

PRODUCTION OF COAL IN THE UNITED STATES

States		1912 Short Tons	1913 Short Tons
Bituminous			
Alabama		16,513,040	17,500,000
Alaska		2,000	2,600
Arkansas		2,100,000	2,250,000
Colorado		11,016,948	9,188,432
Idaho		2,000	2,000
Illinois		60,217,019	62,000,000
Indiana		15,285,718	17,246,000
Iowa		6,820,828	7,415,757
Kansas	(a)	6,986,182	7,400,000
Kentucky	(a)	16,490,521	18,500,000
Maryland	(a)	4,964,038	4,800,000
Michigan	(a)	1,206,230	1,400,000
Missouri		4,229,907	4,230,000
Montana		3,048,495	3,365,712
New Mexico	(a)	3,536,824	3,600,000
North Dakota		528,603	495,000
Ohio		34,444,291	37,500,000
Oklahoma		3,600,000	4,000,000
Pennsylvania	(a)	161,865,488	168,000,000
South Dakota	(e)	6,000	(e) 7,000
Tennessee	(a)	6,473,228	6,600,000
Texas	(a)	2,188,612	2,300,000
Utah		3,088,356	3,289,255
Virginia	(a)	7,846,638	8,500,000
Washington		3,346,946	3,677,946
West Virginia	(a)	66,786,687	71,600,000
Wyoming	(a)	7,368,124	(e) 7,100,000
Total bituminous		449,964,723	471,969,702
Anthracite			
Colorado		69,037	51,903
New Mexico		47,892	(e) 48,000
Pennsylvania		84,361,598	90,000,000
Total anthracite		84,478,527	90,099,903
Grand total		534,443,250	562,069,605

PRODUCTION OF COKE IN THE UNITED STATES

States		1912 Short Tons	1913 Short Tons
Alabama		2,881,861	3,500,000
Colorado		972,539	889,989
Georgia	(a)	43,158	45,000
Illinois		1,764,944	1,750,000
Indiana		2,600,050	(e) 2,700,000
Kentucky		196,020	225,000
New Mexico	(a)	413,906	(e) 400,000
Ohio	(a)	388,669	395,000
Oklahoma		.....	.....
Pennsylvania		26,950,081	27,100,000
Tennessee		345,602	328,000
Utah		347,356	314,694
Virginia		1,009,481	1,207,207
Washington		49,000	74,000
West Virginia	(a)	2,465,986	4,000,000
Other states	(d)	2,100,000	(e) 2,400,000
Total		42,528,653	45,328,890

(a) Figures of U. S. Geol. Survey. (b) Year ending June 30. (c) Year ending Sept. 30. (d) Includes output of byproduct coke for Massachusetts, Maryland, Minnesota, Michigan, New York and Wisconsin. (e) Estimated.

The chief difference between the expansive use of air and steam is the heat loss in compression and expansion. Starting with an initial pressure of 75 lb. per sq.in. the adiabatic curve for air cuts the atmospheric line at a point where the final volume is 3¾ times that of the initial volume. The same curve for steam, on the other hand, cuts the atmospheric line at a point where the volume of the expanded steam is 4½ times the original volume. The mean effective pressure, in the case of the expanding air, is 18.9 lb. per sq.in.; while for steam the value of this pressure reaches 25.2 lb. per sq.in. The low value for air is due to the loss of heat during expansion. For this reason air cannot be used expansively to the same extent as steam.

Editorials

New Year Prospects in the Public-Land States

The best gifts the West received this new year were the recommendations of the Secretary of the Interior in his report to the President. We regard these statements as important as if made by the chief executive himself, for the President has been disposed to let the public learn the greater part of the conclusions of himself and his cabinet through the annual reports of the secretaries of the various departments so that only what he considers of leading importance may appear in his own addresses to Congress.

As the President has so far always had his own way with Congress and obtained the passage of such bills as seemed desirable to him, we look upon the recommendations of the Secretary of the Interior as already on their way to enactment and it is well that they should be.

Let us review the situation in the West from the point of view of an ordinary Westerner, who is not a coal operator. We are not sure we have the approval of the Western mine owner in our attitude toward coming legislation. Nor do we much care so long as we are in accord with what is right and fair. Such a position in respect to any coal-mining interest may be credited only with difficulty to the technical press, but we have never been disposed to put purely private interests before those of the nation.

PRODUCTION OF PUBLIC-LAND STATES, 1906-1912

	Tonnage	Value	Price per Ton
1906	25,510,997	$35,711,944	$1.40
1907	27,767,599	44,040,332	1.58
1908	24,819,029	40,254,515	1.62
1909	28,896,787	46,767,383	1.62
1910	32,849,009	53,309,745	1.64
1911	29,675,510	48,404,247	1.63
1912	31,863,762	52,587,127	1.65

The table above shows that the production of coal in the public-land states has increased 25 per cent. in the six years between 1906 and 1912. The bituminous output in all the other states in the Union has increased in the same time 31 per cent. Thus the old well developed partly depleted states of the East have shown greater rapidity of development than the West with its merely grazed resources. Meanwhile British Columbia in the same period of six years increased its production 59 per cent.

Looking at the table we realize the truth of the remark by the statistician of the Geological Survey, E. W. Parker, at the American Mining Congress. He said:

"I desire to call attention to the conditions in the public-land states which are also coal producers. All of them showed favorable comparisons with other states" in earnings on capital.

To relieve the conditions which we have pointed out, Franklin K. Lane, the Secretary of the Interior, suggested in his report that a royalty take the place of a cash payment for lands, and in the case of Alaska that the money earned be thrown into a fund for the development of that territory. There is no reason why this should not be done for the public-land states as well as for Alaska, the royalty collected being paid over, less the cost of administration, to those states to which the production went.

We are afraid that every little while, unless something is done speedily, there will be a revaluation of Western coal lands. Every time some unwise person pays a foolish price for Connellsville, Pocahontas or New River coal, we shall publish it. Mr. Ashley has declared that he reads this record of ours and he will doubtless give his prices a new boost every time he notes a rise if he can find a complacent lawyer-secretary like Walter L. Fisher to give his consent. In a letter dated Dec. 26, 1913, George H. Ashley, the chief of the Coal Section of the Land Classification Board admits that three modifications have been made of the classification system since 1907 and we quote him at length, for it would not be fair to pick and choose from among his statements on that particular subject:

> Public coal lands are classified and valued according to regulations drafted by the Geological Survey and approved by the Secretary of the Interior. The first regulations were promulgated in 1907 and these have been replaced necessarily by those of 1908, 1909 and 1913. The regulations now in effect were approved by Secretary of Interior Fisher in February, 1913, and are given in full in U. S. G. S. Bulletin 537, a copy of which you doubtless have. From the beginning, the principles underlying this scheme of valuation have remained unchanged. That is, the land is valued according to the quantity, quality and accessibility of the coal it contains, accessibility including both depth beneath the surface and nearness of transportation.
>
> The changes that have been made from time to time have to do with the limits set and have resulted in more refinement of detail. Revaluation of lands is always in progress, sometimes with resulting lower price, but more often, because of new data showing more coal to be present than at first supposed, resulting in an increase of price. No widespread or radical revaluations are made, however, and many if not most of the coal lands upon which values have been placed have never been revalued.

There is, we think, no reason why the West should not have advanced like the South, had the land tenure been the same. While the Western production went up 24 per cent., the Kentucky coal output rose 70 per cent. and that of West Virginia 54 per cent.

We saw how British Columbia has forged ahead under favoring laws, advancing between two and three times as fast as the public-land states. The laws of this province, however, are different, according to Donald McKenzie. There, "whether a man is citizen or alien, he can buy a license for $100 good for one year. This license can be renewed for a second and third year upon payment of $100 a year and doing $50 worth of work every 12 months.

"Upon discovery of coal the licensee can have a lease of land for five years at 15c. per acre per year. This lessee can obtain a renewal of his lease for a further term of three years on payment of $100 in addition to 15c. per acre and there is no royalty to be paid for the coal mined. During the term of the lease or within three months thereafter, if the lessee has expended $50 on each 640-acre tract in mining and development work he may pur-

chase the tract for $20 per acre cash and secure his title in fee simple.

"Thus a prospector may secure 640 acres of lands and hold them for three years under a license and prospect them upon the payment of $100 per year and then may procure a lease of the tract for a total of eight years at 15c. per acre, making 11 years before purchase and payment is required.

"During this period any number, not exceeding ten, of the licensees and lessees can combine their locations with locations adjoining, making a total of 6400 acres and may do all their development and annual work upon one claim and at one or more points in the whole tract."

Much of this system of parting with public domain may be open to question but such liberality side by side with the close-fisted narrowness of our land system has shut like a trap on the progress of the public-land states.

But within a year, we trust the restrictions will be removed and the West, released from its financial tyranny, will show a new lease of life, the cause of which perhaps even the citizens of the West may not themselves realize.

Mining Education

The educator is a charming personality swayed rather by the fascination of his studies than by their value to the world at large and as year by year certain subjects receive new interest, the rage to impart them upsets the balance of the educator and he would fain teach them whether they are needed or not.

Years ago, the farmer needed training in agriculture but if we gave him an education, we made him a theologian, a doctor or a soldier, and agriculture which needed entomologists, botanists, agrologists, pomologists or veterinarians was defrauded of her rights.

No one ever questioned whether there was a market for the type of brain culture which was being created, whether the students when graduated were headed where they were needed or to some place already overcrowded. No one even condemned the teachers and parents who coined too many intellects of one character but rather censured the world for refusing to find place for those who had been cultured at so much expense.

And it is so today. The coal companies have at each of their mines place for one or two mine foremen and a few firebosses but some are at much expense, training a great number of men for those few positions. They are creating applicants for jobs, encouraging them to hope they may get them and then they are necessarily disappointing them when the goal seems attained.

But some of the men who qualify will ultimately get the positions they seek and they will then usually get less salary than a hard-working miner can make and so they will not feel that what they have learned at the expense of much evening labor has been adequately rewarded. Thus the generous and enlightened actions of the most advanced coal-mine managers will be largely defeated.

All of which does not condemn education nor declare it of no value, nor advise its denial to the workingman nor mean that he shall never aspire to the highest of places. And what is a workman? It appears to us that he is a man who does his own work and does not merely supervise the labors of others and in a degree, of course, all are workingmen. Among such men are artists, sculptors, writers, educators and surely their work is worth doing well. The workman of whatever kind does not necessarily condemn himself to an insignificant place because he does not seek, at least primarily, to be a boss and control the labors of others.

Certainly there is a place for men who can do their work with consummate skill. The world is full of jobs needing from the workmen the highest of ability. As a matter of fact our motormen today are the poorest possible electrical experts; our mule drivers know little about the needs of the animals they drive; our coal diggers are often merest butchers of coal and the machinemen understand but little of what is needed for the care of their machines and as for our chauffeurs on gasoline locomotives, their ignorance of the motors they run is usually colossal.

We have been so accustomed to these conditions, that they appear normal but if every man were expert and went about his work, whether tracklaying, mining coal or hauling it, with the utmost skill, the product and quality of the work of his hands would immensely increase.

If you have 500 miners, 10 motormen, 20 mule drivers and 15 timber men in your mine, have you prepared to bring out of them an efficiency which will pay them and reward you and make their work a science and a pleasure? Instead, are you not trying to teach them that the height of ambition is to handle a pencil and rule one's fellow man?

It is better indeed to arrange a program of general education than one which will serve only the elect. Colleges are good, but public schools are better, and the coal companies will do well to lay out broadly before their employees the elements of good living and the best methods of performing their duties.

Time was when this was a better country than today with forests uncut, mineral resources untouched, waters unpolluted, and few people to support. Yet the Indian people, who found in that ideal country their abode, starved and shivered in the cold and their misfortunes were so numerous that the population did not increase. Today with a less fortunate country but with a more efficient people, the population is well fed and well housed and their numbers continually increase. The reason is in efficiency. No one can deny that efficient labor is the greatest physical need of the working man and will pay him the most liberal returns.

Let every operator so educate his employees and their families that they can have that efficiency which will make for their well being and will promote their contentment. For there is little pleasure in seeking for jobs which cannot be attained and which even if once possessed, are seen to be far from desirable. And pleasure there *always* is in doing a work of any kind as well as it can be done and giving our service not to the overseer but to the task in which we are engaged.

Training for mine foreman has its proper place, much of it serves as a basis for any kind of mining work and all of it is useful as mental gymnastics which we all need. Such training does, however, urge that there is but one rightful ambition that is to be a foreman having a position of authority and it is, therefore, apt to be unsettling in its effect on mining men in general, if it is the only education which colliery schools afford.

Legal Department

When Does a Labor Union Become an Unlawful Combination?

By A. L. H. Street*

SYNOPSIS—A combination formed by members of a labor union which has the effect of limiting free combination in the production of coal in interstate commerce, is as much violative of the federal anti-trust law as a similar combination between mine operators. Action taken by a union interfering with contracts of employment, are also unlawful and actionable.

Any organized attempt by the members of a labor union, through the means of a boycott, to prevent a coal operator from mining coal intended for transportation beyond the state, or to interfere with traffic in the coal after its delivery in another state, or to prevent persons from negotiating with the operator for the purchase of such fuel in interstate commerce, constitutes a violation of the Sherman law. This conclusion necessarily follows from the recent decision of the United States Circuit Court of Appeals in the Danbury Hatters' case, which latter decision conforms to the judgment of the federal supreme court rendered Feb. 3, 1908, on a former appeal.

The holding in the Hatters' case is that a combination between members of a labor organization to destroy an existing interstate traffic in hats by preventing the manufacturers, by means of a boycott, from manufacturing hats intended for transportation beyond the state, and to prevent the manufacturers' retail customers in other states from further negotiating for the purchase of such hats in interstate commerce, constitutes an unlawful combination within the prohibition of the federal anti-trust act, entitling the complaining manufacturers to recover treble damages for the injury sustained by them in consequence of the combination, even though a small amount of interstate business may be involved.

Prohibits Any Combination That Obstructs Commerce between States

The Supreme Court said that its "conclusion rests on many judgments of this court, to the effect that the act prohibits any combination whatever to secure action which essentially obstructs the free flow of commerce between the states, or restricts in that regard the liberty of a trader to engage in business." (28 Supreme Court Reporter 303.) The cited opinion, also, contains this quotation of Justice Brewer in the case wherein the American Railway Union was enjoined from combining to enforce a boycott by railroads against Pullman cars: "If a state, with its recognized powers of sovereignty, is impotent to obstruct interstate commerce, can it be that any mere voluntary association of individuals within the limits of that state has a power which the state itself does not possess?"

That labor unions are amenable to the anti-trust law says the Circuit Court of Appeals, "is no longer debatable. The law makes no distinction between the classes, employers or employees, corporations or individuals. Rich and poor alike are included in its terms. The Supreme Court particularly points out that, although Congress was frequently importuned to exempt farmers' organizations and labor unions from its provisions, these efforts all failed and the act still remains." The staute looks solely to competition and to the giving of competition full play by making illegal any effort at restriction upon competition. (25 Supreme Court Reporter 276.) It is injury to the public that characterizes interruption of trade as illegal. (Tennessee Supreme Court, 52 Southwestern Reporter 853.)

Application of Principles to Coal Industry

Concrete application of these principles to the coal industry is illustrated by the decisions reached by the United States District Court for the Northern District of West Virginia, in the case of Hitchman Coal & Coke Co. vs. Mitchell, 202 Federal Reporter 512. These points were decided: In their relations to the general public as consumers of the products of labor and capital, the members of labor unions are governed by the same rules of law as to combinations in restraint of trade as are combinations of capital.

Consideration of a labor union is not to be limited to its relations to its members and to those who employ them. A union of mine workers becomes an unlawful combination in restraint of trade, within the meaning of the Anti-Trust law, when it requires its members to surrender their individual freedom of action, or when it seeks to require mine workers to become members whether they desire to do so or not, or when it attempts to restrict or destroy the right of a mine owner to contract with his employees independently of the union, or when it attempts to exclude his right to employ nonunion men, or to discharge any man he sees fit, if that man is not under contract, or when it assumes the right to shut down a mine at any time by ordering a strike, or when it tends to create a monopoly in mine labor, or when it combines with rival operators to restrain the trade of a mine owner operating in another state.

Independently of consideration of the Anti-Trust act, the same court holds that it is an actionable wrong for a labor union to induce its members to break existing contracts with their employers, or to interfere by intimidation or coercion with the inherent right of the employer to control his property and conduct his business in any lawful manner he may choose, and that, although they have the lawful right to advise their members to strike, *unless that amounts to a violation of a contract,* and by reasoning or persuasion to prevent others from taking their places, neither a union nor its members may lawfuly prevent other workers from taking, or remaining in employment, by intimidation or coercion.

The judicial opinions here reviewed reflect the present attitude of most of the appellate courts of the country.

*Attorney-at-law, St. Paul, Minn.

Briquetting in North America

By C. T. Malcolmson*

SCYNOPSIS—More than 40 briquetting plants have been built, but at present only 14 are in operation. Various causes, chief among which is the fact that the difference in price between fine and coarse coal is not sufficient to cover the cost of briquette manufacture, are responsible for this state of affairs.

The history of coal briquetting in the United States is in marked contrast to that of most of our other industries. More than 40 plants have been built, but at the present time only 14 are in operation. There have been various causes for the suspension of some of these plants, the principal one being the fact that in the present condition of the coal market, the difference in price between the fine and lump coal, which was formerly sufficient to cover the briquetting charge and show a profit, has now ceased to exist. Other plants have been designed without practical knowledge of the progress of the art or a realization of what is necessary to make merchantable briquettes.

The largest and most complete coal-briquetting plant in this country is that of the Berwind Fuel Co., at Superior, Wis. This plant started operations in February, 1912. Changes in the design occupied a large part of that season, so that the plant was not placed on a commercial basis until September, 1912. The buildings were designed for the installation of two Rutledge presses; the second press, with the necessary mixing, feeding and drying equipment, was installed during the summer of 1913, which brought the plant up to its full capacity of 80 tons per hour.

During 1913 the plant of the Standard Briquette Fuel Co., at Kansas City, Mo., was completely rebuilt and its capacity increased from 10 to 30 tons per hour. These plants represent the latest development in the briquetting of bituminous coal by the use of American presses, which have been perfected to meet the commercial conditions in this country.

At first, coal briquetting developed more rapidly on the Pacific Coast than elsewhere, owing to the favorable trade conditions which obtained there 10 years ago. At the present time, however, only two plants are operating there; one built by the United Collieries Co., at Seattle, Wash., contains a Belgian or roll type of press, with a capacity of ten tons per hour; and the other built by the Los Angeles Gas & Electric Corporation, utilizing a modified brick press to produce briquettes out of carbonized residue without a binder, at the rate of approximately 15 tons per hour.

Trade conditions have again shifted so that at the present time the opportunities for coal briquetting on the Coast are very encouraging. The Pacific Coast Coal Co. is now building a plant to manufacture bituminous-coal screenings into briquettes at the rate of 30 tons per hour. The plant is similar in design and construction to that used by the Berwind Fuel Co., although the process has been modified to permit the use of California asphalt as a binder.

There are three other plants operating in the Middle West. The Stott Briquet Co., Superior, Wis., make briquettes from anthracite screenings with the addition of a small percentage of bituminous coal. This plant has an output of 12 tons per hour. A roll press is used, with liquid pitch as a binder. Two other presses have been developed for the manufacture of bituminous-coal briquettes to meet American requirements. The Ladley press is installed at the plant of the Indianapolis Pressed Fuel Co., Indianapolis, Ind., with a capacity of 12 tons per hour; the Renfrow press is used at the plant of the Detroit Coalette Fuel Co., Detroit, Mich., having an output of approximately 8 tons per hour. In both plants hard pitch is introduced into the coal in dry form. Advices have been sent out that a plant now being built by the Colorado Pressed Fuel Co., Denver, Colo., will be in operation this year; but so far no commercial briquettes have been manufactured.

The development of the industry in the Eastern States has been marked by the installation of two plants in the anthracite field. The Scranton Anthracite Briquette Co., Dickson City, Penn., employs an improved Belgian type of press having a capacity between 40 and 50 tons per hour. Coal-tar pitch is used as a binder; it is manufactured at the plant and introduced into the coal in liquid form.

The plant of the Lehigh Coal & Navigation Co., at Lansford, Penn., contains two Belgian-type presses with a total capacity of 10 tons per hour, manufacturing briquettes out of anthracite dust and coal-tar pitch by the drp process. Machines of similar design and capacity are installed in the Coal Boulet Co.'s plant, New York City, and the American Coal Boulet Co.'s plant at Phœnix Mines, Maryland.

The plants of the Eggette Coal Co., of Trenton, N. J., and the Virginia Coal Briquetting Co., of Richmond, Va., contain presses of similar design to that installed in the Stott plant and have approximately the same capacity. These two plants, however, use patented binders in the manufacture of their briquettes, in which starch is the main binding constituent.

The plant at Bankhead, Canada, built in 1906, is one of the pioneers in the industry on this continent. This plant now contains two roll presses of a modified Belgian type with a maximum capacity of 30 tons per hour. It operates 20 hours per day during part of the year and has made over 500,000 tons of briquettes. During 1912, 101,175 tons were produced.

The Colonial Coal Co., of Sidney, N. S., has two plants in operation, containing three Belgian presses with a combined rated capacity of 30 tons per hour. The plant at the McKay Colliery, built at North Sidney, N. S., in 1912, has one machine; while at the Bras d'Or Colliery two machines were installed in 1913.

Those desiring the index of Coal Age for the second half of 1913 may send in their names at any time. The index will be ready to mail very shortly.

*Old Colony Bldg., Chicago, Ill.

Discussion By Readers

Longwall Mining Methods

Letter No. 1—Having worked under contract, in longwall mining, in seams varying from 3 ft. to 6 ft. 6 in. in thickness, with and without a drawslate above the coal and under both slate and rock roof, I have used many different methods of working, both in the advancing and retreating systems of longwall. Although I have used three rows of chocks and even four rows along the working face, I have found that the best results are obtained by the use of two rows of chocks only, as shown in Fig. 1. Experience has shown that when three or four rows of chocks are used, the roof is held up too long in the goaf, and excessive weight is thus thrown on the coal face; whereas, when only two rows of chocks are used the roof settles uniformly on the packs, which greatly assists the mining of the coal.

I consider it of great importance to set the chocks in such a manner that they can be easily and safely removed. I have found that the following method gives the best results: Place 3 or 4 in. of fine dirt under the front log, which is laid just back of the road and parallel to the face of the coal. Having laid this first log at the front, build up the back with slate or rock sufficient to support the rear ends of the two side logs, the front ends of which rest on top of the front log. Now, build up the chock to the roof in the usual manner. I have shown this method, in a rough way, in the accompanying figure. It is important to keep the front ends of the chocks in line with the front ends of the packs. These packs are made about 3 yd. in width and are extended as often as the face is advanced sufficiently to permit another row of chocks being built, say about 8 ft.

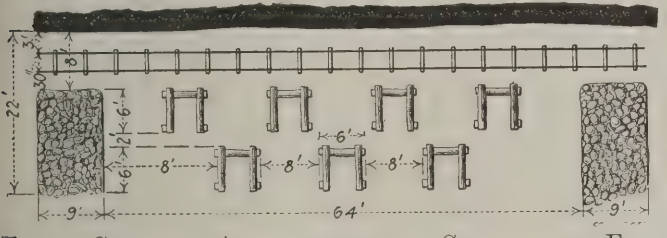


Fig. 1. Showing Arrangement of Chocks and Face Track in Longwall Work

When removing the chocks, the miner always stands in the front and mines out the front log resting on the pile of dirt. When this log is taken out, the two side logs are easily removed, and the other timbers can then be taken out, in turn, from the top down. It will generally be necessary to loosen the slate or rock at the back end with a pick, in order to release the side logs; but the miner need not go behind the chock to do this. This method avoids the use of a back log, the removal of which would give much trouble.

Recently, I had the contract on a longwall face advancing. The coal was 3 ft. 9 in. high, and the contract price was $1.75 per yd., which included blowing down 2 ft. of roof, building the packs and setting and drawing all chocks and post timbers required. The chocks were counted every month to see that none were lost, and when a pack was finished, the company inspector would pull the pieces off the pack to see that no hollow places or timbers were left in the wall.

During three years while working this contract, the only trouble experienced was an occasional fall at the face, or on one of the roads that had been stopped for a few days. In carrying the road along the face, I have used the method shown in Fig. 2, in which case it was necessary to "blow" or "brush" the roof along the face, as shown in the figure; but I consider this method dangerous. Two-piece sets were used, one end of the collar resting in the slate and the other end, at the coal face, resting on a tapered post, as shown in the figure.

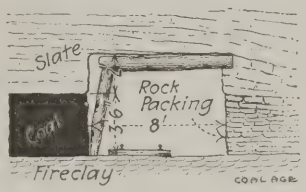


Fig. 2. A Dangerous Method

Charles Waine.

Marianna, Penn.

Letter No. 2—Referring to the mention, Coal Age, Nov. 15, 1913, p. 723, of the working of a seam of coal, in Wales, by the longwall method, which was described by Erskine Ramsey in a paper read before the Alabama Coal Operators' Association, permit me to remark that I believe I helped to open out one of these seams of coal, which was 10 ft. thick.

It was opened at that time by driving entries and rooms. There was no face track as shown on p. 723. In order to support the roof, cribs were built every 4 to 6 ft. apart on each side of the roadways in the rooms and entries and crossbar timber was used to support the roof above the roads. At times, when the first weight would come on, it was necessary to build the cribs to within a foot of the coal face. I do not remember that there was any great caving of the roof.

This system of working was continued for about 12 months and then came a change of management and a change in the system of mining. A face track was laid, as described in the article to which I have referred. As a result of this change, the places were continually caving, and the company estimated their losses to be £125,000 in five years.

Then came another change in the management, and the system of working was changed back to the old entry-and-room system, with no face track. The new company then saved £74,000 the first year; and, in the first nine months of the second year, they had saved £64,000, at which time I left Wales and came to this country. In order to show how it is possible, in Wales, to pack or fill in the space left by taking out the coal in a 10-ft. seam of coal, the conditions in this coalfield should be explained.

In South Wales, there are 16 seams of coal, of which eight are workable, according to Prof. Galloway, in his description of the coalfields of South Wales. It is the

general practice to sink the shafts to the lower measures, and when the workings are sufficiently developed cross-tunnels are driven to tap the other seams. This gives the opportunity to secure enough building material for the 10-ft. seam, by taking it from the other seams that have more than enough for their own needs. A loaded car is taken out of a place and replaced by a car of dirt, and the miner is paid 3d. per car for unloading and packing this dirt in place.

In the case mentioned on p. 723, where the attempt was made to work a 5-ft. 6-in. seam of coal overlaid with an 18-in. drawslate, on the longwall plan, I think too much reliance was placed on the good roof. In changing the system from room-and-pillar to longwall work, in this particular seam, conditions seemed favorable. I would suggest that this should be done by starting to rob the pillars back, after having first secured the face of the coal by building cribs close to the same. As the pillars are drawn back, packs should be built with the drawslate. If there is not sufficient building material to fill the whole of the empty space, the packs should be built on the checker-board system. In starting the longwall face, I believe that a 5-ft. mining is too deep, especially before the first weighting of the roof takes place. A 5-ft. mining gives too much leverage, which will probably break the roof before it can be properly secured after loading out the coal.

In the case mentioned where the 12-ft. skip was taken across the face that had caved, and this was followed by a second cave, I would say that the space was too wide. The roadway should not be over 9 ft. wide, and there should be 5 yd. of packs on the loose end. Then if cribs had been used, every 4 to 6 ft. along this space, I believe there would not have been a second cave. This opinion is based on an experience of several years in longwall work of every kind and 35 years of work in all classes of mines, gaseous and nongaseous.

William James,
Mystic, Iowa. Mine Foreman.

The Certificate Law

Letter No. 10—I have been reading the letter of Joseph Virgin, Coal Age, Dec. 13, 1913, p. 912, in which he states that "a man might successfully manage mines in some of the districts in this state (West Virginia) and yet utterly fail in respect to safety in another state." He refers to some mines having gas, dust, water, bad roof and dangerous quantities of black damp, while other mines may have little of these dangers to contend with or be free from all of them. Mr. Virgin says: "Fancy a man, for instance, who has had charge of mines in the Clearfield region but with no other experience, coming to take charge of the gaseous mines of West Virginia or the mines on the Monongahela, etc."

I gained most of what experience I have in mines in Clearfield County, Penn.—mines that generated as much gas or more than any mine on the Monongahela. I want to say, also, that no mine in the latter district could compare with a mine of which I had charge in Jefferson County, in respect to the generation of gas. I did, however, see and learn much in regard to ventilation while in charge of one mine on the Monongahela. The mine had not been properly planned in the beginning and its proper ventilation was difficult on this account. My experience and that of many other men, at that time, was that many of the mine foremen of the Monongahela mines were as far behind the times in their practical experience as most foremen in other counties and states.

I have been looking over the examination questions asked candidates for the positions of mine foremen and firebosses in the state of Pennsylvania, comparing them with the questions asked in other states, and I want to say that, judging from these questions, any man who has passed the examination in Pennsylvania and has had practical experience in the coal mines in this country or in England, is, in my opinion, able to take charge of any mine either in West Virginia or any other state. My observation convinces me that the examining boards in the bituminous regions of Pennsylvania, for several years past, have arranged the questions for mine foremen and firebosses, so as to cover all manner of mine work.

I fully believe it would be better for all concerned, if every mine foreman, fireboss and mine superintendent was compelled by law to undergo an examination every three years. My reason for this is that ten out of every dozen mine foremen and firebosses who are employed in the mines today, fail to give any time to study or to reading what will keep them in touch with the latest methods of mining work. Many of these men seldom look at a copy of the mining law and cease to read and study after passing the examination and securing a certificate of competency. Many with whom I have talked and whom I have advised to continue to study and to read mining journals, say that they "have not time to read, much less to study"; while others who take mining papers and mining courses lay them aside and devote no time to them, claiming that they "know it all."

I have engaged men who had in their possession first-grade and fireboss certificates, but who did not understand much of the work they had to do. My experience is about the same as that of Mr. Stansberry, in Letter No. 6, p. 913. As he says, these men "could not take a safety lamp apart, clean, fill and put it together again properly." At one time, I had shots fired in the mine by shotfirers, using the wire and the Davy lamp; and when shown how, many of these men could not understand that the gas was so strong at the working face as to make any other method dangerous to employ. It is inexplicable how such men obtain their certificates. I presume it is this sort of men to which Mr. Virgin refers.

A greater interest in the safety and welfare of mining men is being taken today; greater efforts are being made to render the mine immune from accidents of any nature; and more practical methods to secure the safer mining of coal are being insisted upon by all mine inspectors than ever before. It is only reasonable, then, to expect and require that all coal-mine officials shall continue to read, study and increase their knowledge of mining. But, notwithstanding this fact, there are yet a large number of mine officials who think they have all the knowledge they need and continue on in the same old rut. On the other hand, I am glad to say that there are some of the older experienced men who are glad to gain more knowledge themselves, and are striving to educate those in their charge and to assist them in preparing themselves for examinations.

John J. Clark,
Asst. Mine Supt.,
Saginaw, Penn. B. & S. Coal & Coke Co.

The Danger of the Injector

In the Nov. 22 number of Coal Age, on pp. 777 and 778, an article translated from the *Montanistiche Rundschau,* makes an attempt to defend the injector type of mine-rescue apparatus and refers to Dr. John Cadman's paper as having first exploited the danger in the use of the injector. While this may be so in England, I happen to know that it is not true in the United States. J. W. Paul, of the Bureau of Mines, was the first to make this discovery after the death of Farrell, and the details of this accident were given to me by Austin King, of the H. C. Frick Coke Co.

Shortly after this I went to London, and at that time the only man in England who had apparently given the matter any serious attention was Henry A. Fleuss, who, over 30 years ago, invented the first practical self-contained oxygen rescue apparatus. In his effort to improve this, 14 years ago, he discovered the danger from the suction by the injector, and after some experiment dispensed with that device, on account of the danger from accidental leaks.

H. N. Elmer.
American representative, Siebe, Gorman & Co.
1140 Monadnock Block, Chicago, Ill.

Knowing

In looking over the several interesting articles in Coal Age, Nov. 8, my eye caught the "Outcroppings," p. 702, and I read, "Knowing a thing is nothing unless another knows you know it." It is one thing to possess knowledge but quite a different thing to demonstrate that fact to another's satisfaction.

It is a fact that no matter what you know, without you can prove your assertions, your knowledge will be absolutely worthless to you or to anyone else. Again, you may be the *one* person present who knows *how* to do a certain piece of work, and could accomplish better results with the men in your charge, in a given time; but you will not be given a chance to demonstrate that fact unless the manager or superintendent will listen to you and you are able to secure his confidence.

The best mining men sometimes make mistakes, and many do not know what they profess to know; but the man who thinks he knows it all, generally knows the least. To the manager or superintendent, I would say, listen to the man who thinks he knows and give him a chance to demonstrate his ability if he has it and if his plans seem at all practicable. He may be able to save you time and money.

A Knowing Sufferer.

Study Course in Coal Mining

By J. T. Beard

The Coal Age Pocket Book

Furnace Ventilation—When the circulation of air throughout a mine is created and maintained by means of a furnace built in the mine the system is known as "furnace ventilation."

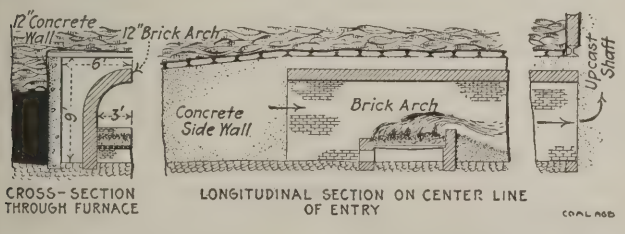
Principle of Furnace Ventilation—The heat of the furnace imparted to the air in the furnace shaft makes it lighter, volume for volume, which causes it to rise in obedience to the law of the equilibrium of fluids. The cooler and heavier outside air, in obedience to the same law, flows into the mine by way of another opening, to take the place of the air displaced. The action is continuous as long as the furnace is in operation. There is thus created and maintained a constant flow of air into and through the mine.

Location of a Mine Furnace—The furnace is built in the main-return airway about 20 or 25 yd. back from the foot of the upcast or furnace shaft, so as to reduce the danger of the fire damaging or destroying the shaft.

Construction of Furnace—The essential details to be considered in the construction of an efficient mine furnace are the following:

1. Beginning, say 50 yd. back from the foot of the shaft, the main-return airway should be gradually widened and its height increased so that the unobstructed sectional area at the furnace will not be less than 25 per cent. greater than that of the original airway.

2. The roof of the enlarged airway should then be secured by steel rails or I beams supported on posts or concrete walls, as illustrated in the accompanying figure, which represents a well built mine furnace.



3. As shown in the figure, both the concrete walls and the brick walls supporting the arch are started on a good firm bottom below the floor line. The thickness of the concrete walls will vary from 10 or 12 in. to 2 ft., depending on depth of cover and other roof conditions. The brick walls and arch will vary in thickness from 8 to 12 in. A good quality of vitrified brick should be used, except where the arch and walls are exposed to the direct action of the flame they should be lined with the best firebrick. All bricks should be first soaked in water before being laid and only the best cement mortar should be used.

The Coal Age Pocket Book

4. The brick walls and arch should be started about 2 yd. in front of the furnace proper and extended to the face of the shaft. The clear width between the walls should equal the width of the fire-grate, and should be such as to leave a clear passageway between the brick and concrete walls. The arch is semicircular and sprung at such a height above the floor as to leave not less than 12 in. of space between the crown of the arch and the rails that support the roof. The purpose of this air space around the furnace is to isolate its heat, which is thus more completely utilized in heating the air current.

5. The area of the grate or the grate surface must be sufficient to burn the weight of coal per hour required to heat the volume of air passing the furnace in that time, to a temperature that will create the air column, in a specified depth and condition of shaft, necessary to circulate such volume of air against a specified mine potential.

The theoretical problem of determining the weight of coal burned per hour, per volume of air circulated, is thus seen to depend on many factors. In ordinary mining practice, however, a safe estimate is to assume that each pound of coal burned per hour will cause a rise in temperature of from 10 to 15 deg. F., per 1000 cu.ft. of air in circulation. Or, calling the weight of coal burned W (lb. per hr.); the volume of air passing Qm (1000 cu.ft. per min.); the rise in temperature t (deg. F.), and the temperature constant c = 10 to 15 deg. F.,

$$W = \frac{Qmt}{c}$$

Example—Find the weight of coal required per hour, to produce a rise of temperature of 360 deg. F., in a furnace shaft when a current of 100,000 cu.ft. of air per minute is passing, under fair mining conditions.

Solution—The weight of coal required is

$$W = \frac{Qmt}{c} = \frac{100 \times 360}{12} = 3000 \text{ lb. per hr.}$$

In very deep or wet shafts or a comparatively small mine resistance, giving a larger air volume and greater loss of heat, the constant 10 deg. should be used; while in dry shafts of less depth, especially if the mine resistance is considerable, a temperature constant of 15 or even 16 may be employed to find the necessary grate area.

6. The grate area necessary to burn any required weight of coal W (lb. per hr.) varies with the hardness and the inflammability of the coal. A mine furnace will commonly burn from 15 to 20 lb. of anthracite, or from 20 to 25 lb. of bituminous coal, per square foot, per hour. Hence the weight of coal required, divided by such constant will give the necessary area of grate surface, in square feet.

Example—What grate area will be required to burn, say 3000 lb. of a very soft, inflammable coal per hour?

Solution—In this case, the coal being a free-burning, inflammable coal, the constant 25 should be used; and the required area is 3000 ÷ 25 = 120 sq.ft.

Inquiries of General Interest

Calculation of Sines and Cosines

Is it possible to calculate the sine and cosine of an angle, as, for example, 42 deg., when no table is at hand?

D. W. SEIGHMAN.

Martin, Penn.

The values of the sines and cosines are for the most part based on geometrical principles, from which trigonometrical formulas have been derived. By the use of these principles and formulas, it is possible to calculate the values of some of the more simply derived angles.

For example, referring to the accompanying Fig. 1, *o* being the center of the quadrant, *oa* is the radius. If

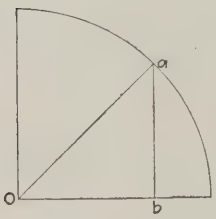


FIG. 1.

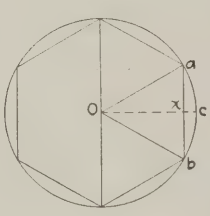


FIG. 2.

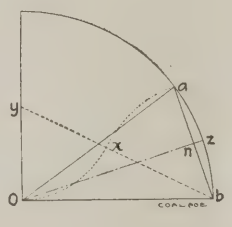


FIG. 3.

this radius, *oa*, bisects the quadrant, the angle *aob* is one-half of 90, or 45 deg. By definition, the sine *ab* is perpendicular to the cosine *ob*, and the angle *oba* is a right angle or 90 deg. Then, since the sum of the interior angles of a triangle is equal to 180 deg., the angle *oab is* 180 — (90 + 45) = 45 deg.; and by the principles of geometry, *ab* is equal to *ob*, or the sine of 45 deg. is equal to the cosine of 45 deg.

All sines and cosines are expressed decimally, the radius of the arc being 1. Then, since the square of the hypotenuse of a right triangle is equal to the sum of the squares of the two sides,

$$(ab)^2 + (ob)^2 = (oa)^2$$

But, since $ob = ab = \sin 45$ deg.; and $oa = 1$, we have

$$2\ sin^2\ 45^\circ = 1$$

and $$sin\ 45\ deg. = \sqrt{\tfrac{1}{2}} = \sqrt{0.5} = 0.7071$$

Therefore, the sine and the cosine of 45 deg. are each 0.7071.

In like manner, by the principles of geometry, a regular hexagon is composed of six equilateral and equiangular triangles. If such a regular hexagon be inscribed in a circle, as shown in Fig. 2, any side *ab* is equal to the radius *oa*, and the angle *aob* is equal to 60 deg. The radius *oc*, bisecting the arc *acb*, also bisects the angle *aob*, and is perpendicular to the chord *ab* at its middle point *x*. Hence, in this case, calling the radius $oa = 1$, $ab = 1$ and $ax = \tfrac{1}{2}\ ab = 0.5$. But the angle *aoc* is 30 deg.; and *ax* is the sine and *ox* the cosine of 30 deg..

Therefore, $$sin\ 30^\circ = 0.5$$

$$cos\ 30^\circ = \sqrt{1^2 - 0.5^2} = \sqrt{0.75} = 0.866$$

Again, the sine of an angle is always the cosine of the complement of that angle, which is 90 deg. minus the angle. Therefore,

$$sin\ 30^\circ = cos\ (90 - 30) = 0.5$$

or,

$$cos\ 60^\circ = 0.5$$

In like manner the cosine of an angle is always the sine of its complement. Therefore,

$$cos\ 30^\circ = sin\ (90 - 30) = 0.866$$

or,

$$sin\ 60^\circ = 0.866$$

Once more, referring to Fig. 3, by the principles of geometry (Euclid, 2, 10), assuming a radius $o\ a = 1$, laying off $o\ y = \tfrac{1}{2}$ and drawing $y\ b$; we have $y\ b = \sqrt{1^2 + \tfrac{1}{2}^2} = \sqrt{1 + \tfrac{1}{4}} = \tfrac{1}{2}\sqrt{5}$.

Then, with *y* as a center and a radius *y o*, describe the arc *o x*. Again, with *b* as a center and a radius *b x*, describe the arc *x a*. Now, draw the cord *a b* and the radius *o z* perpendicular to this cord at its middle point *n*. But, $a\ b = x\ b = y\ b - y\ x$. Hence, $a\ b = \tfrac{1}{2}\sqrt{5} - \tfrac{1}{2} = \tfrac{1}{2}\ (\sqrt{5} - 1)$.

Now, by the principles of geometry, under this construction, the angle $a\ o\ b = 36$ deg.; and the angle $a\ o\ z$ = one-half 36 = 18 deg. But, $a\ n$ = one-half $a\ b = sin$ 18 deg. Therefore,

$$sin\ 18^\circ = \tfrac{1}{4}\ (\sqrt{5} - 1) = 0.30902$$

$$cos\ 18^\circ = \sqrt{1^2 - 0.30902^2} = 0.95106$$

From the three figures that we have given, it is thus possible, by geometrical principles, to calculate exactly the sine and cosine, respectively, of the following angles: 18, 30, 45 and 60 deg.; and observe sin 90° = 1; cos 90 ° = 0. Using these values as the base of calculation, the sines and cosines of other angles that are the sum or the difference of the angles given can be exactly calculated by means of the following trigonometrical formulas:

$$\text{Sin}\ (a + b) = \sin a \cos b + \cos a \sin b$$
$$\text{Sin}\ (a - b) = \sin a \cos b - \cos a \sin b$$
$$\text{Cos}\ (a + b) = \cos a \cos b - \sin a \sin b$$
$$\text{Cos}\ (a - b) = \cos a \cos b + \sin a \sin b$$

The sine and cosine, respectively, of twice or one-half of any angle *A* are given by the formulas

$$sin\ 2\ A = 2\ sin\ A\ cos\ A$$
$$cos\ 2\ A = 1 - 2\ sin^2\ A.$$

$$sin\ \tfrac{1}{2}\ A = \sqrt{\frac{1 - cos\ A}{2}}$$

$$cos\ \tfrac{1}{2}\ A = \sqrt{\frac{1 + cos\ A}{2}}$$

To calculate the sine of 42 deg., proceed as follows:

$$sin\ 15^\circ = sin\ \tfrac{1}{2}\ 30^\circ = \sqrt{\frac{1 - 0.866}{2}} = 0.2588$$

$$\sin 3^\circ = \sin\ (18^\circ - 15^\circ) = 0.3090 \times 0.9659 - 0.95106 \times 0.2588 = 0.0523$$

$$\text{Sin}\ 42^\circ = \sin\ (45^\circ - 3^\circ) = 0.7071 \times 0.9986 - 0.7071 \times 0.0523 = 0.6691$$

Examination Questions

Mine Inspectors' Examination, Held at Springfield, Ill., Dec. 15, 1913

(*Selected Questions*)

Ques.—If 20,000 cu.ft. of air pass in a circular airway 12 ft. in diameter, what quantity of air will pass in one 6 ft. in diameter?

Ans.—The question probably means to ask what quantity of air will pass, assuming the *velocity* of the air current remains unchanged. For a constant velocity, the quantity of air passing will vary as the area or as the square of the diameter. In that case, the quantity ratio is equal to the square of the diameter ratio. Thus,

$$\frac{x}{20{,}000} = \left(\frac{6}{12}\right)^2 = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$x = \frac{20{,}000}{4} = 5000 \; cu.ft. \; per \; min.$$

This question can also be answered by assuming a constant ventilating pressure, in which case the quantity ratio is equal to the square root of the fifth power of the diameter ratio; or,

$$\frac{x}{20{,}000} = \sqrt{\left(\frac{1}{2}\right)^5} = \sqrt{\frac{1}{32}} = \sqrt{0.03125} = 0.1767$$

$$x = 20{,}000 \times 0.1767 = 3534 \; cu.ft. \; per \; min.$$

Again, it may be assumed that the power on the air is constant, in which case the quantity ratio is equal to the cube root of the fifth power of the diameter ratio; or

$$\frac{x}{20{,}000} = \sqrt[3]{0.03125} = 0.3150$$

$$x = 20{,}000 \times 0.3150 = 6300 \; cu.ft. \; per \; min.$$

Ques.—An entry in a mine is driven N 40 deg. E and the rooms are turned N 10 deg. W. If the pillars are 30 ft. wide and the rooms 24 ft. wide, what is the distance between room centers, measured on the entry?

Ans.—The distance between room centers measured square across the rooms is 30 + 24 = 54 ft. The corresponding distance measured on the entry is found by dividing the distance measured across the rooms by the sine of the angle the rooms make with the entry. Since the entry bears 40 deg. to the east of north and the rooms bear 10 deg. to the west of north, the angle between the rooms and the entry is 40 + 10 = 50 deg. Then, the distance between room centers, measured on the entry, is

$$d = \frac{54}{sin \; 50^\circ} = \frac{54}{0.766} = 70.5 \; ft.$$

Ques.—If 30,000 cu.ft. of air enters a shaft 14 ft. in diameter, at a temperature of 60 deg. F., what diameter of upcast is necessary to pass the same weight of air, at the same velocity, the temperature of the upcast being 90 deg. F.?

Ans.—For the same weight of air and velocity of the air current, the sectional area of the shaft must increase in proportion to the expanded volume of the air current, which is in the ratio of the absolute temperatures of the downcast and upcast shafts. But, since the diameter varies as the square root of the area, the diameter ratio is equal to the square root of the area ratio or the absolute-temperature ratio. Therefore,

$$\frac{x}{14} = \sqrt{\frac{460 + 90}{460 + 60}} = \sqrt{\frac{550}{520}} = \sqrt{1.0577} = 1.028$$

$$x = 14 \times 1.028 = 14.39 \; ft.$$

Ques.—What horsepower would an engine exert when yielding 60 per cent. of duty, to move 100,000 cu.ft. of air per minute, the water gage standing at 1 in.?

Ans.—The effective horsepower or the horsepower on the air, in this case, is

$$H = \frac{Qp}{33{,}000} = \frac{100{,}000 \; (1 \times 5.2)}{33{,}000} = 15.757 \; hp.$$

The gross horsepower of the engine is then 15.757 ÷ 0.60 = 26.26 hp.

Ques.—We have a tank full of water in the morning when commencing work and no more water in sight, as the well is dry. The tank is a circular one 12 ft. in diameter at the top, 14 ft. at the bottom and 18 ft. deep. How long will we be able to run, using 1200 hp.?

Ans.—This tank being a frustum of a cone, its volume is calculated thus:

$$vol. = 0.7854 \frac{h}{3} \frac{D^3 - d^3}{D - d} = 0.7854 \times \frac{18}{3} \times \frac{14^3 - 12^3}{14 - 12}$$

$$= 0.7854 \times 6 \times \frac{2744 - 1728}{14 - 12} = \frac{0.7854 \times 6 \times 1016}{2}$$

$$= 2394 \; cu.ft., \; nearly$$

It is usual practice to estimate the consumption of water as 35 lb. standard per horsepower per hour; which gives in this case 1200 × 35 = 42,000 lb. per hr. Taking the weight of water as 62.5 lb. per cu.ft., the quantity of water used per hour is 42,000 ÷ 62.5 = 672 cu.ft. per hr. The length of time this tank full of water will last is, then, 2394 ÷ 672 = 5.56 hr., say 5 hr. 30 min.

Ques.—What load will break a white-oak timber 8x12 in. and 15 ft. between the supports, if the load is equally distributed along the length of the beam?

Ans.—For a beam supported at both ends, and uniformly loaded, the breaking load is calculated by the formula

$$L = \frac{4}{3} \frac{fbd^2}{l}$$

the dimensions all being expressed in inches, and the breaking load estimated in pounds. Substituting values in this formula as follows: Unit stress, white oak, f = 8500 lb. per sq.in.; breadth of beam, b = 8 in.; depth of beam, d = 12 in.; length of beam, l = 15 × 12 = 180 in.; we have

$$L = \frac{4}{3} \times \frac{8500 \times 8 \times 12^2}{180} = 72{,}533 \; lb.$$

$$L = \frac{72{,}533}{2000} = say \; 36\tfrac{1}{4} \; tons$$

Coal and Coke News

Washington, D. C.

Although the Congressional investigating committee charged with the duty of reporting on the conditions of the mining strike in West Virginia has not yet made ready its report for publication. Senator William E. Borah, of Idaho has completed a statement on the subject embodying his own views which he has just made public. Senator Borah takes a strong attitude in opposition to the action of the State of West Virginia and of the coal mine owners in that region.

He finds that martial law was declared in the Paint and Cabin Creek region about Sept. 2, 1912 and continued in force except at short intervals until June 1913. During this time various individuals were arrested, tried and convicted for alleged offenses, upon orders issued by the military authorities and not by virtue of any warrant issued by the civil authorities or from established courts.

These parties were put upon trial, he asserts, without the finding of any indictment by the Grand Jury before a court martial created by the order of the Commander in Chief, while the charges made against them were in the nature of specifications drawn up and presented by the military authorities. Continuing Mr. Borah says:

In the trial of these parties and in the assessing of punishments, the court before which they were tried deemed itself bound alone by the orders of the Commander in Chief, the Governor of the State and in no respect bound to observe the Constitution of the United States or the constitution or statutes of the State of West Virginia relative to the trial and punishment of parties charged with crime.

At the time these arrests were made and the trials and convictions had, the civil courts were open, holding their terms as usual, disposing of cases and dispensing justice, in the usual and ordinary manner. In rendering judgment and assessing the punishment, the parties were punished by terms of imprisonment unknown to the statutes or in excess of the punishment provided for such offenses under the laws of the state. . . . A number of these parties were sent to jail and many to the State Penitentiary under sentence of this court martial as approved by the Government.

Most of those who were sent to the Penitentiary were given a conditional pardon before the term for which they were sentenced had expired, the pardon being conditional in a general way upon good behaviour. . . . No threats of violence or use of force was made or had against the judges or the courts at any time during the existence of the disturbance or the reign of martial law. . . . . Great feeling and interest doubtless prevailed generally throughout the country, but the existence of this feeling and its effect upon grand or petit juries were not tested by the calling of a Grand Jury, or the submitting of the charges against those persons to a Grand Jury, and no attempt was made to try them before a petit jury—the officers of the county, after the declaration of martial law proceeding upon the assumption that the feeling and prejudice were so strong as to prevent the operation of the civil authorities, together with a further belief that the declaration of martial law had the effect of suspending and nullifying all constitutional and statutory rights of the accused.

It had been expected that Senator Borah's report would be strongly critical of the mine owners and the belief is that although his report is not officially sanctioned by the committee, he being a minority member, that it will be a part of the majority's report, which however, is expected to go considerably further in direct condemnation of the mine owning interests than did the senator from Idaho.

Investigations to Be Made

The United States Committee on Industrial Relations has voted to carry on a direct investigation on the spot in the Calumet copper region and in the Colorado coal mining region, for the purpose of ascertaining the nature of the conditions prevailing in those two parts of the country where aggravated mining controversies have been in progress.

This action on the part of the Committee has been loudly called for during the past few weeks in both Houses of Congress, it being claimed that such an investigation should properly be undertaken by the Committee in question, in order that the facts as to the merits of the strike in each place may be definitely known.

It has been alleged that the action of members of Congress in thus demanding such an investigation was certainly to be regarded as a severe reflection upon the Department of Labor to which would naturally fall, as in the past, the duty of investigating such disorders and if possible offering arbitration or mediation with reference thereto.

The Department of Labor under its present head has been reluctant to do any thing of the kind and has almost refused to do anything that might seem to involve a possible criticism of or difference of opinion with organized labor in the United States.

The present head of this department has at various times announced himself as a confirmed trade unionist, asserting that his opinions on that subject remained the same as in the past—a position which has greatly tended to weaken him with employers who have regarded the arbitration function as one which was properly to be carried on by a non-partisan investigator.

The findings of the industrial commission will not be likely to be made known for a good while to come as the fieldwork is expected to occupy special agents for a considerable time.

PENNSYLVANIA

Anthracite

Wilkes-Barre—While taking measurements in the Maltby mine of the Lehigh Valley Coal Co. recently, two firebosses and a mine foreman were severely burned by an explosion of gas, and for three hours after the accident were entombed in the mine because the ropes had been taken from the cage by a force of men who were making repairs. Rescuers, by walking several miles in a roundabout way, finally reached the injured men.

Catasauqua—The Lehigh Coal & Navigation Co. recently issued a notice to the effect that part of the Lehigh Canal from Coalport to Catasauqua would be abandoned after Apr. 1. After that date coal will be carried between Coalport and Catasauqua over the new branch of the Lehigh and New England R.R.

Scranton—Offending coal companies here are being hedged about on all sides. Recently the city of Scranton again officially entered the list of the complainants against the promiscuous mining of coal in a manner that places the surface in jeopardy. The bill in question explains that the general manager of the Scranton Coal Co. recently served notice on a number of property owners explaining that the pillars will shortly be removed from under their homes.

Harrisburg—Under a ruling recently issued by Auditor General Powell, anthracite coal companies will be exempted from paying tonnage tax on the coal used in the operation of the collieries, but that dredged from rivers and streams is taxable. Every operator is required to furnish the auditor general during the month of January the number of tons mined during the preceding year. If he intentionally refuses or fails to furnish the information he can be prosecuted and, on conviction, be fined not more than $500, or imprisoned not more than one year; or fined and imprisoned in the discretion of the court.

Bituminus

Connellsville—The Connellsville and lower Connellsville coke region during the year 1913 shipped in the aggregate 20,097,901 tons of coke valued at $59,288,808, the average price of all merchant coke being $2.95 a ton. The year 1912 was beaten for quantity and quality, the cash returns being 55% in excess of that received during the previous year. In both quantity and value, however, the business in 1906 and 1907 was close to that of 1913.

Johnstown—The call for the next biennial convention of the delegates from all the locals in District No. 2 of the United Mine Workers of America was issued Jan. 7. It is understood that the convention will be held in Du Bois, on Feb. 24. The scale committee will be ready to begin work on Mar. 1, and the operators will be notified that if they propose taking part in a joint conference again they must have their committee ready for deliberation by that date.

Punxsutawney—The year just closed was one of the most prosperous in the history of Jefferson and Indiana Counties, so far as mining was concerned. The mines have worked throughout the year and allied industries have been correspondingly busy. Except for an occasional strike the miners have worked almost without interruption since Jan. 1, 1913, and the prospects for a continuance of excellent business are good.

Pittsburgh—The annual report of mine inspectors will indicate an increased output during 1913 in almost all local districts. More accidents have occurred, however. In spite of safety and first-aid work, more miners were killed than in 1912, but more were employed than for many years, although this number was insufficient. The coal markets were lively, due in part to floods in the early spring.

WEST VIRGINIA

Charleston—It is believed that all the contracts in the $50,000,000 New River coal deal will have been printed, properly signed and sealed, and copies filed with one of the Charleston banks in a short time. The representatives of the London syndicate will then sail with copies for England, with the purpose of arranging for the first payment of $1,500,000 in February.

Wheeling—The coal mines of this state and the Ohio subdistricts are averaging at present about two days' work per week. Many of the operations are shut down entirely and most of those working are on only about half time. This apathy is explained by the lack of orders, which is an annual affair occurring about this time of year.

Fairmont—The Consolidation Coal Co. completed the past year with a production of about 11,000,000 tons, or 800,000 tons more than was secured in 1912. Every ton of this fuel was marketed at prices higher than those received a year ago. It is estimated that the production would have been at least one million tons greater had it not been for the floods in the Central West last spring, which paralyzed railroad traffic for nearly a month and prevented shipment to that territory.

Bluefield—The shop and drum house of the Borderland Coal Co. were totally destroyed by fire recently. In addition to the buildings, all tools, electric motors, and other valuable equipment were destroyed and considerable damage done to tracks leading to the mine. The origin of the fire is unknown.

KENTUCKY

Lexington—The Kentucky Utilities Co., which is said to be controlled by the Insull interests of Chicago, and which has acquired a large number of electric plants in central and southeastern Kentucky during the past year, recently took over a plant at Harlan, Ky., in the heart of the Harlan County coal-field. The plant is a small one at present, but is destined to form one of a chain of power plants operated by the company in the coal field referred to. The company is now constructing a trunk line for the distribution of current from its central plant at Pocket, Va., and the Harlan, Varilla, Pineville and other plants now owned by the company will form important factors in the development of the coal fields in that section, in connection with the power from the Virginia plant.

Middlesboro—The Low Ash Coal Co., a West Virginia corporation which a few months ago purchased the old Mary Moore mines near Middlesboro, has completed the installation of new machinery at the mine and begun the shipment of coal. The Barner seam is mined on the property. The company has a capital stock of $20,000, and was recently incorporated.

OHIO

Columbus—Arch Grossman, who represented the New York Coal Company, of Columbus, Ohio in Indiana territory for a number of years has resigned to open a jobbing business in Indianapolis under the name of the Cedar Creek Coal Co.

New Lexington—The Blue Rock Run Coal Co. has started work on a new mine on the Olden Farm in Harrison Township in Perry County. The seam is 5 ft. thick.

INDIANA

Carlisle—The Carlisle coal mine and the Bellevue mine, near here, which have been idle two years, have been reopened.

Terre Haute—The Indiana Coal Operators Association has decided to stand back of the Queen Coal Mining Co. in its dispute at two of its mines near Jasonville over a technical construction of provisions in the contract as to certain working conditions. The Association protects its members in strikes on such occasions by providing coal to fill contracts depending on the output of the mines in trouble.

Illinois and Indiana miners will endeavor to get a uniform wage contract to succeed the two-year agreement that will expire Mar. 31. They are pleased with their individual contracts so far as they go but each state has some conditions the other one wishes and neither do the miners wish, they say, to give operators in one state any advantage in working conditions in mines over the operators of the other state, which affect the cost of production and enable one to undersell the other. William Houston, president of the Indiana United Mine Workers and vice-president Lord of the Illinois Mine Workers are drafting the contract that will be submitted for the approval first of the miners and then of the joint conference of miners and operators.

Bicknell—Aliceville is the name selected for a new coal town being promoted on coal lands owned by the Zeller & McClellan Coal Co. about three miles west of here, H. R. McClellan, Clinton, Ind., being manager of the company. The company has 6000 acres. One mine is being opened and others will be sunk.

ILLINOIS

Springfield—The United Mine Workers in Illinois are going to prevent their members from getting beat out of their wages on account of mine failures in the future if, according to rumor, the Mine Workers succeed in putting through one of the propositions that will come up as an issue in the new settlement on Apr. 1. This proposition is that every operator must put up a bond, protecting the maximum number of employees employed at each mine for twice the maximum pay roll, or something along those lines, with possibly some modifications. If they succeed in getting this proposition through, it will put a large percentage of the mines out of commission.

New Baden—A fire at the New Baden mines, twenty miles east of Belleville, recently destroyed the blacksmith, machine and storage shops and partly burnt the boiler house. The damage is estimated at $5000, and 600 men will be out of employment until repairs can be made.

Harrisburg—George F. Wilson, who absconded with $11,000 belonging to the Seventh subdistrict of District 12, United Mine Workers, has been arrested in Spokane, Wash. Officers from Herrin have gone after him. Wilson was secretary-treasurer of the district at the time of his disappearance. He deserted his wife, who is now living in East St. Louis.

SOUTH DAKOTA

Woonsocket—While boring an artesian well upon the farm of Joseph Dodd at a depth of 430 ft., a bed of soft coal, 20 ft. thick, was encountered. This was accompanied with traces of oil. As lignite coal exists in vast quantities in the northwestern part of the state, it is believed that it will also be found in paying quantities here. This discovery on the Dodd farm has caused considerable excitement throughout this section.

COLORADO

New Castle—The Coroner's jury, which has been investigating the recent explosion at the Vulcan mine rendered a verdict recently declaring that the operators did not sprinkle the mine properly, permitted the use of open lights, did not forbid smoking by the miners, and frequently fired shots while men were working in the pits. The Coryell Leasing Co. operates this mine.

Steamboat Springs—Seven members of the United Mine Workers of America charged with rioting in the miners' strike were sent out of town Jan. 3 by the Routt County Taxpayers' League. The League issued a notice that every miner in the county must find work or leave.

MONTANA

Red Lodge—Operations were recently resumed at the Brophy coal mines in the Bearcreek field following a shutdown caused by the miners going on strike because of the discharge of one of their number. The decision to return to work was reached by the local union after several fruitless conferences with the mine management in an effort to secure the reinstatement of the discharged miner.

FOREIGN NEWS

Vladivostok, Siberia—A dangerous fire recently broke out in a local mine, and was supposed to be due to incendiarism. Two hundred men were employed in the mine, and when the fire broke out 50 were underground.

Nagasaki, Japan—Recent surveys made at Iojima (an island in Nagasaki Harbor) confirmed the opinion of exports that a valuable deposit of coal exists there. Its quality is said to be the same as that of the Takashima coal and in quantity it is thought to be equal to the Nakanoshima field near Nagasaki. If this deposit proves as valuable as it is supposed to be Nagasaki will be fortunate in having an abundant supply of good coal near the entrance of its Harbor, and local business circles anticipate a revival of prosperity as the result of opening a mine.

TRADE CATALOGS

The Ingersoll Rand Co., 11 Broadway, New York. "Calix Bore Holes," 15 pages 3½x5½ in. illustrated, describing calix core drills.

Buff & Buff Mfg. Co., Jamaica Plain, Boston, Mass. "Buff," a 30-page, 4x6-in. booklet describing the construction of Buff precise transits.

The Sullivan Machinery Co., 122 South Michigan Ave., Chicago. Bulletin 66-H, "Sullivan Rock Drills." Fifty-six pages, 6x9 in.; illustrated.

The Ingersoll-Rand Co., 11 Broadway, New York City. "The Story of the Imperial." Pamphlet of 20 pages, 6x9 in., describing the manufacture of air compressors.

The Draeger Oxygen Apparatus Co., 422 First Ave., Pittsburgh, Penn., "Draeger Pulmotor." Pamphlet of 32 pages, 6x9 in., illustrating and describing the pulmotor and its uses.

The Eveland Engineering & Manufacturing Co., 2324-2328 Market St., Philadelphia, Penn., "Eveland Electric Riveter." Folder of 10 pages, 8½x11 in., describing the Eveland electric riveter.

Alberger Pump & Condenser Co., New York. Bulletin No. 18. "Alberger Spiroflo Surface Condensers." Pamphlet of 32 pages, 6x9 in., illustrating and describing Alberger condenser apparatus.

The Armstrong Cork Co., Pittsburgh, Penn. "Nonpareil Insulating Brick," 31 pages, 5x7 in., illustrating and describing an insulating brick which transmits about one-tenth as much heat as ordinary fire brick.

Coppus Engineering and Equipment Co., Worcester, Mass. "Coppus Turbo Biower." A pamphlet of 36 pages, 4x9 in. copiously illustrating and describing the details and application of the Coppus blower for increasing the draft of furnaces.

Arthur G. McKee, Contracting Engineer, Cleveland, Ohio. "Storage Bins." Pamphlet of 26 pages, illustrating and describing the Baker patent suspension type of storage bins, and the many and various uses to which these structures may be put.

The Ingersoll-Rand Co., 11 Broadway, New York, pamphlet form 8011, "Little David Riveters." Eight pages 6x9 in. illustrated; describing Little David riveting hammers with capacity for driving rivets up to from ¾ in. to 1¼ in. in diameter.

The Pneumelectric Machine Co., Syracuse, N. Y. "Pneumelectric Room Hoists," 15 pages, 6x9 in., illustrating and describing the construction and application of machines especially designed to easily and quickly handle cars over local dips, grades, etc., and make easier and more effective the work of both men and mules.

PERSONALS

George Wales, civil and mining engineer, has been appointed city engineer of Central City, Ky.

John M. Roan, member of the recent Ohio State Mining Commission, has been appointed to take charge of the safety and accident prevention bureau of the mining department.

John Sanderson, of Red Lodge, Carbon County, Mont., succeeded J. B. McDermott as state coal mine inspector of Montana on Jan. 1. Mr. McDermott held this position long and creditably.

"Mother" Jones, prominent labor leader, was recently deported from Trinidad, Colo. She was met at the train and ordered to get back on board and continue traveling until out of the strike district.

E. J. Pietzcker formerly Southwestern Sales Manager for the Standard Underground Cable Co., has been made Western and Southwestern Manager for the same firm, in charge of the offices in both Chicago and St. Louis.

Thomas M. Jenkins, of St. Louis, has been appointed general manager of the St. Louis & O'Fallon Coal Co. The mines of the company are located in the vicinity of O'Fallon, Ill., and last year produced 7,000,000 tons of coal.

Neal Robertson, of Charleston, W. Va., recently appointed receiver of the La Folette Coal, Iron & Ry. Co., of La Folette, Tenn., after spending a week at the operation left on Jan. 3 for New York, on business connected with the receivership.

Clarence Hall having acted in the capacity of expert in charge of the explosive section of the U. S. Bureau of Mines for seven years, has tendered his resignation in order to establish an industrial laboratory in the city of Pittsburgh. Analyses and tests of explosives will be made a specialty.

William Haggerty, recently underground superintendent of the Red Lodge coal mines of the Northwestern Improvement Co., has been raised to the position of superintendent of the whole works. C. C. Anderson, who held this position prior to Mr. Haggerty's elevation, is now general manager of the company and all the coal properties of the Northern Pacific System.

OBITUARY

James Lackey, a prominent member of the Philadelphia Coal Exchange, died in that city recently after a slight illness. He began business in Philadelphia about 35 years ago.

John Skeath, mining expert, recently died at the state hospital at Mahanoy City, following a stroke of paralysis, at the age of 70 years. Mr. Skeath began life as a slate picker, became chute boss, foreman, superintendent and finally general manager for the Reading Coal Co. in this district.

CONSTRUCTION NEWS

Cannonsburg, Penn.—The Pittsburgh Coal Co. is digging a shaft on what was formerly the Hopper farm about half a mile from Hill's station.

Brownsville, Penn.—The Denbeau Coke Co. plans to erect 64 ovens next spring, which will make its plant one of 300 ovens of the rectangular type. It is also planned to erect a $50,000 washer.

Cumberland, Md.—Work will begin shortly on the new nine-mile railroad branch of the Federal Clay, Coal and Lumber Co. from Cooksville Mills, Penn., to Confluence tapping a rich coal and timber country.

Roscoe, Penn.—Work has begun upon the building of the new tipple for the Eclipse mine above Wood Run station. This structure is to cost about $70,000. Work of erection is in charge of the Bravo Construction Co.

Connellsville, Penn.—The Snowden Coke Co., of Pittsburgh, has recently bought the plant of the Mt. Hope Coke Co. and about 1050 acres of coal adjoining from other owners. It is planned to increase the present plant from 150 rectangular ovens to 400.

Kingwood, W. Va.—The North American Coal Co., of W. Va., has closed an agreement with James A. Comley, of Morgantown, for the development of a tract of 100 acres of coal on the Monongahela River and along the Buckhannon & Northern R.R.

Clarksburg, W. Va.—The Clarksburg Northern R.R. has been completed to the corporate limit of Middlebourne, and but one bridge prevents entrance to the town. The last rail before crossing the creek will soon be laid, and the completion of the road will be made an important event by the people of Tyler and Wetzel Counties.

Huntington, W. Va.—In order to furnish power to about 12 coal operations that are located upon its holdings, the firm of Montgomery Clothier & Tyler, of Philadelphia, has installed a plant at Sharples, W. Va., on Coal River, at a cost of about $75,000. This plant will furnish power to operations for miles around, having a capacity of 1000 kw.

Youngstown, Ohio—Work is progressing rapidly on the byproduct coke plant being built by the Republic Iron & Steel Co. It will contain 68 byproduct ovens of the Koppers type and will have a daily capacity of 800 to 1000 tons. It is expected that this plant will make enough coke to supply the company's blast furnaces in the Youngstown district.

Connellsville, Penn.—The Pennsylvania R.R. has completed the extension of the Monongahela & Southern from Rice's Landing to the Crucible Coal Works, and passenger trains are being operated daily over the additional trackage. It is understood that eventually this road will be extended up the Monongahela River to Queensboro, where it will connect with the Monongahela R.R.

Morgantown, W. Va.—About 25 men have been put to work on the siding for the mine to be opened on the Comley property, about half a mile above Maidsville, by the North Ameri-

can Coal Co. While the siding is being put in by one gang, another force is at work opening up the mine, which is to be operated as a drift. Work on the tipple will be started as soon as the siding is in.

Woodward, Ala.—Between $700,000 and $1,000,000 will be expended by the Woodward Iron Co. and allied interests in the construction of new plants during the present year. This is the beginning of a series of additions to be made at Woodward. It is announced that 30 by-product coke ovens will be started within the next 30 days. In addition to this a creosoting plant will be erected by the American Creosoting Co., which will be one of the most modern in the South.

NEW INCORPORATIONS

Lynchburg, Va.—The Black Wolf Coal & Coke Co. has increased its capital stock from $150,000 to $225,000.

Sheboygan, Wis.—The C. Reiss Coal Co. of Sheboygan has filed an ammendment increasing its capital from $800,000 to $2,000,000.

Shinnston, W. Va.—The Bridgeport Gas Coal Co. has been incorporated here with a capital stock of $50,000 to develop coal mines.

Frankfort, Ky.—The Bank Coal Co., of Williamsburg, recently filed amended articles of incorporation, increasing the capital stock from $6000 to $8100.

Sullivan, Ind.—The Vance Coal Co. has been organized with a capital stock of $10,000. The directors are O. P. Smith, B. W. Lovett, W. H. Vance and others.

Cleveland, Ohio—Notice has been filed by the Kea Coal Co., of Cleveland, of an increase in its capital stock from $10,000 to $150,000 and of a change of name to the Indian Hill Coal Co.

Chicago, Ill.—A certificate of increase in capital stock of the Southern Illinois Coal & Coke Co. with headquarters in Chicago, was recently filed at Dover, Del. The increase is from $1,000,000 to $1,200,000.

Wheeling, W. Va.—The James H. Emblem Co. has been incorporated with a capital stock of $100,000 to manufacture coke and sell coal and gas. The incorporators are James H., Robert, Albert, George, Sarah and Rosella Emblem.

Charlestown, W. Va.—The Gassaway Coal Oil and Gas Co. of Gassaway has been organized for the purpose of operating oil, gas and coal. The capital stock is $25,000 of which amount $500 has been subscribed and $50 paid. The incorporators are: Grace Jacob, C. J., L. G. and A. L. Schearer.

Great Falls, Mont.—The National Coal Co. has been recently incorporated to carry on a general coal and fuel business. The capitalization is $100,000, and it is declared by the organizers that the new concern is one of the largest fuel companies in the Northwest.

Charlestown, W. Va.—The Extrapoca Coal Co. has been organized at Bramwell, Mercer Co. for the purpose of operating coal mines in McDowell Co. The capital stock is $10,000 of which amount $500 has been subscribed and $50 paid. The incorporators are: J. F. Biggs, H. S. Brown, B. W. Freeman, J. E. Jones, and Hattie Brown.

Logan, W. Va.—The Reece Coal Co. has been organized with a capital stock of $25,000 for the purpose of mining coal and manufacturing coke. The incorporators are J. C. Alderson, F. B. Robertson, R. L. Shrewsbury, of Logan, W. Va., L. E. Browning, Reece Browning, of Chancey, W. Va., and T. O. Deaumer, of Huntington, W. Va.

INDUSTRIAL NEWS

Pittsburgh, Penn.—Pittsburgh officials of the Pennsylvania R.R. predict an increase in the coal traffic in January which will continue until after Mar. 1.

Harrisburg, Ill.—The Guaranty Trust Co., of Chicago, has sold to the Chicago Harrisburg Coal Co. about 20,000 acres of coal land in the western section of Saline County.

Berlin, Germany—A mining engineer at Bochum is said to have invented a successful wireless apparatus for signalling the imminence of perilous conditions inside a coal mine to the station at the pit mouth.

Morgantown, W. Va.—The first shipment of coal over the Buckhannon & Northern R.R. was recently made from the newly opened mine of the Sterling Co., on the west side of the Monongahela river opposite Point Marion.

Washington, D. C.—J. G. Wright, commissioner to the five civilized tribes of Oklahoma has been authorized to make new leases for the surface of the segregated coal and asphalt lands of the Choctaw and Chickasaw indians for another year.

Punxsutawney, Penn.—Deeds for 17 tracts aggregating 1700 acres of coal land in East and West Wheatfield townships have been recorded by attorney Frank P. Barnhart for the Operators' Coal Co.

Brownwood, Texas—What is believed to be a large field of lignite has been discovered in the eastern portion of Brown Co. and more than a 1000 acres have been leased to Wright Stewart and G. F. Wilson.

Berlin, Penn.—About 1000 acres of coal land belonging to the Johnson estate adjoining the holdings of the Brothers Valley Coal Co. have been recently sold to the Brothers Valley interests for what is said to be $100 per acre.

Marion, Ill.—The Black Diamond R.R. recently sold at auction and was bid in by E. M. Stotlar for $28,200. A coal mine was included with the road which is graded 12 miles east of Marion and is in operation as far as Pittsburg which is six miles distant.

Huntington, W. Va.—Fifteen of the 70 steel hopper-bottom cars ordered from a Butler, Penn., firm by the Chesapeake & Ohio R.R., have arrived and were taken to the coal fields. It is said that these cars will be used principally for the shipment of coal to tidewater.

West Newton, Penn.—Jacob F. Paterson, of Waynesburg has purchased from David M. Comstock and J. D. Loughman, of Morris Township their interests amounting to 50 acres in what is known as the Frederick Loughman tract of land near Deer Lick in Greene Co. for $260 per acre.

Franklin, Penn.—The Pennsylvania Southern, Pennsylvania Northern & Pittsburgh, and Clarion and Northern railroads have been merged into the Lake Erie, Franklin & Clarion R.R. The roads in the merger are in Venango and Clarion counties and traverse important coal lands.

Eaton Rapids, Mich.—Coal in paying quantities has been unearthed by the digging of a well on a 600-acre tract of land between this city and Albion. A mine has been in operation upon this tract for some time, but the drilling of this well revealed the presence of another deposit of coal which is said to be 4 ft. in thickness.

Washington, D. C.—The beehive type of coke oven which does not admit of the recovery of by-products from the distillation, according to the Department of Agriculture is responsible for an annual waste in the United States of $22,000,000. About $4,000,000 worth of ammonia is obtained annually as a by-product of coke making, while more than five times that amount is allowed to go to waste.

Washington, Penn.—As the result of a coal deal recently closed it is expected that Owen Murphy a coal operator of Latrobe will shortly open a coal mine in Coon Island in southwestern Washington Co. It is alleged that Mr. Murphy has come into possesion of approximately 400 acres of coal and has options on two pieces of surface just outside the town, on one of which the shaft is to be sunk.

Seattle, Wash.—Eight hundred and forty miners employed in the Black Diamond mines of the Pacific Coast Coal Co. refused to work recently alleging that they were not properly safeguarded in the mines. The District Executive Board of the United Mine Workers of America upheld the action of the miners. If the allegations of the men are found to be correct, they will remain out until proper safeguards are installed.

Chicago, Ill.—A newly patented electrical primary battery, said to have been invented by a man in Washington, D. C., is being heralded in Chicago and other Illinois cities as "coming within 5 per cent. of perpetual motion." The salesmen openly affirm that when the invention is spread throughout the country, "the coal mines may as well shut up or down," for heat, light and power will be dispensed to stockholders at one-tenth the present cost.

Philadelphia, Penn.—The year 1913 proved one of the most prosperous in the general business of the port of Philadelphia, although the figures recently issued by collector Berry show a decline which, obtained on a limited number of products only. Bituminous coal one of the principal exports showed a substantial increase in volume and valuation over the year of 1912. During this time the exports amounted to $2,378,299 as compared with $2,590,954 for 1913.

Coal Trade Reviews

General Review

Hard coal still dull; colder weather and labor difficulty in New York Harbor have a stimulating local effect. Congestion of bituminous general at most of the distributing centers. Prices soft under adverse conditions, but showing a stubborn resistance on the decline.

Even under the combined influence of severe weather conditions, and an almost complete tie-up of water transportation in New York Harbor, the anthracite market has still failed to show the customary winter buoyancy. Tidewater demand is light at the best, and all companies are heavily stocked. The restricted production over the holidays has not relieved the situation, and unless there is a long continued spell of moderately severe weather, it may ultimately prove necessary to effect a further curtailment in the output.

Biuminous consumers are still carrying full stocks, and the congestion is noticeable everywhere. It is more difficult to negotiate business now than during last summer, but sellers are not, as a rule, attempting to force the market, appreciating the futility of adopting any such policy. The strike in New York Harbor has interfered with water deliveries and caused a congestion at some of the loading ports, but the situation has not developed to serious proportions as yet, and the rail movement continues in good volume. There has been an excess accumulation at the Hampton Road piers, and as a consequence, there is a superabundance of the Southern fuels in the New England markets, which has caused a sharp break in the Pennsylvania grades.

The long continued mild weather in Ohio, together with the slowing down in manufacturing over the halidays, resulted in a further slump in the market there; stocks are heavy, and consumers are loath to place further orders until these can be moved. Business at Hampton Roads is only fair, few spot sales being negotiated; the bunker prices for 1914 were announced Jan. 1 on the same basis as last year. Colder weather in the South has created a more active situation there, and stocks are somewhat reduced. Steam coal is quiet, but with an excellent undertone; car situation much improved. A deficiency in the supplies of fuel oil at New Orleans has caused an unusual activity in the coal markets.

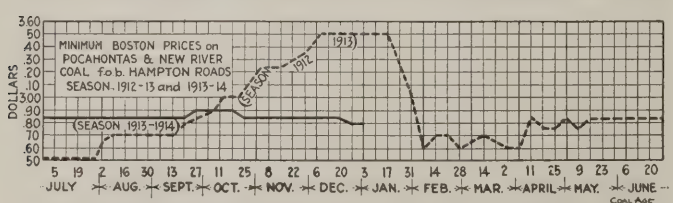
A more optimistic tone pervades the Middle Western market as a result of the colder weather. There is an increased demand, and while prices have not advanced as yet, there is a strong inclination toward higher levels. The manufacturing demand is getting under way again after the holiday cessation, and there is greater activity in retail circles, though this has not been felt in the wholesale end as yet.

EASTERN MARKET

BOSTON, MASS.

Bituminous market shows no material change. Still a large accumulation of New River and Pocahontas at Hampton Roads.. Pennsylvania are largely affected by the abundance of Southern coals. Anthracite has yet to show the brisker movement expected on account of the present cold snap.

Bituminous—The market continues generally inactive. There is still an accumulation of coal at Hampton Roads in excess of chartered tonnage and though as yet the circular f.o.b. price of $2.85 for New River and Pocahontas has been



fairly well maintained, several instances of shading have been reported. The New England market is so well stocked that it will probably be several weeks before this present cold weather has any effect. Pennsylvanias for tidewater shipments have become considerably weaker owing to the superabundance of Southern coals. Georges Creek remains in good supply with a firm price. Contract demand in all quarters is slight.

The market continues quotable as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$1.00@1.55	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.25@2.75	2.50@2.85	2.92@3.02	
New York*	2.55@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.80@2.90	
Hampton Roads*				$2.80@2.90
Boston†				3.72@3.82
Providence†				3.72@3.87

*F.o.b. †On cars.

Anthracite—This market remains listless, its only feature being the scarcity of stove coal. It is hoped that the present cold weather will soon produce a brisker demand but as yet the effect has been negligible. Freight rates are still 70@75c., Hampton Roads to Boston, but a strike of the captains in New York Harbor is bound to have an early effect.

NEW YORK

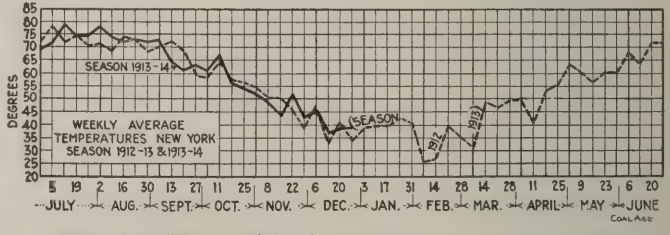
Strike of the barge captains in New York Harbor the feature of the local market. Conditions easy as yet due to large stocks of all kinds. Colder weather having a stimulating effect.

Bituminous—The strike of the boat captains has held up deliveries of coal to a considerable extent, and to prevent a congestion at South Amboy Piers, the Pennsylvania Railroad placed an embargo, the latter part of last week, on shipments to that point. Should the strike continue for any length of time, the other roads will undoubtedly find it necessary to take similar action. Ordinarily, such a situation at New York might force the coal into other channels, but mining operations have been somewhat curtailed this week by the severe weather conditions in the several regions. With the exception of those plants which have little or no storage capacity, the interruption to deliveries in New York Harbor is not likely to be serious.

Coal continues to move freely to consumers reached via all-rail, and a prolonged suspension of deliveries by rail and water would undoubtedly compel some water consignees to take their coal in via the rail routes.

The market continues quotable as follows:

West Virginia steam, $2.60@2.75; fair grades of Pennsylvania, $2.70@2.80 good grades of Pennsylvania, $2.80@2.90; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.



Anthracite—Even with the suspension of mining due to the holiday season, there has been little noticeable improvement in the demand for prepared sizes. Most of the cheap egg coal which has been offering in the market for the past month or so has practically dissappeared; this size seems to be moving along fairly well now with the stove and chestnut at, or about, circular prices. During the past week, however, pea coal was quite short in the local market as well as the better grades of buckwheat, while the poorer grades are still offering at a discount.

The strike of the boat captains, Jan. 2, has not up to this writing seriously handicapped the movement of coal since the stocks in the hands of the retailers were good. The shipments to tidewater have been light for the past week and the failure to move boats on account of the strike has not seriously effected the docks. It is not generally thought that the strike will be of long duration. The captains, of course, live on the boats and in striking they deprive themselves of a home. This together with the fact that they have in most cases very little money to carry themselves along during this inclement weather should lead to a speedy settlement.

We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	.....	$5.05	.....
Egg	5.25	$5.15@5.25	5.30	$5.10@5.20
Stove	5.25	5.25	5.30	5.20
Chestnut	5.50	5.50	5.55	5.35@5.45
Pea	3.50	3.50	3.50	3.35@3.45
Buckwheat	2.75	3.50	2.70@3.45	2.25@2.70
Rice	2.25	2.25	1.95@2.20	1.75@2.20
Barley	1.75	1.70@1.75	1.70	1.40@1.70

PHILADELPHIA

General restriction of production continues and market remains apathetic. New year holds little promise for operator and retailer. Demand exceedingly light.

The year 1913 closed with the lightest demand for hard coal in months, and little hope is entertained for relief. The new year was eagerly looked forward to by operators and dealers, but at the present time it hardly seems probable that the market will harden until seasonable weather arrives.

Business has sagged and everyone is anxiously waiting for it to recover. A general restriction of production continues, and it has been a long time since the local market was so dead. Two years ago the trade had a similar experience, and it was late in February before it started to show its real form. Reports from the mines state that individual operators are mining full time, but that they are compelled to make concessions in prices on every size in order to move their product. It is evident that the anthracite supplies are fully adequate, but the demand cannot be found as yet.

The bituminous market remains unsatisfactory. Prices for good coals continue to show resistance against any further decline, and persistently hold around the same level. Some poorer grades have eased off since the holidays. The production is being sharply curtailed partly by voluntary action on the part of the operators and partly as a result of the holidays.

BALTIMORE, MD.

The year is started with more winter-like weather, but with the trade still rather flat. Plenty of fuel on hand despite the holiday period. Anthracite conditions brisker. Coal exports break record.

Wintry weather conditions have marked the first week of the New Year, and while a continuance is likely to result in a stiffening of the coal trade as a whole, business just now is flat. The bituminous call remains remarkably poor for the season, most consumers reporting that they are loaded up to such an extent that they can take no more coal for a time. In West Virginia the steam coals of medium grade are still commanding around 90c., while gas coals range from 65c. for slack to around 85c. for three-quarter. The Pennsylvania coals show no marked change, first grades still calling for about $1.25 and other classes selling down to 90 cents.

There is plenty of fuel on hand despite the holiday period. Nearly all mining interests were making reasonable offerings to the trade to keep fuel moving and to prevent congestion at the loading points.

Anthracite conditions showed an improvement. Much interest is being taken in the trade in a move under way to consolidate about twenty of the largest retail concerns here, much on the plan pursued some time ago in both Philadelphia and New York.

The coal exports from Baltimore for 1913 broke the record. In 1912 the total exports was 628,522 tons, while the past year saw a foreign movement from this port of 870,751 tons.

CENTRAL STATES

PITTSBURGH, PENN.

Production greatly curtailed in past fortnight. Demand light and weather unseasonable. Prices being cut somewhat. Connellsville coke market less active. Rumors of dissensions among leading operators.

Bituminous—There has been only about one week of operation in the fortnight, on account of the holidays, and as some mines were closed altogether before the holidays, production has been light. Consumption has also been small and prospects are not good in this respect, manufacturing demand being poor while the weather on the whole is unseasonably warm. Not much prompt coal is moving and there has been little contracting for the three months, while annual contracts are few as they would extend over the wage settlement and on account of the uncertainties such contracts are avoided equally by buyers and sellers. Relatively little prompt coal is moving, and there is some cutting. Regular prices, which are usually quoted, remain as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—Contracting for furnace coke for the new year has not been pursued with any avidity in the past few days, or since contracts for 125,000 to 150,000 tons a month were made about a week ago, at from $1.85 to $1.95. It is claimed that the regular asking price of $2 has been paid in two or three instances, but chiefly for January tonnages only. Rumors are numerous that there is trouble among the companies which have been selling, or perhaps more accurately speaking holding their product for sale, through the Producers Coke Co. One rumor has it that several companies are withdrawing while another is to the effect that the company will reduce its asking price. This might avail little, seeing that there is not much more coke to be covered.

Prompt furnace coke is quiet, but unquestionably higher. Corrigan, McKinney & Co. have blown out two of their five stacks and have bought 8000 tons of prompt coke at $1.75, intending to run their three furnaces a short time longer. We quote: Prompt furnace, $1.90@1.95; contract furnace, $1.85@2; prompt foundry, $2.40@2.65; contract foundry, $2.40@2.65, per ton at ovens.

The "Courier" reports productions in the Connellsville and lower Connellsville region in the week ending Dec. 27 at 236,085 tons, a decrease of 48,851 tons, and shipments at 233,581 tons, a decrease of 44,774 tons.

BUFFALO, N. Y.

Still a quiet market. Dealers do not look for much recovery this month. Coal on track and business in retail centers heavy. Preparations for the spring suspension.

Bituminous—There is still much difficulty in getting the surplus supply out of the way. Jobbers are holding back the production as much as possible, and the result is a lot of cars standing on track on demurrage. It is the good salesman and careful manager who is making money out of the business now.

Coal will not sell half as readily now as it would last July. The retailer and the consumer are so loaded up with stock, that neither of them is able to take any more while actual consumption has gone off somewhat and the congestion is noticeable everywhere. Even if the consumption increases it is estimated that a month will be needed to make any headway against the oversupply and it may even take a big spring suspension of the mines to wipe out the surplus. The spring suspension is fully expected to take place, though it may not be long. The miners are well supplied with funds so that it may turn on how soon the operators wish to get back to business or on the effort of some district attempting to get started ahead of another. Such has been the situation in former years. Coal sellers are not trying to push the market very hard appreciating the futility of such an action. The consumer is not afraid of running out of stock and treats the talk of a spring strike with contempt. Bituminous prices are unsteady and do not rule above $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.25 for mine-run and $2.15 for slack, with slack doing a little better than sizes. Allegheny Valley coal follows Pittsburgh closely, but on account of the lower freight rate in this market it sells for about 25c. less.

Coke—The demand for coke is still light and the small promise last week of a firmer market soon does not appear to have been realized. Dealers do not agree as to the outlook; some believe a generally better state of trade will compel a revival of the iron trade. Coke quotations remain weak at $4.60 for best Connellsville foundry.

Anthracite—The late winter snow has not brought about any larger demand as yet. In fact many of the mines, including the independents, are running on only part time and with coal on demurrage at various points, the anthracite trade is not without its difficulties. There begins to be fear that the big supply shipped West by Lake will not all be required this winter.

One company has a large amount of coal on hand here and is loading into lake vessels. The amount put afloat so far is more than 40,000 tons, with prospects of a continuation. As a rule the other companies do not appear to be anxious to tie up their coal in that way and there are certainly two sides to the question. A long spring suspension of mining tied up the anthracite trade West very badly two years ago, which a good amount afloat here would have prevented.

TORONTO, CAN.

Colder weather created some activity in anthracite. A projected municipal coal yard.

Trade showed considerable improvement during the past

week owing to the setting in of cold weather; anthracite for domestic purposes is moving freely, many having allowed their supplies to become low so long as mild weather lasted. An active business for January is anticipated. Quotations remain unchanged.

The City Council of Toronto, in pursuance of a project for the establishment of municipal coal yards, which has been advocated from time to time, has applied to the Provincial Legislature for an amendment to the civic charter to enable them to engage in the coal business. The dealers do not consider that there is much likelihood of its adoption.

COLUMBUS, OHIO

Combination of adverse factors in the local trade. Continuation of mild weather and the closing down of many manufacturing plants caused very quiet trade. Movement small in every line and prices again slumped in spite of the efforts of the larger operators and jobbers to maintain the circular.

Production was at a low point during last week. Because of the holiday, which always means a cessation of work and little demand for steam and domestic grades, the output in the various mining districts was small. In the Hocking Valley the production was about 35 per cent. of the average and the same is true of eastern Ohio and Pomeroy Bend. In the domestic fields of Jackson, Massillon and Cambridge the output was even less.

Domestic trade is dead in every way. Dealers stocks are large and they are loath to place orders until they are able to move what they have. The larger householders have laid in their supply for the winter and the domestic trade is now largely a weather proposition. Orders placed for delivery in January have either been canceled or deferred. Collections are bad as a result of the inability of dealers to move their stocks.

There is more doing in steam lines but even this department is feeling the effects of the holiday vacation and the business depression. Many plants which have shut down temporarily have not yet started while others are on part time. Their fuel consumption is not at all large. The movement on the part of some steam users to stock up against a possible suspension after Apr. 1, has not caused much effect on the trade. Contracts are being renewed on the same basis that prevailed during the past year. There is practically nothing doing in retail circles. Dealers are not busy and many of their wagons have not been out for several days.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.75 @ 1.70	.....	$1.90 @ 1.80	$1.70 @ 1.60
3-4 inch	1.50 @ 1.45	$1.20 @ 1.15	1.60 @ 1.40	1.50 @ 1.45
Nut	1.30 @ 1.25	.....	1.50 @ 1.40	1.30 @ 1.25
Mine-run	1.30 @ 1.25	1.10 @ 1.05	1.30 @ 1.25	1.30 @ 1.25
Nut, pea and slack	0.80 @ 0.75	.....	0.90 @ 0.85	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	0.90 @ 0.85	0.80 @ 0.75	0.70 @ 0.65

DETROIT, MICH.

The long period of mild weather has caused a general heaviness in the market. Railroad yards congested with coal.

Bituminous—The unusually mild weather has caused a falling off in the local trade and it is now entirely a weather market. The railroad yards are crowded with coal, and with shipments still coming in there is considerable forced selling to avoid demurrage. The domestic business is suffering the worst as would be expected. Stocks generally appear to be large, and with consumption light there is little or no excuse for any business.

Steam trade is adversely affected by the slowing down in business. Cancellations and hold-over orders are reported on all sides. Railroads are giving an almost perfect service. Operators have exhausted practically every effort to maintain prices which are now weak. Domestic lump is quoted at $1.35, the regular circular being $1.75@1.85. While three-quarter lump is quoted at $1.60 the mines, it can be obtained apparently in any quantities at $1.10 in Detroit.

The market is quotable on the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump	$1.45	....	$1.50	....	....	$2.40	$2.25
Egg	1.45	....	1.50	....	....	2.40	2.25
Nut	1.20	....	1.10	....	....	....	....
Steam lump	1.20	....	....	....	....	....	....
¾-in. lump	1.10	$1.10	1.10	$1.10	$1.10	....	....
Mine-run	1.00	1.00	1.00	1.00	1.00	1.25	....
Slack	0.75	0.80	0.60	0.65	0.65	....	....

Anthracite—Hard coal is in light demand, business negotiated being about the same as occurs in a normal summer market. The circular is being freely shaded as much as 50c. in some instances, and there is considerable coal unsold.

Coke—Coke is in practically no demand at all. Connersville is quoted at $1.75, with Semet Solvay at $2.85 and gas house $2.65 f.o.b. ovens. Local ovens have suspended operations indefinitely.

HAMPTON ROADS, VA.

Dumpings for the week fair. About normal accumulation at tidewater, total shipments for December over one million tons.

The movement from Hampton Roads during the past week has been only fair. The demand has not been so heavy owing no doubt to the holiday season and such shipments as have moved were mostly on contract business. Very little spot coal was sold during the week, and those made covered only small parcels. Bunker prices for 1914 went into effect on the first, the contract figures being the same as for 1913. In addition to coastwise shipments, principally to New England, coal has moved during the week to Coronel, Vera Cruz, Naples, St. Louis and Cristobal.

During the month of December the Norfolk & Western dumped over their piers at Lamberts Point 514,020 tons, The Virginian Ry. at Sewalls Point 267,632 tons and the Chesapeake & Ohio Ry. at Newport News, 274,734 tons. These figures show a considerable falling off in the Virginian Ry. tonnage as compared with their previous month's dumpings. The total dumpings over the three Hampton Roads terminals for 1913 amounted to 11,993,658 tons. This is the greatest amount of coal ever shipped in any one year from Virginian Tidewater, the dumpings for 1912 being a close second with 11,437,987 tons.

LOUISVILLE, KY.

Advent of winter weather stimulated buying. Curtailment over holidays created a mild shortage. Prices more buoyant.

The most disagreeable weather of the year resulted in an immediate improvement of the coal market in this section, the increased demand with the retailers being reflected at once in orders upon the wholesalers and operators. This improved demand, coupled with the usual holiday lay-off resulted in something like a shortage. Most of the available fuel on tracks was eagerly snapped up in the early part of the week, at increased prices, as compared with those prevailing a short time ago. It is apparent that stocks laid in early in the season are about exhausted and with a heavy consumption an equally steady demand is certain.

The steam market is in equally good shape; as yet the short supply available last week has not been considerably improved, owing largely to the same conditions as prevail in the domestic market. In consequence almost anything in the shape of screenings has sold readily, the lower grades being freely placed where usually only first-class Eastern Kentucky coals have been acceptable. This will probably ease up considerably with the increased production of the prepared grades, but there should be a good demand, sufficient to take care of a large and steady supply, for the remainder of the winter. The car supply has been adequate for the comparatively slight output at the mines during the holiday season; whether it will continue so when full operations are resumed is a question with the mine owners.

Prices for delivery this month are quoted at $2.15 for the better grades of Eastern Kentucky block, $1.85 for block and lump, and $1.55 for round, with nut and slack in active demand at 85 to 95c. Western Kentucky is in fairly good call at $1.25 for block, with some sales a little higher, and 65 to 75c. a ton for nut and slack.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM, ALA.

Cold weather for the last few days has had a stimulating effect on lump coal. Steam grades quiet. Blacksmith coal in satisfactory condition. Furnace and foundry coke dull. Pig iron more active.

For the past few days freezing weather has had rather a stimulating effect on lump coal, and while the operators have not yet reaped any benefit, the accumulated stocks in dealers hands and in railroad yards have been greatly depleted. A week more of cold weather will bring about a decided change for the better in lump coal; the present market is still quiet, but with a more cheerful outlook.

Steam coal shows little change over last week. The output is really in excess of the demand, as all of the mines have resumed operations since the Christmas holidays. The operators are feeling more optimistic, however, over the prospects for a good business. Blacksmith coal is normal, the

tonnage handled being about the average for this season.

Both furnace and foundry coke are still quiet, with no immediate prospects of improvement. Pig iron was considerably more active this week, a good tonnage being booked by the Birmingham manufacturers. Buying for the first quarter and half of 1914 has started, and the furnaces are expecting a most favorable year. Prices are firm at $11 f.o.b. Birmingham for 2 Foundry. The car situation has improved within the last week or ten days, due partly to the mines being closed down over the holidays.

NEW ORLEANS

Parcel shipments to Mexico and Central American points heavy. Honduras principal buyer. East Texas and west Louisiana taking more than usual. Alabama coal reaches New Orleans by water route.

Heavy parcel shipments of coal to Mexico and Central American points was the only feature in the coal market here last week. Honduras was the largest buyer. Numerous shipments were made to Costa Rica and Guatemala. Colder weather made the city demand heavy although total sales in the city are fully 30% under normal, thus far this winter.

Shipment of coal to points along the Southern Pacific Railroad and Louisiana and east Texas are much heavier than usual at this time of the year. This is due entirely to the fact that the strike six weeks ago has cut off fuel oil shipments. The dealers are buying now in a hand-to-mouth manner, so as to be able to supply their trade, but without stocking up for more than their requirements.

Two barge loads of coal have arrived from Alabama fields. These trips have not been satisfactory owing to the low stage of the Warrior and Tombigbee rivers. It is probable that no future attempts to bring coal on barges will be made until the government locks in the upper rivers have been completed. This means that the prevailing prices will continue in effect for at least a year. Introduction of water transported coal threatens to lop 50c. off the prevailing quotations.

INDIANAPOLIS

No change in trade conditions or prices. Some operators, tired of waiting for winter weather, are reported making concessions. Signs of improvement in factory demand.

January is usually a good month for the coal business but so far it gives no evidence of living up to its past reputation. However there is a light mantle of snow over most of the state and this has been a stimulant. As stocks are ample, the increased demand has not yet reached operators and mines continue to work on short schedule where they are not entirely closed down. This condition is not likely to last as retailers will soon be in the market again, unless the winter breaks the record for mildness. The less optimistic producers are reported to be shading prices, to catch such emergency orders as are available and to induce those who have made holes in their stocks to fill them up again at a bargain.

While it has been comparatively easy to get $1.90 to $2 for domestic lump, orders are now being booked mostly below these figures, perhaps around $1.80, while some sales are even reported 20 to 30c. below this. Operators point out, however, that there is considerable difference in the quality, and that the best domestic lump is still worth $1.90 to $2; and further that it is being sold at that figure. Mine-run has a range of $1.10 to $1.20 and screenings 60 to 75c. The factory demand shows signs of improvement as there is considerable preparation for getting operations back to normal again. Car shortage has been eliminated by the general slacking of operations.

Retail prices in this city still stand at the only advance made since spring, which went in effect Sept. 20. Fortunately for the yards, this raise was almost to the usual high mark for winter and was caused by the fear of not being able to get a sufficient supply of coal on account of the car shortage in September and October. Anthracite sells at $7.75@8.50, according to grade; Pocahontas at $5@6.50; Eastern bituminous, $4.75@5.50; Indiana lump, $3.50; Brazil block, $4.25 and coke, $6.50.

ST. LOUIS, MO.

Colder weather has appeared and there is a generally more optimistic tone. Steam coal in good demand.

Colder weather has brought about somewhat better conditions, and the trade seems to have an optimistic view of future conditions. While the weather has brought some demand, it has not been sufficient to make much change in prices, although there is an inclination that way.

Steam coal is in good demand, and the price of screenings is getting back to where it was last spring and summer. Carterville and Franklin County are hovering around 80c. at the mines, while Standard screenings are in good demand at 55@60c. The smaller sizes of washed coal are hard to get at any price, while the domestic grades are not moving. The better coals from the high grade field are still holding up at good prices, but there is always some tonnage of inferior coal that is under demurrage and taking whatever the market will bring. There is some demand for anthracite and a little call for smokeless, but the coke market is heavy.

The prevailing market is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.90@1.00
3-in. lump	.....	.....	$1.40	.....
6-in. lump	$1.25 @ 1.50	$2.25	1.50	1.15@1.25
Lump and egg	1.85 @ 2.15	.....	.....	.....
No. 1 nut	1.15 @ 1.40	.....	.....	.....
Screenings	0.75 @ 0.80	.....	.....	.....
Mine-run	1.10 @ 1.20	.....	.....	.....
No. 1 washed nut	1.60 @ 1.75	2.25	1.60	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....
No. 3 washed nut	1.15	.....	.....	.....
No. 4 washed nut	1.05	.....	.....	.....
No. 5 washed nut	0.50	.....	.....	.....

KANSAS CITY, MO.

Outlook much improved with the colder weather. Stocks being diminished and orders are more plentiful. Production increased.

The coldest weather of the season has prevailed in Kansas and Missouri during the past two weeks, and coal operators are more optimistic than for some time past. While dealers are not yet ordering heavily, their stocks are being diminished rapidly and the prospects are considered excellent. Many business houses which ordered as lightly as possible before their annual inventories, are now anticipating their requirements thirty or forty days.

The market, which has been weak for some time past, is showing more strength, and operators are more inclined to stand by their quotations. Most of the mines in Kansas and Missouri have taken a brace, as far as output is concerned, and are now working from one-half to two-thirds time. If the weather continues favorable, many of the mines will be worked to capacity during the next week.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during November, 1913, and the first eleven months, as compared with corresponding periods of 1912 in short tons:

	November		Eleven Months	
Coal	1912	1913	1912	1913
Tidewater, foreign	83,877	50,154	1,259,228	1,392,064
Tidewater, coastwise	239,476	269,169	3,325,067	3,474,018
Domestic	1,573,454	1,707,475	16,361,386	17,190,564
Coke				
Tidewater, foreign	.....	16	52,762	30,507
Domestic	136,912	117,791	1,282,093	1,382,572
Total	2,033,719	2,144,605	22,280,536	23,469,725

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for October, 1912-13, and for the ten months ending October, 1911-12-13, in long tons:

	10 Months			October	
Imports from:	1911	1912	1913	1912	1913
United Kingdom	7,418	4,864	5,259	802	662
Canada	817,081	1,169,702	897,489	119,308	69,476
Japan	9,271	20,718	89,115	490	10,040
Australia and Tasmania	164,623	140,502	141,578	31,577	20,192
Other countries	355	2,105	3,296	80	480
Total	998,753	1,837,891	1,136,737	152,257	100,850
Exports:					
Anthracite	3,016,127	3,032,691	3,598,343	431,060	425,341
Bituminous,					
Canada	8,933,044	8,907,968	11,662,469	1,141,770	1,378,471
Panama	417,476	396,227	419,680	33,950	32,098
Mexico	418,479	256,657	417,262	17,255	19,509
Cuba	853,834	943,262	1,111,573	91,873	128,181
West Indies	447,357	563,948	524,260	57,324	59,615
Argentina	.....	.....	61,877	.....	6,000
Brazil	.....	.....	241,099	.....	30,054
Uruguay	.....	.....	5,163	.....	.....
Other countries	573,733	1,237,714	1,100,273	70,111	95,765
Total	11,643,931	12,395,776	15,543,656	1,412,483	1,749,693
Bunker coal	5,583,497	6,151,280	6,483,020	655,561	719,436

Financial Department

Virginia Iron, Coal & Coke Co.

President John B. Newton reports in part, for the year ending June 30, 1913, as follows:

Results—Although the year 1912-13 started out full of encouragement, the demand for iron had by Dec. 31 fallen off, prices dropping until in May 1913 the low level of 1911 was reached. The market remained through June and July; today, while it is by no means strong, there is a better feeling and indications point to more demand and better prices. During the few months of active market we booked sales of 230,000 tons of iron, at fairly remunerative prices.

The blast furnaces at Radford and Roanoke were operated continuously and the Pulaski furnace for six months of the year, producing a total of 130,435 tons of coke iron, while the charcoal furnace at Foster Falls turned out 2912 tons of cold-blast charcoal iron. On June 30, 1912, we had 163,826 tons of pig iron on hand; on June 30, 1913, only 60,000 tons, we having shipped from current make and out of stock a total of 237,608.

Our coal business has continued to grow, both in volume and profit. The mines produced 1,840,213 tons, at a profit of $353,655, as against 1,563,284 tons at a profit of $309,419 the preceding year. At Toms Creek (your largest operation) the most modern all-steel tipple obtainable should be completed by Oct. 1 of this year, substantially increasing production.

Exchange of Coal Lands—We have concluded negotiations with the Clinchfield Coal Corporation for the exchange of certain interlocking coal lands in Wise County, Va., making it practicable to mine the maximum amount of coal with the least possible waste.

Bonds—We have retired by purchase $21,000 additional of our first M, bonds, costing $19,959, and 21 Carter Co. bonds, costing $22,143.

Financial—We have been able, through the reduction in our stock of pig iron, to reduce bills payable $764,000 and increase our sales ledger balances $398,589 and our bills receivable $57,000, and in addition to purchase from the Inter-State Coal & Iron Co. for $187,500 the coal property, in fee simple, formerly covered by our Inman lease, and known as Inman mines. We purchased during the year new equipment amounting to $60,000 and real estate amounting to $30,000.

Purchase—The Inman purchase was of especial importance to us since during the lease we had expended over $200,000 in the construction of 175 coke ovens, 179 dwelling houses for miners, storehouses, etc., all of which would have had to be removed or disposed of on the expiration of the lease. The property still contains from 3,000,000 to 4,000,000 tons of minable coal, upon which, under the lease, we would have had to pay 10c. per ton royalty as same was mined. Now that we own this property, we confidently expect to save enough royalty on coal mined to pay the interest and principal on the purchase price, leaving the improvements available for use at our adjoining Linden mines.

Depreciation—The plants and equipment have been fully maintained, there having been charged against operating expenses for depreciation of plants, equipment, ore lands and coal lands, a total of $318,292, while additions and permanent improvements aggregated $149,503.

INCOME ACCOUNT

	1912-13	1911-12	1910-11	1909-10
Net earnings from oper...	$581,830	$278,517	$336,235	$517,879
Farms and farm remtals..	16,145	9,822	6,187	7,856
Misc., mdse., dis., etc....	18,922	23,820	29,318	33,147
Total net income.....	$616,897	$312,159	$371,740	$558,882
Deductions—				
Taxes.....	$57,337	$57,069	$50,500	$49,280
Bond interest.....	262,688	264,513	265,638	267,082
Insurance.....	28,191	23,792	22,348	19,602
Expenses of idle plants...	71,439	65,490	51,758	151,202
Deprec'n of idle plants...	126,359	91,155	60,691	.....
Depr'n of active plants ..		29,048	53,594	65,270
Interest and discount....	103,160	112,809	90,519	73,146
Dead rents and contracts.	2,674	13,111	14,190	39,457
Miscellaneous.....	302	168	245	399
Development.....	2,838	28,044	25,044	23,371
Total deductions.....	$654,988	$685,199	$634,527	$688,809
Loss for the year.....	$38,091	373,787	262,787	129,927

Operating accounts were charged during the year with $318,292 for depreciation, viz.; Depreciation of coal lands, $100,708; deprec. of ore lands, $3,749; deprec. of impts. to leased properties, $62,772; deprec. of impts. to owned properties, $151,064; also with furnace repairs, $33,347.

There was spent $149,503 during the year for improvements to owned and leased properties, viz., impts. to owned properties, $126,792; impts. to leased properties, $22,712; repairs to furnaces, $109,855.

BALANCE SHEET JUNE 30

Assets	1913	1912	Liabilities	1913	1912
Real est. and plant.....	$12,595,009	$12,632,985	Capital stock.	$10,000,000	$10,000,000
Equipment...	411,147	352,114	First mtge. bonds.....	4,835,000	4,856,000
Sec. owned...	197,363	230,663	Prior lien bonds.....	398,000	419,000
Sales ledger bal.....	747,169	348,580	Unpaid vouchers...	251,806	219,162
Bills rec'v'ble.	104,142	43,862	Unpaid pay-rolls.....	89,132	69,503
Cash.....	57,346	167,456	Accounts payable.....	9,850	10,123
Materials.....	1,753,755	3,026,517	Bills payable..	1,522,056	2,286,056
Miscellaneous.	95,401	124,269	Interest accrued.....	85,292	86,104
Profit and loss	1,229,804	1,039,502	Furnace - repair fd.....	.....	20,000
Total.....	$17,191,136	$17,965,948	Total.....	$17,191,436	$17,965,948

EARNINGS FOR YEAR ENDING JUNE 30

Operation of	Year 1912-13 Gross	Year 1912-13 Net	Year 1911-12 Gross	Year 1911-12 Net
Furnaces.....	$1,986,679	$185,828	$1,019,840	def.$29,095
Foundries.....	102,555	1,182	70,591	def. 11,670
Coal mines.....	1,616,465	353,655	1,378,802	308,419
Coke ovens.....	444,729	35,861	242,567	2,854
Saw mills.....	296	.....	83	.....
Grist mills.....	180,539	5,304	181,331	8,009
Total.....	$4,331,263	$581,830	$2,893,214	$278,517

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Jan. 3.

Stocks	Week's Range High	Week's Range Low	Week's Range Last	Year's Range* High	Year's Range* Low
American Coal Products.....	80	87	80	87	80
American Coal Products Pref.....	..	..		109½	105
Colorado Fuel & Iron.....	29	27⅞	28½	41½	24½
Colorado Fuel & Iron Pref.....	....	....		155	150
Consolidation Coal of Maryland.....	....	....		102½	102¼
Lehigh Valley Coal Sales.....	190	175	175	....	....
Island Creek Coal Com.....	48½	48	48	53½	47
Island Creek Coal Pref.....	85	83½	85	85	80
Pittsburgh Coal.....	18⅜	17⅞	17⅞	24⅜	14½
Pittsburgh Coal Pref.....	86⅝	86⅝	86⅝	95	73
Pond Creek.....	19	18⅜	18⅝	23¾	16½
Reading.....	170½	166½	167⅜	171	151⅜
Reading 1st Pref.....	88	87½	88	92½	82½
Reading 2nd Pref.....				95	84
Virginia Iron, Coal & Coke.....	..	..		54	36

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's* Range	
Colo. F. & I. gen. s.f.g. 5s.....	90⅛	91⅛	91¼	Dec. '13	90	99⅛
Colo. F. & I. gen. 6s.....	102	106½	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu.....	78	Sale	78	78	75	85
Cons. Ind. Coal Me. 1st 5s.....	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s.....	..	88	87⅜	Dec. '13	87	87¾
Gr. Riv. Coal & C. 1st g 6s.....	..	..	102½	April '06	..	..
K. & H. C. & C. 1st s f g 5s.....	92½	..	92¼	Dec. '13	91	98
Pocah. Con. Coll. 1st s f 5s.....	..	85½	86	Oct. '13	85	87½
St. L. Rky. Mt. & Pac. 1st 5s.....	76	77	77	77	73	80½
Tenn. Coal gen. 5s.....	97⅛	Sale	97⅛	97⅛	96	103
Birm. Div. 1st consol. 6s.....	101	102½	100⅜	101¼	100⅝	103
Tenn. Div. 1st g 6s.....	100⅜	101½	101½	Dec. '13	99	102
Cah. C. M. Co. 1st g 6s.....	..	..	103	July '13	103	103
Utah Fuel 1st g 5s.....	..	..	..	..	..	..
Victor Fuel 1st s f 5s.....	..	84	80	May '13	79½	80
Va. I. Coal & Coke 1st g 5s.....	92½	Sale	92½	92½	92	98

*For the full year 1913.

DIVIDENDS

Central R.R. of New Jersey—Regular quarterly dividend of 2% payable Feb. 2 to holders of record Jan. 23, also an extra of 2% payable Dec. 30 to holders of record Dec. 24.

Delaware, Lackawanna & Western Coal—Regular quarterly dividend of 2½% payable Jan. 15 to holders of record Dec. 31.

The Bond County Coal Co. (Illinois)—This company has recently offered $120,000 first mortgage, serial, 6% sinking fund, gold bonds. The total authorized issue is $500,000, the balance above that now offered being reserved for the acquisition of additional coal lands at a rate not to exceed $10 per acre.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

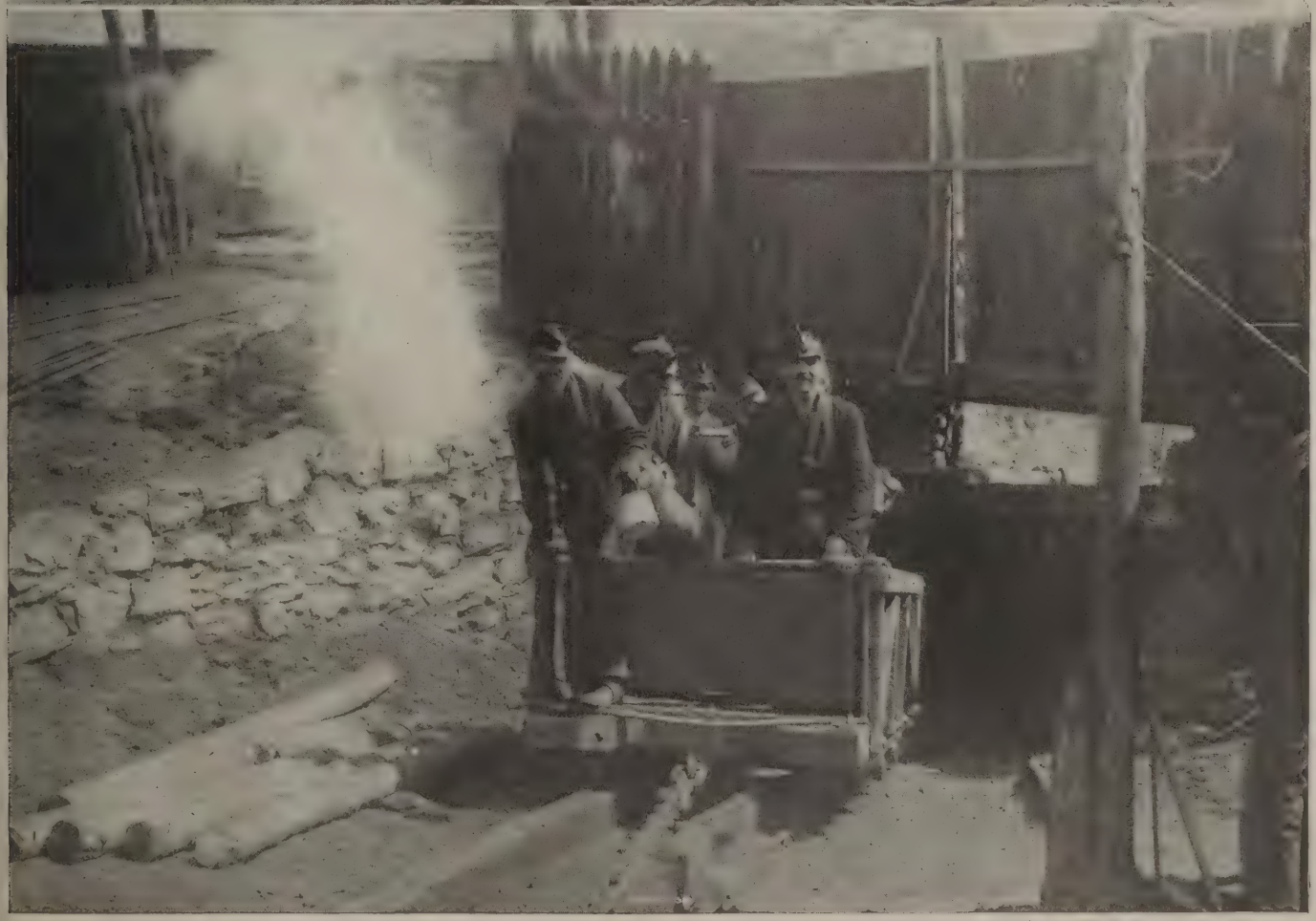
Volume 5, No. 3
Issued Every Saturday
Hill Publishing Company

NEW YORK, JANUARY 17, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



After the Day's Work in an Anthracite Mine



18 Fifty-Ton Railroad Cars Loaded In a Day With One Baldwin-Westinghouse BARSTEEL Electric Mine Locomotive



understood the business
ground up.

MOTORMAN ESTABLISHES RECORD AT SCALP LEVEL

SPECIAL TO JOHNSTOWN DEMOCRAT.

SCALP LEVEL, Sept. 19—What is believed to be the highest record ever made in any section was made today in No. 1 mine of the Scalp Level Coal Mining company, one of the John Lochrie operations, when 18 steel cars were loaded by one motorman. The motorman who made the record output was Victor Gustasson. The foreman at No. 1 is William B. Wilson.

Eighteen steel cars of coal loaded in a single day with but one motorman is the highest run that has ever been made in this vicinity and it is believed that it has never been equalled anywhere.

Pure ... stamps needed ...

On this particular day they worked exactly nine hours and forty-five minutes. The only haulage equipment used was an eight-ton Baldwin-Westinghouse **Barsteel** Electric Locomotive, equipped with commutating-pole motors.

This locomotive, except for a few mine cars hauled from a dip from a point in the heading by a mule, did all the work, gathering the coal cars and hauling the same to the tipple.

When they stopped work in the evening the locomotive was inspected and found to be in first-class condition, in spite of the heavy work it performed. The motors were nearly as cool as when started in the morning.

Twelve mine cars, each loaded with two tons of coal, were hauled on each trip. The longest haul was made about 2500 feet from the face of first left to tipple and about the same distance from face of main heading to tipple. At two points in the mine for a distance of 400 feet the grades are 1½% against the loads.

Thirty-six trips were hauled, and it is estimated that at least two minutes were lost on each trip on account of the motor man waiting for empty cars outside.

There was no extra effort made this day to make a record. It was only an ordinary day's work, and it is believed that if they would make an extra effort, for any one day, this Baldwin-Westinghouse **BARSTEEL** Locomotive could gather and haul sufficient coal to at least load twenty-four steel cars.

Full information about Baldwin-Westinghouse BARSTEEL Electric Mine Locomotives can be obtained by addressing either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.



A view of the Mines, the Motorman, and the Baldwin-Westinghouse BARSTEEL Locomotive which made this record.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JANUARY 17, 1914 NUMBER 3

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 113

The Coal Miner. Poem by Berton Braley.

TRADE UNIONS AND THE LAW: *Pages* 114-115

The suggestion is made that regulation of combinations is far better than prohibition of such bodies. An anti-combination law against wage earners would be unjust.

PROGRESS OF COAL BRIQUETTING: *Page* 115

*UNDERGROUND CONCRETE PROTECTIVE WORK IN ILLINOIS MINES: *Pages* 116-119

Detailed description of an unusually elaborate undertaking in mine concreting on the part of the Madison Coal Corporation. Steel I-beams, reinforced-concrete and concrete blocks were used according to varying conditions and loads. The application of concrete to underground conditions has not become sufficiently general yet to evolve the customary rules and formulas. The work here described is of particular interest in view of the fact that it has stood the test of time. G. E. Lyman. COAL AGE, Vol. 5.

PENNSYLVANIA BITUMINOUS OPERATORS HOLD STORMY SESSION: *Page* 120

COMMITTEE ON COAL AND COKE: *Page* 120

HAILWOOD LAMP APPROVED BY BELGIAN GOVERNMENT: *Page* 120

*MINE DRAINAGE BY COMPRESSED AIR: *Page* 121

RECENT LEGAL DECISIONS: *Page* 121

DISCUSSION ON RETARDING VENTILATION WHEN FIRING: *Pages* 122-125

Explosion in a strong current of air—an incident. Reason for slowing down the fan before firing. Conditions and practice in Illinois mines discussed. History of the theory of retarding ventilation. A remarkable experiment in a Kansas mine. Effect of the supply of oxygen in mine workings. Effect of the size of mine openings. Study of the theory by the Bureau of Mines. COAL AGE, Vol. 5.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 140

COAL AND COKE NEWS: *Pages* 141-144

*SOME DETAILS OF MINING METHODS: *Pages* 126-129

Explains the difficulties in drawing pillars after they have been allowed to stand, and details some of the precautions which should be taken to obtain safety and maximum recovery. A preliminary statement showing the defects of the room-and-pillar methods, such as are quite frequently adopted. W. H. Grady. COAL AGE, Vol. 5.

*LOADING AN OLD SLACK PILE: *Pages* 129-130

F. W. Whiteside. COAL AGE, Vol. 5.

COAL-MINING INSTITUTE OF AMERICA: *Page* 130

MINE EXPLOSION IN ALABAMA: *Page* 130

EDITORIALS: *Pages* 131-132

Looking Ahead—Kincaid—The Labor Union—Uniformity in Reports of State Mine Inspectors.

SOCIOLOGICAL DEPARTMENT: *Pages* 133-134

*PEABODY'S NEW COAL TOWN IN ILLINOIS:

F. S. Peabody and S. Insull are building a model town for coal miners and others at Kincaid, Ill. The builders planned their town with the help of John Mitchell, formerly president of the United Mine Workers of America. COAL AGE, Vol. 5.

DISCUSSION BY READERS: *Pages* 135-138

Results in Discussion. Letters Nos. 1 and 2—Collapsible Stoppings. Letters Nos. 11 and 12—Starting a Fan after Explosion. Letter No. 9.

*STUDY COURSE IN COAL MINING: *Page* 138

INQUIRIES OF GENERAL INTEREST: *Page* 139

Organic Sulphur in Coal—Rope Lubrication—The Mining Expert.

COAL TRADE REVIEWS: *Pages* 145-150

ADVERTISING INDEX: *Page* 26

CIRCULATION OF THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers

Advertising Keeps Prices Down

The Weekly Ad-Talk Page

"Go 'long"—you say, "prices haven't been doing anything but going up since the original Wise Dutchman bought Manhattan Island for $24 with a bottle of 'schnaps' thrown in for good will."

Right—but they haven't been going up as fast as they might, or as they would have gone had it not been for certain restraining factors.

When everybody lived on a farm, churned his own butter, smoked his own hams and, in between times, the women folks made home-spun, selling cost and cost of distribution didn't cut much figure. But today these two latter are big factors in determining the price you pay for your goods.

Anything that reduces selling cost and cost of distribution reduces selling price. *Advertising reduces selling costs—and you get the benefit.*

A page ad in Coal Age costs anywhere from forty to sixty-five dollars. It goes into every nook and corner of the coal mining world—into the hands of thousands of men who influence the purchase of mining equipment and supplies, just how many more than the actual circulation of the paper it is impossible to figure.

How much would the manufacturer have to pay to send his story to the same places via two-legged salesmen? No—how much would *you* have to pay?

Then, too, advertising has been, and still is, the very heart and life of competition. And, invariably, competition spells low prices, monopoly, high.

Read the ads and reap the benefits!

COAL AGE

Vol. 5 NEW YORK, JANUARY 17, 1914 No. 3

The Coal Miner

By Berton Braley

Written Expressly for Coal Age.

I

The engineer lays out the mine
An' tells just where the workin's goes,
An' when it comes to rule an' line
I guess he knows, I guess he knows,
The super'ntendent runs it all,
He's boss of every part an' whole,
But just the same I gets the call,
For I'm the guy who digs the coal!

II

The breaker boys, they does their share,
The pumpman does his duty, too,
An' then there's them that gives us air
An' hoists us up when we are through,
An' them that hauls the coal away,
An' them that keeps the workin' roll,
But don't forget ME, partner, say,
For I'm the guy who digs the coal!

III

It's me that drills where roofs is low,
Often lyin' on my side,
Until my body's achin' so
That nothin' keeps me there but pride,
It's me that takes the chance of damp
Or pickin' in a loaded hole,
It's me that wears the miner's lamp,
For I'm the guy who digs the coal!

IV

It's coal that makes the engines run,
It's coal that drives the ships at sea,
That gets the great world's labor done
An' warms the homes of you an' me,
It's coal that gives the strength to steam
An' I'm the grimy human mole,
That brings it out of vein an' seam,
Yes, I'm the guy that digs the coal!

V

They pats me on my sweatin' back
An' tells me I'm a high-class guy,
Although my face with dirt is black
An' I got coal dust in my eye,
But though they smile an' grin an' smirk
An' tell me I'm a "noble soul,"
I know my job is damn hard work,
For I'm the guy who digs the coal!

Trade Unions and the Law

By Henry R. Seager

SYNOPSIS—The suggestion is made that regulation of combinations is far better than prohibition of such bodies. An anti-combination law against wage earners would be unjust.

An incident of the present Colorado strike—the indictment of officials of the United Mine Workers by a Federal Grand Jury in Pueblo—again brings to the fore the relation of unions to the Sherman anti-trust law.

No single action of President Wilson has called forth more criticism than his approval, last June, of the sundry civic bill. This provided, among other things, that no part of the $300,000 appropriated for the enforcement of the anti-trust law should be used for the prosecution of labor organizations.

That such a method of limiting the activities of the Department of Justice was highly objectionable, few will deny. It does not appear, however, that the President was responsible either for the inception or for the execution of the plan. To avoid the necessity of changing—perhaps with serious consequences—a carefully prepared legislative program, he signed the bill in the exact form in which it had been passed by the previous Congress. He took pains, however, to qualify his approval by declaring that if it were possible for him to veto the "proviso," without vetoing the whole measure, he should unhesitatingly do so. Also, he pointed out that other funds at the disposal of the government made the limitation as regards this particular appropriation of no practical importance.

More important than the proper apportionment of praise and blame between the President and Congress for the legislation criticized, is the question whether the exemption of labor organizations from the operation of the anti-trust act is itself justifiable or desirable. Congress seems clearly disposed to accord such exemption. In the daily press the only intelligible reason given for this determination is the growing influence of the labor vote. If this were in truth the only motive behind the proposed policy, Colonel Harvey's declaration that the country seems destined soon to "face a determined struggle for class domination whose outcome every patriotic citizen must contemplate with the gravest foreboding" would seem fully warranted. But are there not better reasons for excepting labor organizations from the condemnation of the Sherman law than the fact that labor leaders in and out of Congress desire it?

Sherman Law Should Not Be Applied to All Combinations in Restraint of Trade

That the anti-trust act should not be applied indiscriminately to all combinations in restraint of trade is now generally agreed. After a good deal of hesitation, the Supreme Court of the United States has itself come to that conclusion, although it has not yet clearly indicated what the basis of discrimination, beyond the vague "rule of reason," is to be. Combinations of producers, using unfair methods to build up monopolies and then using their monopoly powers to extort unreasonably high profits from scattered and unorganized consumers, must certainly continue to fall under the condemnation of the law. From this class of clearly obnoxious and unlawful combinations there is a gradual gradation of combinations, like those of Western fruit growers attempting to maintain fair prices for their products in Eastern markets, which all would approve.

Shall we wait for the Supreme Court to work out a satisfactory classification of combinations, condemning the objectionable and upholding the "reasonable" or are there certain principles of condemnation which Congress may itself advantageously apply? I believe that there is one such principle that may at once be applied and that justifies the proposal to accord special treatment to labor organizations—a principle that has been embodied in English law since 1875 and that seems to have operated there in a way that has given general satisfaction.

Amid the complexities of the combination movement two distinct sets of economic relations are clearly separable. One concerns the dealing between the producers and consumers, or the sellers and buyers, of commodities; the other the dealings between employers and employees. Referring to the latter the British Conspiracy and Protection of Property Act of 1875 declared that in connection with trade disputes no agreement or combination to do, or to procure to be done, any act "shall be indictable as a conspiracy if such act committed by one person would not be punishable as a crime." In other words, combinations of wage-earners or of employers concerned with the questions of wages, hours, etc. that arise between them were expressly relieved from the condemnation which the common law applied to "combinations in restraint of trade."

British View Was That Combination Was Beneficial

It was believed that in this field combination instead of being an evil was on the whole beneficial. Wage-earners should be encouraged to combine—"trade union acts" were passed by the same Parliament—since combination was necessary to the protection of their interests. By combining on their side, employers could easily protect themselves from excessive demands on the part of the labor combinations. They should be allowed to combine with equal freedom. The interest of the public would, it was thought, be sufficiently safe-guarded if individuals were held to strict responsibility for their individual acts, the added penalties applying to conspiracies becoming operative only when the acts committed by combinations were in themselves criminal.

This cannot fairly be characterized as class legislation. The exemption applies as well to combinations of employers in connection with trade disputes as to combinations of employees. It is merely a recognition of the fact that the relations between employers and employees present one phase of the combination movement; the relations between producers and consumers, sellers and buyers, a different phase.

The proposal to exempt labor organizations from the operation of the anti-trust act is an application of this same principle. In its practical operation the anti-trust

Note—From "The Survey," Jan. 10, 1914.

act has frequently been applied to labor organizations; never, so far as I am aware, to employers' associations. Because it has never been turned against employers' associations, it has been assumed, perhaps too hastily, that they do not now come under the law. Those who advocate the exemption of labor organizations may easily clear their proposal of the charge of involving class legislation by following the example of the British parliament and causing the exemption to apply alike to employers' associations and labor organizations in respect to their mutual relations. This is what is really aimed at. The exclusion of employers' associations, which has been tacitly assumed, should be expressly added if labor organizations are to be excluded.

There are several arguments that may be urged in favor of this change. The anti-trust law has been held to prohibit the use of the boycott. There seems no reason, so far as the argument runs, why it should not also be held to prohibit the strike. Strikes certainly present combinations engaged in restraining trade as clearly as boycotts. But such an extension would bring our federal law back to the stage of development in which state laws were in the first quarter of the last century. Strikes and boycotts are to be deplored, no doubt; but does not the path of progress lie through developing combinations on both sides and arrangements for collective bargaining, conciliation and arbitration, that will make a resort to these weapons unnecessary? This is the well-nigh unanimous view of economists.

Capitalistic Combinations and Labor Organizations Are Quite Different

The normal procedure under the anti-trust act is a dissolution suit carried on at the instance of the government. Does anyone seriously advocate the dissolution, through judicial order, of our larger labor organizations? The American Federation of Labor has often been the target of attack for embittered employers, but, so far as I know, no one has gone so far as to petition the government to dissolve it, and for obvious reasons. This fact alone shows how different is the problem presented by the great capitalistic combinations and by labor organizations. The remedy that is applied as a matter of course to the one is not even thought of in connection with the other.

Finally, there is good ground for urging that the present law operates unfairly. The fact that it has not yet been invoked against a single employers' association, though frequently applied to labor organizations, is indirect evidence of this. Without any special machinery or publicity employers may readily come together, with business management concentrated as it now is, to agree on common policies with reference to employees. The political activities of the National Association of Manufacturers, revealed through the recent congressional inquiry, shows how far such associations may sometimes go without arousing suspicion of their purposes or methods. Thus effective combinations in restraint of trade may be maintained on the employers' side without attracting attention or giving rise to evidence that might later be utilized in legal actions.

The same is not true of wage-earners. Combined action for them means coming together in public meetings, publishing information in labor papers that may be widely read; in short, advertising as widely as possible what they propose to do and the means they propose to use in doing it. It is easy to prove the existence of the combination, if it amounts to anything. The consequence is that an anti-combination law may be enforced with little effort against wage-earners, scarcely at all against their employers. Feeling the injustice of this situation and their helplessness, the more hot-headed and ill-balanced among wage-earners are only too apt to turn to secret and lawless methods that are socially much more deplorable than any number of strikes and boycotts conducted openly and with proper regard for the public peace.

In this situation, not prohibition of combinations in connection with trade disputes, but regulation applied impartially to both sides by competent administrative officers would seem to be what is needed. If this should prove a first step toward the substitution of regulation for indiscriminate prohibition for combinations of all sorts, so much the better.

Progress of Coal Briquetting

By R. Schorr*

The increase in the world's coal output since 1900 amounts to over 62.4 per cent., which has been due mainly to the United States and to Germany, while the gain of Great Britain is but 14 per cent.

The production of coal briquettes has risen from 4¾ million tons in 1885 to 33 million tons in 1913 (36,366,000 sh. tons), equal to an increase of about 595 per cent. The rapid growth of the German lignite- (brown coal) briquetting industry has been mainly responsible for this, having furnished in 1912 over 19,050,000 metric tons. The total production of Germany in that year was 25.7 million metric or about 28.3 million short tons, equal to almost 78 per cent. of the world's output.

Belgium, France and England combined, manufactured 5.5 million metric tons, leaving for the balance of the world approximately 1.8 million metric tons.

Incomplete returns for 1913 indicate that the "official" briquette production of the German empire will be over 26.7 million metric tons, and allowing, conservatively, 1.3 million tons for the unlisted plants, which are operated by coal dealers, a total of 28 million metric tons (30,856,000 short tons) can be safely expected. England and France will also show gains, so that the briquette output of the world will probably reach 35.5 million metric tons, or 39,120,000 short tons in 1913.

There are about 600 briquetting plants in the world, employing close to 600 presses on bituminous coal and anthracite, and between 1400 and 1500 presses on lignite. Over 80 per cent. of the installations are in Germany.

The history of briquetting in the United States forms a marked contrast with the development of most of our other industries. Over 40 plants have been built, but less than half of this number is still in existence. The reported output was 218,443 short tons in 1911, and 230,064 short tons = 199,597 metric tons in 1912. There will be, however, a very material increase in 1913, due to the new plant at Berwind.

*San Francisco, Calif.

Underground Concrete Protective Work in Illinois Mines

By G. E. Lyman*

SYNOPSIS—Detailed description of an unusually elaborate undertaking in mine concreting on the part of the Madison Coal Corporation. Steel I-beams, reinforced concrete and concrete blocks were used according to varying conditions and loads. The application of concrete to underground conditions has not become sufficiently general yet to evolve the customary rules and formulas. The work here described is of particular interest in view of the fact it has stood the test of time.

Some few years ago the Madison Coal Corporation came in possession of the mine at present known as its No. 9 operation, its acquisition being incidental to an extensive coal land deal in Williamson and Franklin Counties, Ill. The property had been opened up by a local company whose limited capital, and mistaken ideas of economy, prevented their incurring the small additional expense necessary to obtain competent engineering supervision at that critical stage of development. The result was that the shaft pillars were robbed to such an extent, and so many openings made immediately around the bottom, that most energetic measures on the part of the new owners were required to save it.

The mine operates in the No. 6 seam, according to the Illinois Geological Survey's most recent nomenclature. The coal has an average thickness of 9 ft., the upper 18 in. of which is ordinarily left in during mining for roof protection; it is recovered as each working place is finished. Above is a shale and soft limestone roof, which disintegrates rapidly on exposure to the air and above this is the clay and soil, the total depth of cover being about 110 ft. Below the coal is from 6 to 18 in. of fireclay, resting on limestone. The presence of this limestone bottom so near the base of the coal, alone made it possible for the present owners to save the property from the destruction which would otherwise inevitably have followed as the result of the methods used in the original development.

*Mining engineer, the Madison Coal Corporation, Glen Carbon, Ill.

The Inadequate Pillars

As will be noted on the accompanying illustration the pillars between the main bottom and the north run-around range from 10 to 17 ft. in thickness. About 60 ft. east of the hoisting shaft on each side of the run-off for the empties, these pillars feathered out to narrow points, and were beginning to take weight so rapidly that the crushing of the coal could be readily observed. At the narrow edges of the pillars immediately north of and adjoining the hoisting shaft, the same crushing commenced, and the roof fell to such a height immediately adjoining the shaft as to endanger the timbering. Crushing of the coal also occurred near the pump room, where considerable gouging of the pillar had been done in an apparently aimless attempt to connect the two shafts below.



Iron Form for Blocks of Concrete Arch. Finished Blocks in the Background

Both run-arounds, where the empty trips are made up, had been depressed to give gravity operation for the empties, and the clay thus exposed to the air had crumbled away rapidly, leaving the face of the rib unsupported. In consequence of this, serious rashing of the coal occurred, although normally this coal will stand any length of time, and carry any weight below its crushing load without signs of rashing. I have observed workings abandoned twenty years in this field, where the pick marks of the original entry driving were plainly visible. The result of this serious rashing had been to widen the openings, allow the top coal to break, and by exposing the roof to the action of the air, had caused destructive and dangerous falls.

It will be apparent from foregoing that there were three distinct conditions to be provided for, each with its own individual remedy, as follows:

First—Protection of the base of the ribs where the fireclay had been eaten out from beneath.

Second—Protection of the roof at high falls.

Third—Most difficult and important of all, the reinforcement and strengthening of the pillars where the coal had commenced to crush through excessive roof pressure.

The first item was a comparatively simple matter to handle, and was effected in the manner indicated in the accompanying drawing. The loose and decomposed clay was removed, the excavation carried down to rock, and concrete placed as shown in the sketch, being carried up over the base of coal about one foot, and given a crown of 8 in., with a batter of one in four. The further disintegration of the fireclay thus being effectively stopped, and that already lost being replaced with a material

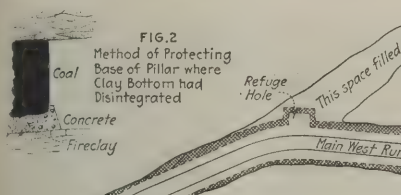


FIG.2 Method of Protecting Base of Pillar where Clay Bottom had Disintegrated

FIG.1 Plan of Bottom Showing Extent of Protective Work Near Hoisting Shaft

FIG.3 General Method of Placing I-Beams where Coal Ribs were in Good Shape. Where Necessary The I-Beams were Placed on The Concrete Walls

FIG.4 Detail of Concrete-Block Arch

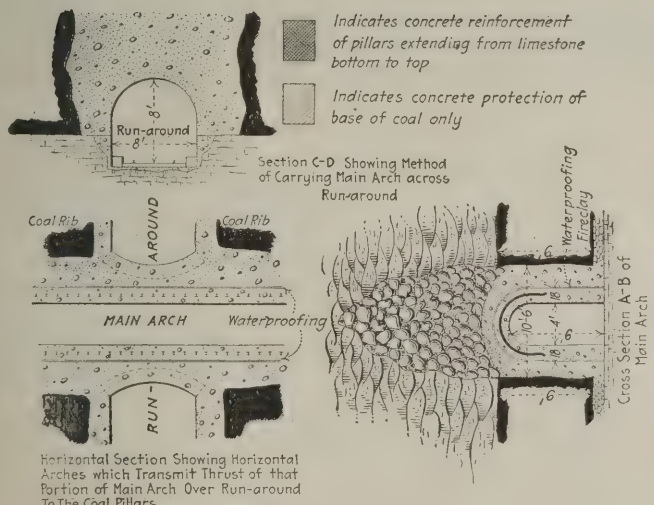


FIG.5 Sectional Views of Concrete Arch at Bottom Alongside Hoisting Shaft.

Details of Construction Used

strong enough to carry the weight, no further trouble from that source was experienced.

Steel I-Beam Roof Supports

The second item, roof protection, was handled in ordinary instances by using steel I-beams, of size and weight varying with the span, spacing them on 3-ft. centers. Where the ribs were in good shape the beams were mounted in hitches, which were then filled with concrete, giving them a solid bearing and effectually preventing them from turning. The beams were covered with 3-in. creosoted oak lagging, and the space between the lagging and roof filled with rock and clay, tamped tight. Experience has demonstrated that by thus shutting the air off the roof, there is little likelihood of further falling, and an excessive weight seldom comes on the beams. In cases where the rib was shattered, or out of line, concrete walls resting on the rock were resorted to. Fig. 3 illustrates the general construction employed.

The exact computation of the load eventually coming on beams under such conditions is manifestly an impossibility. It was decided to use beams which possess about a third more strength than that of an oak timber of the size which experience under similar conditions would lead to be selected for the same service. This strength of beam was figured as being based on the standard section, and in placing the order for the steel, beams of the same depth, but with a somewhat heavier web, were specified. The employment of this extra metal in the web (the critical part for this service) has the practical result of increasing the factor of safety and providing to some extent for unforeseen overloads, and the extra cost may be regarded as insurance against undue weakening through corrosion, a certain amount of which cannot be avoided during a long-lived mine, despite regular painting.

Where necessary to cross openings, such as other haulage ways, girders made of two or more heavy I-beams bolted together were employed. These girders were calculated for a strength sufficient to allow of doubling the number of I-beams carrying the roof, if ever such an emergency should arise, without exceeding the safe load on the girders.

Concrete Blocks

The entire empty side of the shaft bottom was treated in this manner, as well as the passage way between the two shafts, and a considerable portion of both run-a-rounds. No trouble has been experienced with any of this work, and it gives every indication of having permanently remedied conditions.

The roof of the west split for a distance of 200 ft.

from the bottom of the air shaft had fallen so high, and conditions indicated the probability of such an excessive load coming on whatever protection might be installed, that it was decided to use a concrete-block arch. Fig. 4 shows the dimensions of the arch and its individual blocks, and the manner of placing same in the entry. Forms were made of iron, accurately shaped according to plan, and the blocks made on the surface, where they were allowed to set thoroughly before taking below. A



I-Beams and Creosoted Oak Lagging during Erection

concrete consisting of one part portland cement, two parts sand, and four parts limestone, crushed to from ¼-in. to ¾-in. size, was used. The partitions in the form were so arranged as to allow of breaking joints as the successive rings of the arch were put in place below. As the blocks came from the forms, those in each set were numbered, so they might be erected again in the same order. Inasmuch as the perfection of the arch depends so greatly on the nicety of finish of the radial joints, great care was taken to have the planes leave the forms with a true and smooth surface.

The erection below was comparatively simple, though at times surrounding conditions made the work difficult, as well as dangerous. Where possible, continuous hitches were cut in the solid rib for the abutment blocks, and where necessary, concrete walls and foundations were employed. Portable wood centers were erected, and the numbered blocks laid in order on them. When four to six rings had been laid, the joints were grouted from above with cement mortar and pointed on the lower side, the centers moved ahead and operation repeated. Experience has shown, however, that the arch would stand apparently as well without grouting the joints as with it. The space above the arch was packed in tightly with rock and dirt to the roof.

The entire thrust of the arch being resisted by the solid pillars, its only chance of failure would be through crushing, which contingency, with a well prepared 1:2:4 mixture, is extremely remote. Before applying this method in coal that has any tendency to rash, concrete walls would have to be built along the rib to carry the load.

The accompanying halftones show a set of blocks in the form, which has been stood up to secure a better view, as well as several sets of finished blocks piled up to season before taking below. Another view shows the method of placing the blocks on the portable wood centers, and the method of filling in above, while a third shows a section of the finished work*.

*Some of these photos have already been published in previous articles (see "Coal Age," Vol. 4, pp. 619 and 640) on the Madison Corporation and also in "snap shots" (see Vol. 4, p. 813) and so have been omitted here.—Editor.

Renewing Pillars and Miscellaneous Details

The third item, strengthening the pillars where the coal had commenced to crush and break, was handled by filling in with solid concrete wherever possible. Concrete walls were run along the ribs, ranging in thickness from 18 in. to as much as 6 ft. in some extreme cases. The shaded portions of the bottom plat, Fig. 1, indicate the extent of this work, and will give a fair idea of the general conditions which had necessitated such an amount of this protection. One, two and four concrete, on account of its great crushing strength, was used in all this work. It was placed on the limestone bottom, and carried to the roof, at the same time furnishing support for the I-beams.

The especially bad place immediately north of the



Concrete Block Arch and Portable Wood Centers

hoisting shaft presented unusual difficulties, as it could not be filled in solid on account of being an indispensable passage way, while crossing it at right angles was the north run-around. It was decided to use here a solid concrete arch, of massive proportions, sufficient in strength to carry the dead weight of the entire strata above, if necessary; at this particular place the weight of cover over the coal is estimated at approximately six tons per square foot.

In Fig. 5 are sections of this piece of work, which really consists of three separate and distinct arch-elements. The main arch, with a clear passage way of 4 ft., begins at the north edge of the shaft, and extends across the run-around, and about 10 ft. on the other side to a firm anchorage in the pillar. Two secondary arches, with a span of 8 ft., carry the main arch across the run-around, while a third set of arches, placed horizontally, carry back to the solid pillar, the thrust of that portion of the main arch over the run-around.

Considerable water being present, and the space for working extremely limited, the main arch was built in two operations. The inner shell, 18 in. thick, was placed first, and then thoroughly coated with pitch; then came a layer of 2-ply Black Diamond roofing, made by the Barrett Mfg. Co., and a second coat of pitch. Another layer of roofing and a third coat of pitch were applied, and the remaining portion of the concrete laid, filling in solid to the ribs. Above, the arch was filled in to the roof.

The reinforcement consisted of 35-lb. rails, bent to shape and placed on 1-ft. centers as shown in vertical section, and rods were used lengthwise. The photographic view gives a fair idea of the appearance of the finished work, and plainly shows the arches over the run-around carrying the main arch over this space. The work has been in place over three years now, and stands today without a visible flaw. Although built in a very wet place, no sign of seepage has appeared. No further trouble has been experienced with the timbering of the hoisting shaft, and apparently the built-up ground alongside the shaft is as good as the original strata.

The work herein briefly described has resulted in saving the entire bottom development, and in adapting it fairly well to the requirements of a high-tonnage mine. Needless to say, it forms a conspicuous example of the expense and trouble often incurred, when opening a mine, through lack of carefully prepared plans and competent supervision in carrying them out.

Last Year's Anthracite Shipments

Final figures for 1913 show that the total shipments of anthracite coal from Pennsylvania last year were 69,069,628 tons. This is 5,459,050 tons more than in 1912, when the output was curtailed by a suspension in the spring, while a new agreement was being negotiated with the mine workers; but 884,669 tons less than in 1911, which was the record year for high production.

Total shipments of anthracite last month were 5,662,618 tons, as against 5,944,502 tons in December, 1912, a decrease of 281,884 tons. The amount of coal, on hand at tidewater shipping ports, decreased slightly, from 603,031 tons on Nov. 30, to 602,328 tons on Dec. 31.

The Lehigh Valley R.R. led in tonnage last month with 1,062,578 tons; the Philadelphia & Reading Ry. was second, with 1,058,723 tons; the Lackawanna was third with 839,384 tons; the Erie carried 709,431 tons; the Central Railroad of New Jersey, 663,395 tons; the Delaware & Hudson, 590,158 tons; the Pennsylvania, 546,976 tons; and the New York, Ontario & Western, 191,973 tons.

The examination of a mine to detect the presence of gas should be made by a competent man carrying only an approved safety lamp, within three hours of the time when the men enter the mine. Every working place should be visited and some mark left to indicate that the place has been examined. The condition of each working place should be noted in a special book which should be accessible to every underground employee.

Pennsylvania Bituminous Operators Hold Stormy Session

The Association of Bituminous Coal Operators of Central Pennsylvania held its regular Annual Meeting in the Betz Building, Philadelphia, Penn., Jan. 8. Almost the entire membership was in attendance. The tonnage represented amounted to approximately 70,000,000 tons per annum.

The meeting was not entirely harmonious, owing to the fact that there was a strong disposition on the part of a number of members to dissolve the Association for the reason that the United Mine Workers of America, District No. 2, allowed their members to violate the present scale agreement grossly, the argument being that it was useless to make a contract with a labor organization which willfully violated its contract at its convenience and which had apparently no officials connected with it who had power to enforce the terms of the contract.

Union Fails to Answer Association

This situation was considerably aggravated when the executive committee reported to the meeting that on Dec. 12, 1913, at a meeting held in Philadelphia, a communication was prepared and submitted to Patrick Gilday, President of District No. 2, United Mine Workers of America, calling attention to the numerous violations of the contract on the part of the miners and that the dissolution of the Association was seriously threatened by continuation of such conduct and that up to date no reply had been received by the Association other than a mere acknowledgment of the communication.

At the time the letter was addressed to President Gilday, closed-shop strikes were being enforced in the district, some of which not only still exist, but are being supported by the United Mine Workers of America, who furnish the striking miners with relief funds. The effort to smooth out the difficulty caused a motion to be made to refer the matter of dissolution to the executive board of the Association. This motion was defeated.

It was then suggested that under a recent decision of the United States courts labor organizations, such as the United Mine Workers of America, both as an organization and individually, could be held liable in damages resulting to the operators from these violations and particularly from the closing down of the mines to enforce the closed shop, which was prohibited by the terms of the contract.

One Hundred Strikes in Central Pennsylvania

It was reported to the Association that approximately one hundred strikes have occurred during the life of the contract, in violation thereof, a substantial number of which were called almost entirely to enforce the closed shop. It was only when the Association agreed to the appointment of a committee for the purpose of listing all the strikes that occurred in violation of the contract and ascertaining from each individual operator the damage suffered by reason thereof and to make report within 30 days of the result of such investigation, together with such recommendation as the committee deemed proper towards instituting actions for the recovery of damages, that the members of the Association agreed to submit the question to the executive board. This was considered quite a victory for the members who advocated the continuance of the Association, but when it came up to the executive board to take action, everybody was much surprised as a close vote resulted, seven voting against, and six for dissolution.

The meeting was in session from 10:30 a.m. until six o'clock p.m., excluding an hour's adjournment for lunch. The officers elected for the ensuing year are as follows:

President, B. M. Clark, Rochester & Pittsburg Coal & Iron Co.
Vice-president, C. H. Rowland, President Moshannon Coal Mining Co., Inc.
Secretary and Treasurer, W. R. Roberts.

Executive Committee

L. W. Robinson....	Pres. & Gen'l Mgr., The Rochester & Pittsburg Coal & Iron Co.....	Punxsutawney, Penn.
Rembrandt Peale...	Pres., Peale, Peacock & Kerr, Inc...	New York, N. Y.
R. A. Hatfield.....	Messrs. Hatfield & Hilles.....	Philadelphia, Penn.
C. H. Rowland	Pres., Moshannon Coal Mining Co.	Osceola Mills, Penn.
W. A. May.....	Gen'l Mgr., Northwestern Mining & Exchange Co.....	Scranton, Penn.
John Langdon.....	.....	Huntington, Penn.
Arthur M. Riddell..	David E. Williams & Co.....	Altoona, Penn.
F. A. Hill.....	Res. Mgr., Madeira, Hill & Co., Inc.	Pottsville, Penn.
J. B. Irish.....	Irish Brothers.....	Philadelphia, Penn.
H. B. Douglas.....	Vice-Pres., & Gen'l Mgr., Clearfield Bituminous Coal Corporation...	Clearfield, Penn.
W. R. Craig.....	Chief Engr. & Act. Gen'l Supt., Shawmut Mining Co.....	St. Marys, Penn.
F. H. Wigton.....	Pres., Morrisdale Coal Co.....	Philadelphia, Penn.
I. A. Boucher.....	Gen'l Mgr., Logah Coal Co.....	Beaverdale, Penn.
J. R. Caseley.....	Buffalo & Susquehanna Coal & Coke Co.....	Du Bois, Penn.
H. A. Tompkins....	Pres., Portage Coal Mining Co....	Portage, Penn

Committee on Coal and Coke

Under authority of the Board of Directors of the American Institute of Mining Engineers, President Rand has appointed a "Committee on Coal and Coke," to have charge of this branch of the Institute's activities. One of the main objects of the committee will be to secure for the Institute good papers on coal-mining subjects.

The committee is composed as follows:

H. M. Chance, Chairman, S. A. Taylor, Vice-Chairman,
S. D. Warriner, Vice-Chairman, F. W. C. Whyte, Vice-Chairman,
H. S. Fleming, Secretary, 1 Broadway, New York

Franklin Bache	Howard Eavenson	Floyd W. Parsons,
A. W. Belden,	Frank Haas,	Edward W. Parker,
S. W. Beyer,	F. A. Hill,	Edgar P. Pettebone,
William H. Blauvelt,	Charles F. Huber,	Erskine Ramsay
F. M. Chase	A. B. Jessup,	George S. Rice,
Clarence R. Claghorn,	Edwin Ludlow,	W. J. Richards,
E. H. Coxe,	W. J. Murray	Carl Scholz,
F. W. DeWolf,	R. Van A. Norris,	H. H. Stock,
Charles Enzian,	T. H. O'Brien,	Morris Williams.
George W. Evans,	W. N. Page,	

Hailwood Lamp Approved by Belgian Government

The Belgian government has this week signed the authorization approving of the use in Belgium of the Hailwood oil lamp, and also the Hailwood naphtha lamp, as manufactured by Ackroyd & Best, Ltd., of Pittsburgh, Penn.

The Belgian government tests are far more severe than those of many other governments, natural gas from the Grand Trait mines being employed in the gas tests. The lamp is subjected to the most explosive mixtures of this gas and air traveling at velocities of 5, 7, 9, 11 and 15 m. per sec.; the limiting velocities expressed in feet being 984 and 2590 ft. per min., respectively. The whole series of tests are repeated in horizontal currents, downwardly descending currents at an angle of 45 deg., upwardly ascending currents at an angle of 45 deg., vertical descending currents and vertical ascending currents so as to assure the safety of the lamp under all conditions, no matter how adverse.

Mine Drainage by Compressed Air

By A. D. Spears*

SYNOPSIS—When water broke into the mine from a "cave-in," it was removed by putting a bore hole down through a local dip in an entry and installing an air lift.

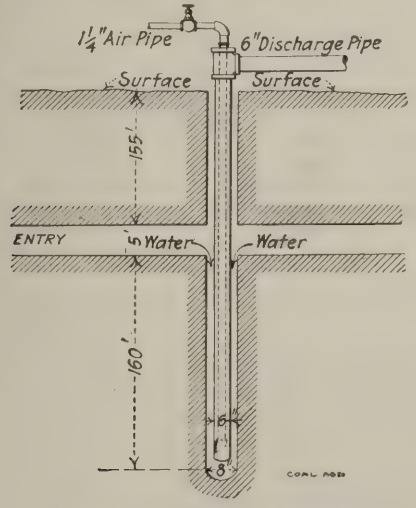
In December, 1912, water broke into the Crown Hill No. 1 mines, owned by the Clinton Coal Co., of Clinton, Ind. This was caused through the caving of an old room.

This mine is working the Indiana No. 5 bed of coal, which in this locality is about 160 ft. from the surface. This coalbed is generally dry, and in the mine in question the only pump installed was that for the sump at the bottom of the shaft. The bed has, however, several local dips, and fortunately the main west entry of the mine



THE AIR LIFT DISCHARGING MINE WATER AT THE SURFACE

starts in one of these. Since mines Nos. 1 and 2 are connected and Mine No. 3 is sunk to the No. 3 bed of coal, which is the one below that being worked by Nos. 1 and 2 mine, permanent arrangements had to be made for the removal of the incoming water.



CROSS-SECTION THROUGH MINE AND AIR LIFT

As pumps and pipe had to be ordered, the water soon caused the abandonment of the west part of the mine. It was the consensus of opinion, however, that the influx of water would soon stop, and only a 3-in. pipe line was laid for its removal, this extending for a distance of about 4000 ft. The 3-in. line proved inadequate to handle the water, and second and third 3-in. lines were subsequently laid. Rough measurements showed that the water was coming in at the rate of about 700 gal. per minute.

It was then decided to put down a drill hole, and discharge the water direct to the surface, and the air lift, as used in many city water plants, was suggested for this purpose.

A survey was made for the drill hole, as it was necessary that this should go through an entry, in order that the water might gain access to the hole. This drill hole was completed the latter part of January, 1913, and water was pumped continually 24 hours a day for four months. From the first day the air lift was started, the water was gradually lowered, but after about six weeks it was deemed advisable to put down another drill hole and install a second lift. The driller, however, had bad luck, and it took some time to finish the hole, and the water was pumped out before the job was completed. It is still necessary, however, to run one air lift 8 hours out of 24 in order to keep the water down.

The accompanying drawing illustrates this method of water removal. The system is most generally used in artesian or driven wells for raising either fresh or mineral waters from any depth. The only equipment necessary is two pipes in the hole and an air compressor. For the best results, somewhat over 50 per cent. submergence of the discharge pipe is required, but fairly good work can be done with only a 40 per cent. submersion.

*Clinton, Ind.

Recent Legal Decisions

Right to Rescind Purchase of Coal in Place—A purchase of all the coal in place in a tract of land cannot be rescinded on account of the coal area being smaller than was expected, if the land contains a substantial quantity. Nor may the purchaser rescind because of the non-existence of a particular bed. "In all cases of sale by the acre, there may be an abatement from the purchase price for deficiency in quantity * * * * Right to abatement or compensation for a deficiency in the case of a sale of land in gross stands upon the existence of a warranty of quantity or fraud and misrepresentation on the part of the vendor, respecting the quantity." (West Virginia Supreme Court of Appeals, Light vs. E. M. Grant & Co., 9 Southeastern Reporter 1011.)

Mining under 999-Year Lease as Invasion of Landowner's Rights—Measure of Damages—A lessee of the surface of land, although for 999 years, having no right to mine coal on the premises, the owner of the land is entitled to recover damages for removal of coal by the former, although the latter and his successors will not be entitled to possession of the land for several hundred years. The damages recoverable in any case for wrongful removal of coal is its value in place, if that value can be established by evidence; it being only when such proof cannot be made that the damages are measurable by the value of the coal at the pit's mouth. In computing the value of coal in place, its royalty or actual market as coal in place at the time must be considered, and not its prospective future value under changed conditions, if the coal is so located as to be marketable. (Pennsylvania Supreme Court, Trustees of Proprietors of Kingston vs. Lehigh Valley Coal Co., 88 Atlantic Reporter 763.)
COL. NOTE

Validity of Restriction on Buyer's Enjoyment of Property—Provision in a contract whereby a firm of retail coal dealers sold a teamster's outfit on condition that the buyer use the outfit exclusively in hauling coal for the sellers, is invalid, so far as it attempts to limit the buyer's title to the property, though the provision may be constued as an enforceable contract for the buyers' personal service in hauling for the sellers. (Iowa Supreme Court, Elijah & Winne vs. Mottinger, 142 Northwestern Reporter 1038.)

Discussion on Retarding Ventilation When Firing

SYNOPSIS—Explosion in a strong current of air—an incident. Reason for slowing down the fan before firing. Conditions and practice in Illinois mines discussed. History of the theory of retarding ventilation. A remarkable experiment in a Kansas mine. Effect of the supply of oxygen in mine workings. Effect of the size of mine openings. Study of the theory by the Bureau of Mines.

The president announced, in calling the meeting to order that the subject for discussion was Retarding Ventilation at Firing Time. He said, Pennsylvania does not have any retarded ventilation during firing time. I believe that Iowa, Kansas and Illinois practiced this method to some extent and I will ask Mr. Dunlop to tell us what he knows about that system.

An Incident

Mr. Dunlop (*Illinois*)—Eighteen years ago I was acting as mine manager when my attention was drawn to an explosion caused by the firing of a shot, in a new room that was in about twenty feet. There was a strong air current passing the room, on the entry. The entry was 6x8 ft. and the air was traveling with a velocity of 200 ft. per min. There were two shots fired in the room, but one did not do much work, while the other set fire to the gases, and caused the explosion. I had several explosions in the same place, and I came to the conclusion that the best thing to do was to slow down the fan during shooting time. This is a subject that an inspector must be very careful about. I would not post such a notice on the tipple. It don't apply to a mine that generates gas or has been known to generate gas.

Concluded to Slow Down Fan When Firing Shots

My conclusion after careful study was this: I felt that the reason for an explosion in a closed place of that kind was due to the gases from the explosion of the powder. I had a deal of trouble with some mine managers. Very often they said, we want more air. My experience, however, has been that the best way to avoid these explosions was to slow the fan down during shooting time, and I will say to you that, during all of my experience as inspector of mines, I have recommended this plan to all mine managers. On one occasion I recall Mr. Taylor and myself went to investigate an explosion, and I recommended this plan to the mine manager, to slow the fan down during shooting time; and they have never had any explosion since.

Now, the reason I have decided to slow the fan down is this: If you have a place just opening up, twenty feet or more, and a strong air current passing, the gases generated by the explosion of powder, do not get out of that room. The smoke is left against the wall. By retarding the ventilation these explosive gases have a better chance to expand and mix with the air; and the more they expand the less chance there is for an explosion; because they are diluted with the air, which renders the gases less explosive. Now, there is one other way, and that is to direct the air current by a curtain or brattice so as to get the gases out that are generated by the explosion of the powder. Then there will be less danger of an explosion from these generated gases. I had an explosion this year in January, nearly 600 ft. from the bottom of the downcast; and after investigation, I recommended to the superintendent to slow down his fan. All of these explosions to which I refer are in new mines and near the bottom of th downcast.

Illinois Conditions and Practice Discussed

Mr. McAllister (*Illinois*)—My theory about slowing down the fan is that if you have a slight explosion it will almost always set fire to coal dust; and for that reason, reducing the ventilation during shooting time is good; the gases become diluted with the air and are rendered less explosive.

Mr. McDermott (*Montana*)—What effect would slowing down the fan have on the coal dust that would be thrown into the air current by the shooting?

Mr. Dunlop—If you have an air current that is dusty, reducing the ventilation reduces the amount of dust in the air.

Mr. McDermott—And that is one of your reasons for advocating the reducing of the air current?

Mr. Dunlop—Yes.

Mr. Flynn (*Alabama*)—Is there any limit to the charges of powder used in the Illinois mines?

Mr. Dunlop—Yes, we have a law governing the amount of powder that may be placed in the hole.

Mr. Flynn—What is your limit?

Mr. Dunlop—Sixty inches of powder to every six feet, in thickness, of coal on a 1½-in. cartridge.

Mr. Flynn—How deep do they bore their holes?

Mr. Dunlop—Six and seven feet.

Mr. Parsons (*West Virginia*)—In the explosion that you said you had in January, you mentioned shooting rapidly two shots I think. Did you find any evidence of a blownout shot?

Mr. Dunlop—We found two holes that had been drilled there, and these holes were 6½ and 6¼ ft. One had blown out only a foot of coal and the other had just blown a little from the top. The coal was 4½ ft. in thickness.

Mr. Parsons—You say there were three shots fired in rapid succession. Now, it is impossible to have all three go off at the same time. Suppose, now, two of those shots went off first causing dust to be thrown into suspension in the air and later the third shot went off, would not this cause the dust to explode, even if you had no ventilation?

Mr. Dunlop—I think not.

Mr. Parsons—My explanation of the phenomena is that when the ventilating current is not moving the pressure is reduced and the gases are permitted to expand more freely and become diluted with the air, rendering the mixture harmless.

Mr. Muir (*West Virginia*)—Would not the same re-

Note—From the published Proceedings of the sixth annual meeting of the Mine Inspectors' Institute, U. S. A., held at Birmingham, Ala., June 10-13, 1913.

sults have been obtained if you should open up one or two breakthroughs and thus reduce the ventilation at the face?

Mr. Dunlop—That would have the same effect as slowing the fan. In reply to a question asked by Mr. Moses, Mr. Dunlop said that he had made these recommendations to a mine manager in Trenton County and had further recommended that the mine be sprinkled.

Mr. Parsons—Mr. Dunlop, what system of ventilation do you have, the blowing or the exhaust system?

Mr. Dunlop—The blowing system is generally used.

Mr. Parsons—If you were using a blower fan would not the reversing of the fan have the same effect in reducing the pressure?

Mr. Dunlop—I think not.

Mr. Pearce (*Indiana*)—In retarding the ventilation, is the idea to eliminate the initial cause of the explosion on the general explosion in the mine?

Mr. Dunlop—It is the initial explosion.

Mr. Moses (*Illinois*)—Have you known of an explosion in an Illinois mine caused by a shot that has done its work properly?

Mr. Dunlop—I remember one or two but they were local and covered very little territory.

Mr. Moses—Did you investigate the explosion at Rend City?

Mr. Dunlop—I am not sure if I did or not.

Mr. Moses—The point I am trying to make is this: You seem to give all the credit of the prevention of explosions, to retarded ventilation; and, to my mind, you do more in retarding ventilation to produce explosions.

Mr. Dunlop—I have done that for sixteen years: We have inspectors in Illinois that do not agree with the principle of retarding ventilation during firing time and I would not advocate this plan in mines in which there are explosive gases generated.

Explosions Occur Where Ventilation Is Poor

Mr. Little (*Illinois*)—Most all of the explosions we have had, in Illinois, have occurred in places where the ventilation was poor; and these explosions were caused by the excessive use of powder or misplaced holes. We have, in Illinois, what are called "shotfirers"; and we have a large number of foreign employees. The shotfirer is not supposed to know what is in the holes; he does not charge them and he fires the shots in rapid succession. In this rapid shooting, there is liberated a large quantity of gas. The shotfirer goes into a place that is beyond the last open crosscut and fires three shots, one of which may have been misplaced and the misplaced shot throws out fire and ignites the coal dust and gases that have been liberated by previous shots.

Mr. McAllister—In the explosion to which Mr. Dunlop refers there were only three shots fired that night; there was much dust; the coal was about 8 ft. thick; the three shots fired in that room all did their proper work. We traced the flame down to the mouth of the room. The force of the explosion blew the cars up into the tower of the shaft. We made a thorough examination after this explosion and did not find a trace of explosive gas. At another mine, near Springfield, at least 1500 lb. of powder is exploded in less than three hours.

Mr. Martin (*West Virginia*)—How far were these shots from the entry?

Mr. McAllister—About 200 feet.

Mr. Martin—Was the air current turned into this room?

Mr. McAllister—There was no evidence of the air being conducted up into the room; the shots were apparently fired in stagnant air.

Mr. Moses—Did that explosion occur on the first of the air or on the return current?

Mr. McAllister—On the return of the air.

The History of Retarding Ventilation

Mr. Beard (*New York*)—I would like to give a little of the history of the suggestion of closing down the fan at firing time. Our records are not complete; but the first mention of the subject, to my knowledge, and the first experiments ever made were by John Verner, a former mine inspector of Iowa, back in 1886, and a charter member of this Institute. It was after the Cedar Mine explosion, just west of Albia, Iowa. Mine Inspectors Thomas Binks and John Verner, together with Joe. Richardson, the mine boss, and myself went into that mine, after the explosion. It was found that the explosion occurred on the 15th or 16th west off the main south entry. On our way out, we had gone about half way to the shaft when John Verner stopped Richardson, the mine foreman, and said: "Joe, you want to open the shutter in this regulator, just before firing, or slow down the fan. By doing that you will short-circuit some of your air and have less circulation in the workings and there will be less risk of an explosion." I took exception to his theory and told Mr. Richardson that he did not want to interfere with his ventilation. That was the beginning of it.

Since that time Mr. Verner has continued to advocate that theory in the West. It has spread into Illinois and down into Kansas and Oklahoma; but whether they accepted and followed it in Oklahoma, I could not say. I think they did not. In Kansas it seems to have gotten a great hold; and this past winter we took the matter up in Coal Age, submitting it for discussion. There were three or four remarkable letters from a man by the name of McAllister, a mine foreman at the time, in Kansas. His statements were so remarkable that after holding his letters several weeks I thought it would be a good thing to publish them for what they were worth. He claimed that the slowing down of the fan and even sealing up the upcast shaft, which retained in the mine the products of combustion due to the explosion of the powder, reduced the oxygen in the air current and rendered those gases less explosive.

Experiment in a Kansas Mine

Mr. McAllister went so far as to state what any of us would be strongly tempted to say was an untruth. He said he took a keg of powder and went down into the mine, in company with another fireboss; and together they fired 27 shots. They had previously placed the keg of powder in a heading and covered it over with a mound of slack. They fired this immediately after the 27 shots while he and the fireboss were in the mine, and they came out alive. Such a statement is beyond belief and would be pronounced by many as not worthy of consideration. The discussion in Coal Age, however, was valuable. We don't any of us realize as we should what value there is in the arguments of the other side. Mr. Verner is right to the extent that a reduction in the velocity of the air current when firing shots reduces

the tendency to an explosion. The discussion developed this point, and I think there is some truth there, but just how far it can be applied, I would not care to say. I am convinced of one thing, however, that there can be too much air at the time of firing. At any rate, the matter was put up as a suggestion to the Bureau of Mines and we asked them to conduct experiments along those lines.

The letters and statements to which I have referred were corroborated by the mine superintendent of one of the large mines in Kansas, who stated that any time the Bureau of Mines desired to test the matter he would throw his mines open in any and every way possible. It seemed as if there must be some conditions in Mr. McAllister's experiments with which we are not thoroughly familiar; and while I would not, for a moment, advocate tampering with the ventilation of a mine, at the same time, I must admit that it has been done successfully in a great many cases. Mr. Dunlop has just given some instances. I regard it as a question to be discussed and tested out by experiment.

Effect of Oxygen Supply

Mr. Flynn—Don't you think that the supply of oxygen at the time of the explosion has a great deal to do with the intensity of the explosion?

Mr. Beard—I do most certainly.

Mr. Flynn—Then you think that if there is less oxygen in the air at the time of firing shots there will be less liability of an explosion.

Mr. Beard—Yes, but when you have reduced the oxygen content to the point where this condition would obtain, the men might not be able to live in such an atmosphere.

Mr. Flynn—Do the same conditions obtain concerning a coal-dust explosion in a mine, as obtain in the case of a fire in a stove, by reason of the supply of oxygen? Shut off the draft in a stove and the fire goes out.

Mr. Beard—No, I think not. The two cases are quite different. In the mines, under any ordinary mining conditions, we understand that there is always enough oxygen to start an explosion of gas or dust. I cannot conceive of a mining condition without sufficient oxygen to start the explosion. There is no similarity in the comparison.

Mr. Flynn—Then you think that you can have an explosion and a propagation of the explosion with a low oxygen content as with a high percentage of oxygen.

Mr. Beard—At the initial moment of an explosion, I believe there is always enough oxygen in the mine air, under working conditions, to make that explosion possible. Now, the question of a strong draft will not only bring with it much dust but also a fresh supply of oxygen that will propagate the explosion through the mine. It is in that manner that the question of draft affects the explosion. But to say that to shut off the air current entirely and then expect to fire a number of shots in the mine, without causing an explosion, I think is open to question and grave doubt.

Mr. Flynn—Is it not a fact that the effect of slowing the fan would be to reduce the oxygen supply in the mine?

Mr. Beard—Yes.

Mr. Martin—Do you believe that at the initial point of an explosion there is a high velocity of the air?

Mr. Beard—Undoubtedly.

Mr. Martin—You stated that you believe a high velocity had a tendency to cause a mine explosion?

Mr. Beard—Yes, a high velocity of the air current passing the shot.

Mr. Martin—Don't you think that if a shot was fired, the air current traveling at a high velocity would take away the gases produced by the shot?

Mr. Beard—Yes, and supply live oxygen and dust to the atmosphere at the working face.

Mr. Cartlidge (*Illinois*)—In reading over Mr. McAllister's articles I somehow got the impression that he did not stop the fan. I don't know that the article said that, but I got the impression that he sealed up the shaft and allowed the fan to continue against a dead end.

Mr. Beard—I think you are wrong there. I think he stopped the fan and sealed the shaft, at first, at least.

Mr. Cartlidge—Here is the impression that I got: In one of his articles he stated that the superintendent wanted to shut down the fan, and close the downcast and he immediately said they would have an explosion and refused to have anything to do with it. Superintendent went ahead and had an explosion.

Mr. Beard—I think your impression is wrong.

Effect of Size of Workings

Mr. Bolt (*Illinois*)—Suppose, Mr. Beard, in a mine where they have a large area, or in other words, where they drive the entry 16 ft. wide and the roms 30 ft. wide and shoot, perhaps, 250 shots at one firing, would it not be absolutely impossible to close down the fan when firing these shots and have enough oxygen to get complete combustion in every instance?

Mr. Beard—I think it would be doubtful.

Mr. Bolt—One other question: Would it not be advantageous to retard the ventilation at firing time, provided the conditions were normal in the mine?

Mr. Beard—I am inclined to think it would be in some cases; but as I said before, in other cases, I think it would be dangerous; I would say that in a thin vein with narrow openings, the danger is greater than in a wide open mine, such as you mention.

Mr. Bolt—But Mr. Beard, most of the severe explosions that have occurred, in Illinois, in the last five or six years, have been in practically new mines where there was an abundance of ventilation.

Mr. Beard—Yes, and you must remember that those new mines are rushing out a large amount of coal and have a comparatively small area working which means a high velocity of the air current and danger.

Mr. Bolt—Why would it not be a still greater advantage where the area is small and the number of shots limited, to close down the fan entirely, and have less oxygen in the mine?

Mr. Beard—In restricted workings such as you describe, I think the safer plan is to keep the air moving at a reduced velocity.

Mr. Bolt—Then you cannot always apply the same rule to all conditions. You must apply a rule that suggests itself to conditions. There is no fixed rule. It would be dangerous to say either close down the fan or decrease its speed.

Mr. Beard—I think that is correct.

Mr. Dunlop—During the month of September, 1912, Prof. Young, of Kansas, who is, perhaps well known to most of our members, wrote an article claiming that you

cannot have too much air in a mine. He was in the mine where we had an explosion, getting samples of dust for the Illinois Geological Survey. Now, as I said, in this very mine an explosion occurred in January. The superintendent was with us; and they had just been putting in a new fan and the superintendent said: "Well, John, I guess when I get that fan started I will have to reduce the speed during shooting time." I said, "I don't think so; because I knew how Mr. Young felt about it. But, the superintendent knew that I believed as Mr. Verner had said, that we must reduce the ventilation during the time of firing shots, and it rather surprised him that I made that statement; and I will say to you now, that the speed of that fan never was reduced, until the explosion occurred in January. It may be a coincidence; but that actually occurred. Since that time, the speed of the fan has been reduced, during firing time.

The Bureau of Mines Studying the Problem

Mr. Paul (*Pennsylvania*)—I have read the articles which have appeared in the public press and journals concerning the effectiveness of reducing ventilation during firing time; and particularly have I noted and studied the articles contributed, in Coal Age, by Mr. McAllister, of Kansas. Probably a year or a year and a half prior to the appearance of these articles in Coal Age, I had the opportunity to peruse the original manuscript. There were some statements made in that article that caused me to question the correctness of the facts as stated by Mr. McAllister. One thing in particular aroused my suspicion. He stated that in one of the mines in which an explosion had occurred he immediately descended the shaft, and found in the center of the entry, a current of pure air, and following that current of air he rescued some men. In all of my experiences in mines, following explosions, I have never found a column of pure air, so located, or air in the center of an entry, which varied much from the air against the roof or on the bottom.

In regard to reducing ventilation during firing time, we have had statements from Mr. Verner, of Iowa, in regard to the effect of retarding ventilation at firing time. And Mr. Rhys, one of the present mine inspectors of that state, shows there has been no prevention of explosions by reason of retarding the ventilation. In Kansas, where they practice retarding the ventilation, we have no facts available with regard to explosions occurring when they did not reduce the ventilation. We do know that Kansas has had a large number of explosions within recent years; a great many in mines where they have had retarded ventilation, resulting in a small loss of life.

The question resolves itself into one requiring the study of phenomena attending the retarding of ventilation. Some investigation is now being made by the Bureau with a view of determining whether or not there is any efficacy in retarding ventilation during firing time. A statement was recently made by a Liverpool professor, in which he advocated reducing the oxygen content of the mine air, as a means of preventing explosions. That theory has been largely criticized and I believe Coal Age has written a plausible and just criticism of it. Experiments made in the laboratory of the Bureau of Mines have not confirmed all the statements made by that professor in regard to the diminution of oxygen in the air. I speak of this since it has appeared in public print. Experiments are now under way at Pittsburgh to determine the effect of diminishing the quantity of oxygen in the air with regard to the propagation of a dust explosion, and I regret on this occasion that our Mr. Hall is not present to give you a summary of some of the preliminary tests that have been made. The statements I make in regard to those tests, are subject to his verification later; but I believe he has found by diminishing the quantity of oxygen in the air to about 2 per cent. below the normal content, a dust explosion is not propagated, owing to the lack of sufficient oxygen to furnish complete combustion.

It seems to me, therefore, that this discussion resolves itself into a technical question concerning the oxygen content of the mine atmosphere. Another feature of the question might be the agitation of the mine air. It is found in laboratory experiments on a large scale, that if you have a mixture of air and explosive gas in the proportion in which it creates the most violent explosion, the air and gas being thoroughly mixed and in a quiescent state, and ignite it, you get a low explosive force; but if you agitate the same mixture of gas and air, before igniting it, you will get a much more violent explosion.

So far as the effect of retarding the air current, in dust explosions, the mere fact that you have retarded the air current and prevented the agitation of the air may be responsible for the lack of propagation of the explosion; but this is a conjecture since it has not as yet been proven by experiments, on a large scale. Analyses taken throughout the country show that it requires an extremely poorly ventilated mine to carry an oxygen content much less than the normal amount in the atmosphere.

Commendation

The following letter comes to us from one of the assistant firebosses in a mine requiring careful inspection. It comes from one who is evidently appreciative not only of the efforts of his employers to carry out the mining law in respect to the safety of the mine; but likewise of the thorough work of the state mine inspector in that district. Coal Age congratulates both the management of the mine and the inspector on the result.

"I want to commend our mine inspector for the thorough manner in which he regularly performs his work, in seeing that the requirements of the mining law are met in respect to the safety of lives and property. Anyone who has observed Mine Inspector Elias Phillips, on his rounds of inspection in the mines, would be satisfied that he is a credit to the inspection department of the state. Unlike some inspectors I have seen, who never leave the main entries, Mr. Phillips inspects every hole and corner thoroughly, and makes his inspection like one of the assistant foremen or the mine foreman himself.

"I would say, also, to the credit of our general superintendent and our mine foreman, that they comply with every order of the inspector to the best of their ability. This mine is one of the hardest mines to handle, in the state, because of a difficult roof and much water. But, as a result of this good work and coöperation, I am proud to say only one fatal accident has occurred in this mine during the past year."

Details of Mining Methods

By W. H. Grady*

SYNOPSIS—Explains the difficulties in drawing pillars after they have been allowed to stand and details some of the precautions which should be taken to obtain safety and maximum recovery. A preliminary statement showing the defects of room-and-pillar methods as are quite frequently adopted.

No attempt will be made in this paper to outline the details of all the methods of mining coal; rather it is my desire to refer to the room-and-pillar method of mining, which, in its various modifications, may be said to be the prevailing method of extracting coal in this country. However, some longwall mining is done, especially through the Middle West, and, as the market value of coal rises, it is quite probable that the latter method will become more general in the thinner seams of coal, which cannot be mined with profit.

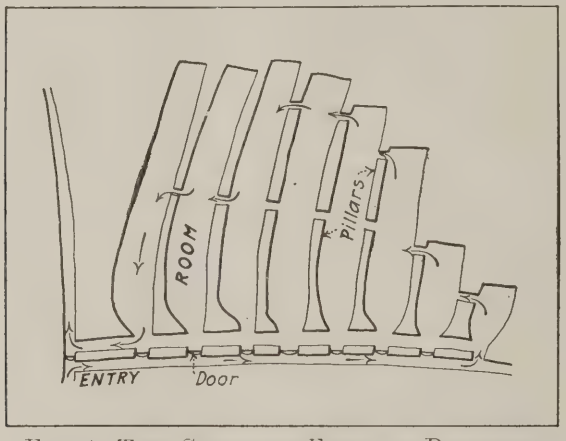


Fig. 1. The Simplest Form of Room-and-Pillar Work—Unsafe and Wasteful

First Cost Versus Final Cost

In the early days of mining in this country, that system which yielded an output at a minimum cost under conditions then existing, was adopted without any thought of how the remaining coal in the ground was to be mined, and the same influencing factor is dominating the methods of operators in some of the mines of today. Coal was little known, its uses were limited, the methods of mining were crude, so that the operators, all of whom were of limited capital, did not seek for what would be the most economical method in the long run, but for that plan by which they could mine coal cheaply and quickly at the commencement of the operation.

As a result large areas were opened and not only were the long-standing pillars subjected to the deteriorating effects of the air but they were constantly injured by the overlying weight. These methods had but one favorable feature and that was but temporary, for though the coal could under the slipshod system, then in use, be mined cheaply, there was a subsequent loss of coal from "V"-shaped robbing, much crushing of pillars, many creeps, large expense from the cleaning up of falls, increased timbering and duplicate trackwork. So that the time is approaching, in fact its advent is already announced, at many mines, when the cost of mining coal in the old workings will be much higher than it now is. In addition, much valuable coal in pillars will be entirely lost.

A Percentage Recovery of 90 Per Cent. without Materially Increased Cost

To avoid these losses operators have realized that they must use methods which make mining costs almost prohibitive or else a system by which only 60 to 65 per cent.

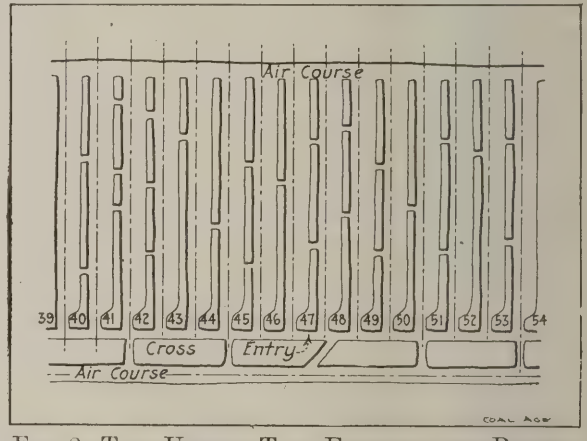


Fig. 2. The Use of Two Entries and Rooms Driven on Sights

of the coal is recovered. Facing such alternatives, they are proud to have lighted on a modification of the old method which differs from it only in detail, and yet gives them a recovery of 85 to 95 per cent., or even more.

That such a great difference in the percentage recovery has been brought about without materially increasing the cost per ton, is all the more to the credit of coal-mining men and places them among true conservationists.

The Simplest System

The simplest form of the room-and-pillar system of mining, may be said to consist entirely of rooms turned off an entry, leaving a pillar between each room turned, as in Fig. 1. This method may be said to yield the greatest number of working places per unit length of entry. Fig. 1 is a reproduction of actual mine workings which came under my observation in the last few years and represents room-and-pillar work in its most dangerous form.

A later step was to drive two entries with rooms off each. This insured somewhat better ventilation. But, as will be shown later, this method will not permit the recovery of the maximum amount of coal at a minimum mining cost.

Where much coal is to be handled, the double-entry system with rooms off both entries presents operating difficulties which are sought to be overcome by driving rooms off one entry, using it as a return airway and haulage road and reserving the other entry as an intake for

*Chief mine inspector, Pocahontas Coal & Coke Co., 133 Giles St., Bluefield, Va.

Note—First part of an article entitled "Some Details of Mining Methods with Special Reference to the Maximum of Recovery" read before the West Virginia Coal Mining Institute, Dec. 9, 1913.

air only. Fig. 2, an example of this method, is a step in the right direction and a great improvement, but for large properties where mining is done extensively, a further improvement must be made.

Leaving Pillars Till Mine Is Finished

Formerly, entries were driven and worked by one of the methods above, and the greater part of a property was developed, before the work of removing the pillars began. Robbing pillars brought on new difficulties which were sometimes calamitous. The thin pillars, became so strained, often before robbing had been attempted, that they could no longer support the mountain or overburden and they failed by crushing at the point of greatest weakness so that the mountain or overburden tottered.

Once "tottering," "squeezing," or "creeping" or all three actions together sets in, pillar after pillar is crushed, the destruction spreading, sometimes with the rapidity of a prairie fire. Until sufficient barriers or areas of solid coal are reached, capable of counteracting this now tremendous dynamic force, no available power can stop it. Sometimes such a squeeze will destroy acres

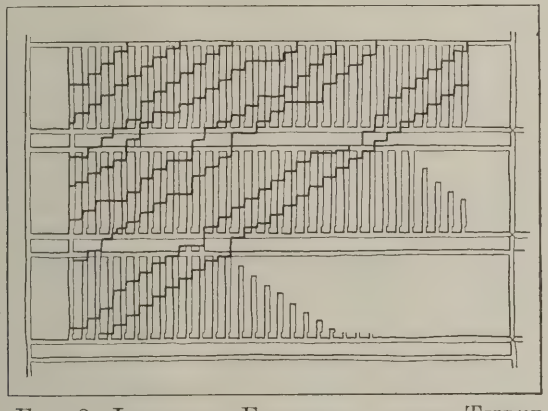


Fig. 3. Lines of Fracture across Three Headings Worked as a Unit by Room-and-Pillar Retreating Method

of pillar coal and render impossible or expensive the mining of other coal lying beyond the affected area which is only accessible through the squeezed territory.

I have in mind an instance where over 75 acres of pillars were crushed so badly, in a period of less than two weeks time, that all hope of ever recovering them was abandoned. Another example of the toll a squeeze demands is the loss of life in the Twin Shaft disaster in the Wyoming region of the Pennsylvania anthracite field, where men were buried alive, whose bodies have never been recovered.

These difficulties and the great expense, attendant on relaying track and cleaning up slate falls with which the pillars were so frequently congested, brought a further change in the room-and-pillar method of mining, whereby the pillars could be more economically extracted, and in the event of a squeeze starting it could be controlled. It developed what is known as the "panel system" of room-and-pillar work as shown in Fig. 3.

This panel system may be said to represent the better practice of today. It is pertinent, therefore, to know what size of panel, width of entries, width and depth of rooms and size of pillars will insure against squeezes and yield the maximum of recovery at a minimum of expenditure.

The overlying burden is often thought to be the determining factor in regard to room widths and size of pillars, but in general it determines the *minimum* size of pillars and the *maximum* width of room only, which may be materially different from the size of pillar-and-room width as determined by other factors.

However, a full knowledge of the manner in which the weight of the roof tends to act should be thoroughly understood in order that we may determine approximately what will happen when the coal is being worked and the pillars extracted. For an excellent analysis of this question of roof weights and action, I would refer to the papers of H. W. G. Halbaum, entitled "The Action, Influence and Control of the Roof;" and, "Great Planes of Strain in the Absolute Roof of Mines." These papers appeared in the "Transactions" of the North of England Institute of Mining and Mechanical Engineers.

Halbaum's Hypothesis

Briefly there are two forces acting which compose the total roof action, a vertical force acting downward and a horizontal force acting opposite to the direction in

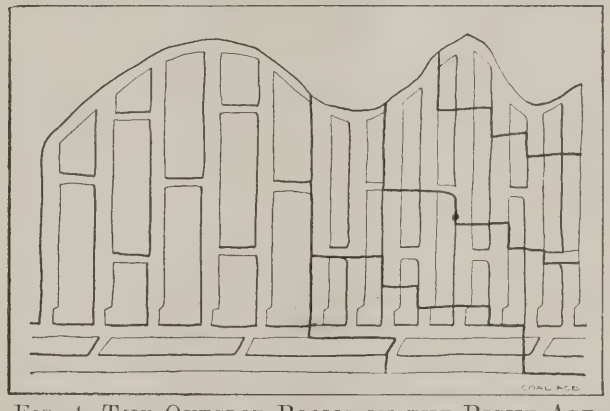


Fig. 4. The Outcrop Rooms on the Right Are Sure to Fill with Slate, and Pillars Are Too Narrow to Split or Slab

which the workings are advancing. The resultant of these two forces is in a direction from over the solid coal toward the excavated area and tends to break the roof over the pillars so that one must be constantly alert for such action.

When the pillars are not mined clean, the strata overlying the excavated area are not allowed to break and rest freely on the bottom.

The tendency often is for the roof not to break but to sag gradually until at some distant point in the gob, it reaches the bottom. This gradual subsidence of the roof often will be so severe as to crush the end of the pillars next to the gob and prevent miners from getting cars to the point where they desire to load them, thus causing more incomplete pillar extraction. Often when this stage is reached it will be found that neither the setting of props nor their removal will affect the action of the roof.

In general it may be said that so far as the weight of the roof is concerned, the pillars should be of the following dimensions:

PILLARS FOR VARIOUS DEPTHS

Depth of cover, ft.	Width of pillars, ft.	Width of rooms, ft.
300	15	20
500	20	20
700	25	20
900	30	20
1200	35	20

Why Uniform Pillars Are Used Despite Varying Cover

Ordinarily the pillars and rooms, within certain limits, are made of uniform size, in the same mine or group of mines, notwithstanding the variations in cover, which may be encountered in mining.

For example, the size of the room pillars required under a ravine where the cover is only 150 ft. thick should be 15x80 ft. and underneath the mountain top where the cover is 475 ft., the size of the pillars should be 20x 80 ft. As a matter of fact, all are somewhat larger than the maximum size required according to the table, because the pillars should not only be large enough to support the weight of the roof while the rooms are being driven, but also at the time the pillars are being robbed back.

To change room spacing would involve a further complication, conducive to losses of coal, in that the small pillars would be robbed back more quickly than the larger ones and an irregular breakline would result, with some pillars extending far back into the gob. These would be inevitably crushed.

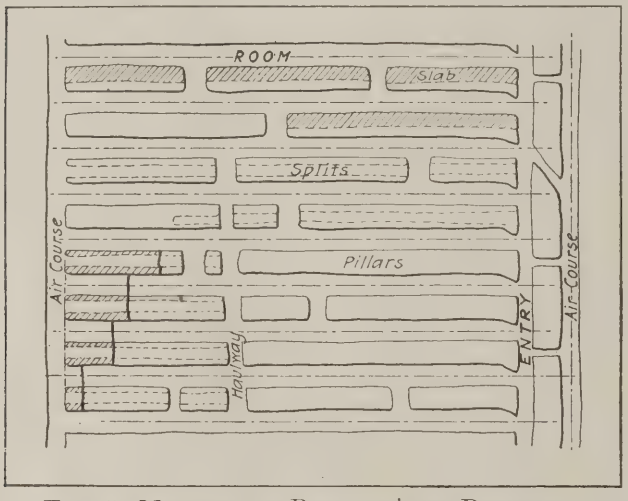


Fig. 5. Method of Recovery of Pillars by Slabbing and Splitting. In Lower Five Rooms the Splitting Is to Be Done in Two or More Lifts from Counter Haulways

Where Pressure Is Light, the Pillars and Pillar-Footings Are Usually Weak

An error that is sometimes made in drift mining is to suppose that because workings are near the outcrop and the cover light, wide rooms on narrow centers may be driven. While it is true that the cover is light, as a rule it is so badly weathered that it has little strength and before mining has proceeded very far the rooms will become congested with slate falls, and splitting of the pillars will become imperative. The dead weight resting on the wings of the pillars soon crushes them and a squeeze may result, causing large losses of coal. Fig. 4 illustrates two systems of crop working with different room spacing.

Large Pillars and Narrow Rooms Needed under Both Weak and Strong Tops

Probably no one factor contributes more to determine the working size of the pillars than the nature of the top and bottom immediately adjacent to the coal. Their behavior, especially that of the top, under the forces acting during robbing, the weathering effects of the air, the effect of temperature changes upon the top and its ability to withstand tension, compression and shear are all of prime importance.

If the roof is a material which cannot resist these agencies, it will fall very probably before the pillars are robbed, so that cleaning up slate falls becomes a daily occurence, and so great are the delays and expense occasioned, that the cost becomes prohibitive; incomplete mining is certain; a squeeze occurs and much good coal is lost.

On the other hand, if the top is a strong sandstone the impression is common that wide rooms may be driven and only small pillars are necessary. Because of the great strength of the top and the absence of slate falls, the time of starting the robbing is a matter that receives very little attention.

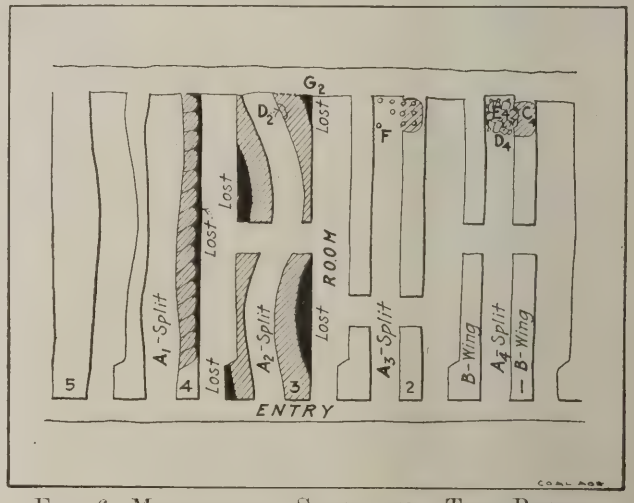


Fig. 6. Methods of Splitting. The Black Areas Show Coal Lost When Roadways Are Not Straight. When Roof Falls against Standing Ribs, the Roof Rock Mixes with the Coal

Under either strong or weak top, large pillars and narrow rooms are imperative and the robbing should follow within a reasonably short time after completion of the room.

Cleaning Out Pillars in Old Workings

Fig. 5 is an example of an honest effort to obtain the coal in the pillars, when, by reason of slate falls or crushing, the pillars cannot be drawn back in the ordinary way. Wide deep rooms were driven on narrow centers, under very weak top which was known not to stand weathering well and fell for a height of from 5 to 15 ft. and even more. The rooms were driven during the years 1898-99 and under the system then practiced at the mine, robbing did not follow. Extracting the pillars was started in the year 1907.

All the rooms were congested with slate falls and the work was started by slabbing. By this method the miner was continually retreating from his solid work and placing himself in danger from the bad roof overhead. When the miner was ready to come back with the remaining portion of the pillar, it was often found to be so badly

crushed that only a partial recovery could be obtained and frequently slate falls would close the space in.

Splitting the pillar from the entry to the aircourse above proved to be a failure because the wings could not support the load coming upon them and the timber cost of attempting to recover the pillars in this way became prohibitive. Finally in an honest effort to recover the coal, if at all possible, counter haulways were driven across the pillars and the falls met in crossing the rooms were cleaned up.

Counters and Short Splits

Then short splits were driven up the pillars from the counter haulway, and the wings quickly robbed back before they became so weakened that their recovery was impossible. This resulted in the maximum of recovery under the circumstances, but the expenditure for handling slate falls, relaying track, timbering, and other items made this coal more than twice as expensive as the coal produced in normal parts of the mine.

If the roof is weak so that "robbing falls" occur quickly after the removal of the coal, a maximum recovery at minimum cost can never be obtained by splitting the pillars and loading out the wings. It is easy to see that the "robbing falls" resulting from the removal of one wing, will prevent the complete mining of the other, unless a sufficient quantity of timber is used to ward off the fall. This timber later interferes with a satisfactory fall at the time such a breaking of the roof is desired.

The Pillar-Splitting Problem

Fig. 6 is a cut of several pillars which are being pulled back by splitting. A_4 shows the split in the pillar, with the wings *B-B* remaining, C_4 shows a portion of the right wing removed by attacking the pillar at the point D_4. The shaded area E_4 represents the fall which occurs, keeping the miner from the extreme inside portion of the left wing. If this fall is warded off, good sound timber will have to be used freely as shown at *F*.

What more frequently happens is that the split in the pillar is driven as at A_2 and the pillar is attacked at D_2, but all of the coal is not mined. A good sized stump of coal as at G_2 is left behind to support the roof, the quantity of good coal lost depending on the thickness of the seam. All the way back to the entry, some of the coal is left.

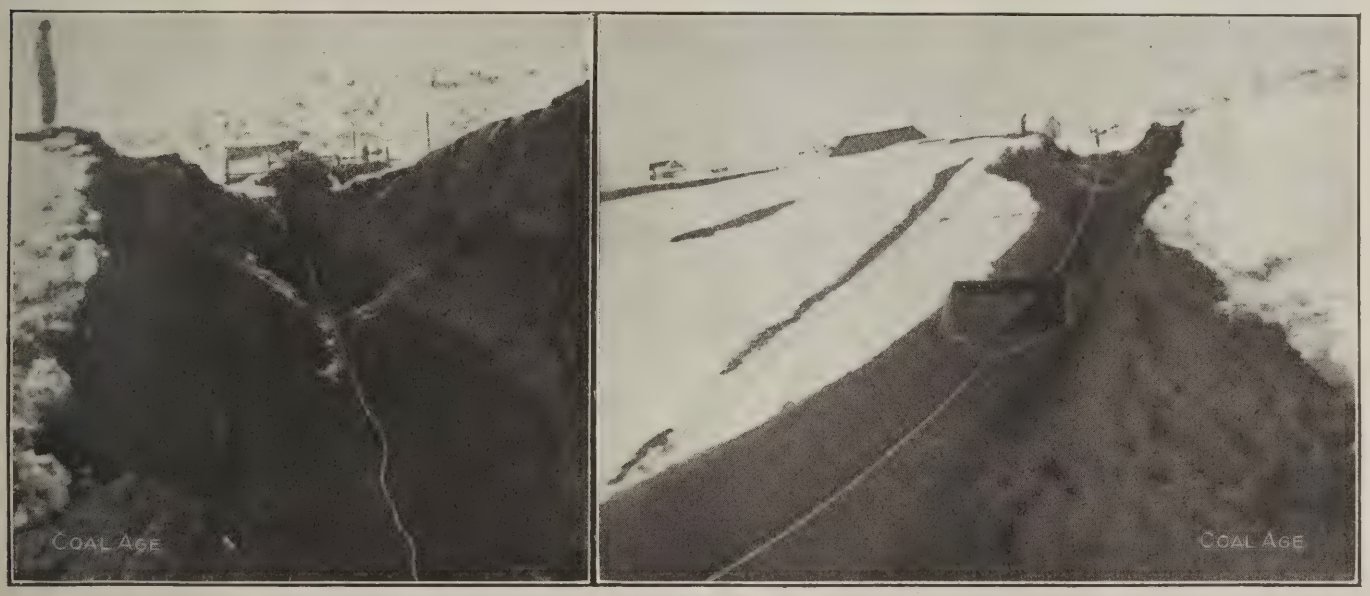
Sometimes it is mined as at A_1, leaving a shell of coal on both wings all the way back to the heading. The miner loading the coal from the wings is often apt to leave a larger shell than he supposes, as a result of poor alignment of the split or of the room and this large quantity of coal acts as a fulcrum or pivotal point, preventing a good clean fall of the roof.

Thus the weight which should be on the bottom is thrown onto some nearby pillar, causing it to be unduly strained, and if the number of pillars working is great and the losses of coal occur too frequently within a limited area, a squeeze may result which will cause serious losses of coal.

Loading an Old Slack Pile

By F. W. Whiteside*

The recent Colorado coal strike, which was called Sept. 23, 1913—while unable to tie up all the mines in any of the coal-mining districts—has caused suspension of operations in a sufficient number in Fremont County to curtail the output seriously. But three properties, two of which belong to the Victor-American Fuel Co., are now running.



The Loaded Scoop Nearing Discharge Point and Returning after Being Dumped

In this district are located the Ideal and Concrete Portland Cement plants; two of the power plants of the Arkansas Valley Ry. Light & Power Co., the United Oil Co.'s refinery, and a number of smaller concerns, all of which consume a large quantity of slack coal.

To meet the shortage of production, a contract was let to the firm of Fox and Smith to load coal from some of the old slack storage or better waste piles at Coal Creek and Magnet mines, upon railroad cars for shipment to the plants above enumerated.

The contractors who have undertaken to load this coal, have a somewhat unique plant consisting of a 50-hp. a.c. electric motor, a double drum drag-line hoist and a large

*Chief engineer, Victor-American Fuel Co., Denver, Colo.

scraper or scoop. The operation can best be likened to a main and tail rope mine-haulage system in which the scraper takes the place of the coal trip. The scraper presents an advantage, in that it dumps without being detached from the ropes.

The electric motor and hoist are mounted upon the same floor system, which is provided with lateral skids, enabling it to be moved upon rollers as a unit whenever a change in position becomes necessary.

By changing the location of the tail-rope sheave directly behind the drag scraper, an immediate adjustment in the course of travel of the latter is effected, so that by this means and by a slight altering of the head sheave just in front of it, a wide range of territory can be covered without moving the hoist.

The best day's run loaded twelve 100,000 lb. capacity steel gondolas to their fullest capacity. An average of nine cars in eight hours, including moving and delays, is easily obtained. The operation of loading can be han-



THE SCOOP JUST AFTER DUMPING

dled by two men, although more are required when it becomes necessary to move the hoist.

The power is charged to the contractors at a flat price per month, but as it is less than the cost of a single laborer, it is readily seen that the expense of loading per ton is very light, and the speed of operation reasonably great.

It is quite possible that a much higher capacity could be maintained, but in the case before us the actual demand had to be considered, and the supply regulated accordingly.

From the above it will readily be seen that by this method slack can be loaded both cheaply and effectively; much more so than with a dipper, as the speed of operation of the drag is considerably greater.

By mixing this material with new slack direct from the mines, good results are obtained, excepting in the case of the cement kilns, where it is necessary to use undiluted fresh slack.

Coal Mining Institute of America

An executive meeting of the directors of the Coal Mining Institute of America, was held Jan. 8, at 2 p.m. in the offices of W. E. Fohl, Farmers Bank Building, Pittsburgh, Penn.; Jesse K. Johnston, I. G. Roby, A. P. Cameron, Joseph Knapper, W. Seddon, and C. L. Fay being in attendance, also S. B. Smith by invitation of the president.

Mr. Johnston reported that inquiries made from 50 members, revealed a desire to make the papers and discussion follow lines interesting to the general run of mining men avoiding the more technical subjects. It was suggested that the secretary should urge on operators the advantage of having their fire bosses and foremen present at the semiannual meetings.

MEETING TO BE HELD IN BIRTHPLACE OF INSTITUTE

The summer meeting was arranged to take place at Monongahela, Penn., that being the birthplace of the Institute. The date was left for later determination, but it will be in June and so arranged as to avoid conflict with the Mine Inspectors Institute of the United States, which is held on the second Tuesday in June and this year occurs on the 9th.

A local committee was named to make arrangements at Monongahela, with Alexander McCanch, state mine inspector, chairman.

The other committeemen are Henry Loutitt, the first president and former mine inspector, William Bird, H. T. Booker and W. A. Luce.

It is too early to give the program in detail, but a paper will be read on the Lake Erie and Ohio River Ship Canal. Timbering methods will be discussed by J. M. Armstrong and William Seddon. Possible substitutes for mine posts will also be discussed and correct methods of timbering will be illustrated by stereoptican views. A. P. Cameron will discuss "Accidents Caused by Machine Mining As Against Pick Mining" and a paper is expected on efficiency methods in mining as exemplified in actual practice.

Mine Explosion in Alabama

BY SPECIAL CORRESPONDENCE

A local gas explosion occurred in the Rock Castle mines of the Davis Creek Coal Co., 30 miles southwest of Birmingham, Ala., on Saturday morning, Jan. 10, killing twelve men. Gas had been reported that morning by a fireboss, in three rooms on the seventh right entry.

After the miners went to work, a mine foreman and a brattice man went down in the mine to investigate the presence of the gas. The explosion followed soon after their entrance, killing them and all the others in that entry; the balance of the mine was not affected. The bodies were recovered by 7 p.m. They were all horribly burned and the men had in all probability been killed instantly. Ninety men were in the mine at the time of the explosion.

Engineers Society of Northeastern Pennsylvania

The Seventeenth Annual Dinner of the Engineers Society of Northeastern Pennsylvania will be held at Hotel Jermyn, Scranton, Thursday evening, Feb. 5, at six-thirty o'clock. The cost per plate will be $3.50. As in the past, members will have the privilege of bringing guests, provided one week's notice is given. Tickets for guests may be procured from the Ticket Committee.

Editorials

Looking Ahead

At no time in recent years has the business outlook in coal mining appeared brighter. We are gradually reaching a point in the fuel industries where producers pay more regard to the demands of the markets. It is no longer easy to open a mine by simply building a railroad dump and driving a drift into the seams. Desirable coal lands near good markets are not available in quantity except at a stiff price. It is also true that recent legislation to safeguard miners has shouldered the owner with an expense for equipment and operation that cannot be borne by the small individual.

All this means that the consumer will have to pay more for his coal, but he will not complain when it is made clear to him that the additional cost is utilized to conserve both men and mineral. Coal mining is the one great industry of the nation where there is no margin of profit for lawmakers to lay a tax upon. The cost of improved conditions must be added to the market price of the fuel we burn in our homes and factories.

And there is no sincere regret to be expressed at the passing of the small operator. His methods were the most disturbing influence in the industry. He found it practically impossible to make money himself, and prevented the larger corporations from doing a satisfactory business.

That conditions in the bituminous industry are tending toward greater stability is the belief of all those who are well informed in coal matters. We have in this country practically inexhaustable supplies of natural fuel, but it is likely that the coming revival in general business will find our mines none too big to satisfy the demands that will be made upon them.

Of course, we have all heard it said that we could immediately double our annual output with the mines now operating, but the statement lacks truth. At the present time, it is a fact that most of the days and hours when our collieries are not working, are given over to necessary repairs to machinery, to the placing of timbers, and to cleaning the underground workings generally. It is fallacious to say that because a shaft will produce 1500 tons in 8 hours, the same shaft and mine by working double shifts, can be made to produce 3000 tons for each of the possible 300 working days of the year.

We hazard the suggestion that American coal operators would have difficulty this year in adding 25 per cent. to the coal production of the United States if called upon to do so. And when we consider that in case of a nation-wide improvement in business, the present railroad equipment of the country would be inadequate, it becomes evident that a few outside influences must be reckoned with.

We sincerely hope that transportation facilities and mine capacity will be the only determining factors in 1914, however, it is a stretch of optimism to believe that "wage scales" this spring will be renewed without some trying moments. It is to be hoped, however, that arrangements will be satisfactorily concluded whereby the mines can continue in operation even though new contracts are not signed by Mar. 31, when present agreements expire.

The year 1914 in coal mining can be made a period of record prosperity for operator and miner alike if each will exercise great forbearance in his dealings these next few weeks. Every evil cannot be remedied in a day, and some sore spots still remain in the coal business; however, general conditions in our mines and camps are so far improved beyond what they were a few years ago, that a look backward can leave no doubt concerning the rapid progress that has been made.

Of course, if we manufactured automobiles instead of mining coal, our labor disputes would be at an end, for we would only have to hand out a few millions of profits and strikes would be matters of ancient history. But there! that is idle conjecture, for automobiles are luxuries while coal, like food, is a necessity. According to common parlance, a necessity is something we *ought* to have, but a luxury, such as our motor car, ah! that's different, that's something we *must* have.

Kincaid, Illinois

Our readers will find in the Sociological Department a description of Kincaid, but we think that most will find the principal interest not in the village as such, but in the light the article throws on the attempt of the operator to avoid the fierce competition of the coal market and work his way into the power-selling industry.

There are altogether too many artificial conditions in the life in which we live and some arise from the attempt of some people to get just what they want, regardless of the expense it may take to get it. When the producer and the buyer are one, there is immediately an endeavor to modify the demands of the latter to meet the producer's ability to supply those requirements.

If the miners get the right to shoot coal out of the solid, there are several ways to avoid the loss which results from this provision. They can be made to undermine their coal by hand, by a contract which expressly requires it; they can be supplied and required to use undercutting machines, or the market can be brought to accept slack. Eventually we believe that small coal will be the general demand of the market and the only question remains whether we shall use slack or pulverized coal. But for the present, the operator can only keep the slack for his own use and sell the large coal to the manufacturer or railroad if he would make a profit.

The requirements of low sulphur and ash are largely removed when power is generated at the mine. When he consumes all or the bulk of the coal he mines, the coal operator is enabled to make the boiler equipment suit his coal and thus get better satisfaction from it than it would give in the general market.

So long as the operator uses his large coal to run his plant, so long it will be hard for him to force fine coal on

an unwilling market. When he is using the slack himself, both he and his force of salesmen can with justice urge the installation of slack-burning furnaces. When all the coal is shipped in that form, there will be less pilfering from the cars and it will no longer be true that slack is lower in thermal units than the larger product and has, in many cases, a greater readiness to clinker.

Moreover, many coals which in the market are not meeting with success, we shall find a way to burn when there is a demand for power at the mine. The outward appearance or the analysis or a low clinkering temperature will not suffice to condemn a coal if a method can be found of burning the fuel with efficiency. The more will this be true because the impurity will not have to be hauled a hundred or more miles with the coal with resultant increased cost for pure fuel substance at the point of delivery. Nor will the ash have to be carted several miles into the country or loaded in railroad cars when coal is burned at the colliery power plant.

Fortunately the Christian County coal is of remarkable purity and probably the Peabody operation is in no need of any or all the advantages described, but there are many plants where a central station for power sale would make all the difference between bankruptcy and success.

Certain it is that combinations which follow a product all through its modifications as iron ore to finished steel, or coal to delivered power, conserve our natural resources and our labor even more than those trusts which working as it were horizontally, combine all those who are engaged in promoting a single process in the whole chain development.

These vertical trusts are those which should be fostered for the good of the public for they do not restrain the freedom of business unless the products or some of the products they deliver are sold by them in such large proportion of those from all sources as to restrict competition in them.

The Labor Union

The labor union is a menace to the country but so are the combinations of operators. We sincerely hope that the nation will never tie its hands in dealing with either when the time for action arrives. If either tries to obtain a strangle hold on the public, let there still be a power in the courts to declare that the laws of the game of life are being violated.

We believe that the Sherman bill, if its true meaning be taken without any "light of reason," condemns all labor unions as combinations in restraint of trade and declares the interstate agreement a violation of law. But like Mr. Seager, in his remarks on p. 114, we believe that if workingmen cannot form a union legally, they should receive that power, but the purposes of their association should be strictly limited and accurately defined.

Perhaps the British law of 1875 that what is right for one man is not wrong for an association, would apply without harm to trades unions, but we cannot be satisfied with its applications to combinations of producers and manufacturers. One man can, without wrong, place his prices as high as he pleases, but it does not seem well to permit a combination of men to conspire to raise prices 100 or 1000 per cent. with legislative approval and consent. Try as we will, we find it hard to bind the laborer with the same cords as his employer without making labor unionism completely illegal or placing trusts largely under the protection of the law. This the British law and Mr. Seager do not fail to recognize.

But between making the confession that we cannot restrain trades unionism altogether and permitting it to go utterly wild to the destruction of the country, there are many intermediate stages. We are convinced that the closed shop and the button strike, with or without an agreement, are as clearly infringements on the rights of the workingman as was the old "iron-clad" agreement which operators made employees sign in the earlier days of mining history. We are convinced that sympathy strikes and those which are continued against operators who are willing to concede the wage scale are opposed not only to the Sherman law but to every reasonable moral code.

Stampeding the body politic is tantamount to treason and fortunately it has not been common in this country. We hope it may never be, but we would as soon fail to provide against it by law as blot out Art. 3, Sec. 3 of the United States Constitution against treason, because the practice of such perfidy has become infrequent.

We have a difficult problem in this country. Those whose wrongs most appeal to us abroad are the very persons who, admitted to citizenship or to the country, make the most dangerous people. They may not have sufficient knowledge of our language or customs to be leaders, but they are always ready to follow. Centuries of oppression have given them a readiness to resist and a power of believing anything of those to whom they are opposed. The Finn and the Pole are often far from being grateful for what they receive and are more confident than any others that they are being wronged. Knowing full well the greed with which they would be animated were they in the ascendant, they cannot credit anyone with even a passing interest in their welfare.

It speaks well for the American heart but not for the American brain that the public of this country is willing always to assume that the foreigner is right whenever his protest takes a riotous aspect. Perhaps the citizens of Routt County, Colorado, and Houghton, Mich., have a right understanding of the difficulties at issue. Like Mrs. Pankhurst, many of the disturbers of the peace thank providence that they live in times of oppression, for they do so dearly like a fight.

Uniformity in Annual Reports of State Mine Inspectors

In compiling the data for our annual statistical number, which appeared last week, considerable trouble was experienced through the lack of a common basis of calculation on the part of the various state mine inspectors. Several states make their coal report for the fiscal year ending June 30. Others report for the year ending Sept. 30, and one state report covers the twelve months ending Oct. 31. And this is not the only point of difference. Several inspectors made their estimates on a basis of gross tons, which basis of calculating output is sure to be highly misleading.

Why can't we all get together on common ground and make an annual report of the coal business in short tons for the regular calendar year ending Dec. 31?

Sociological Department

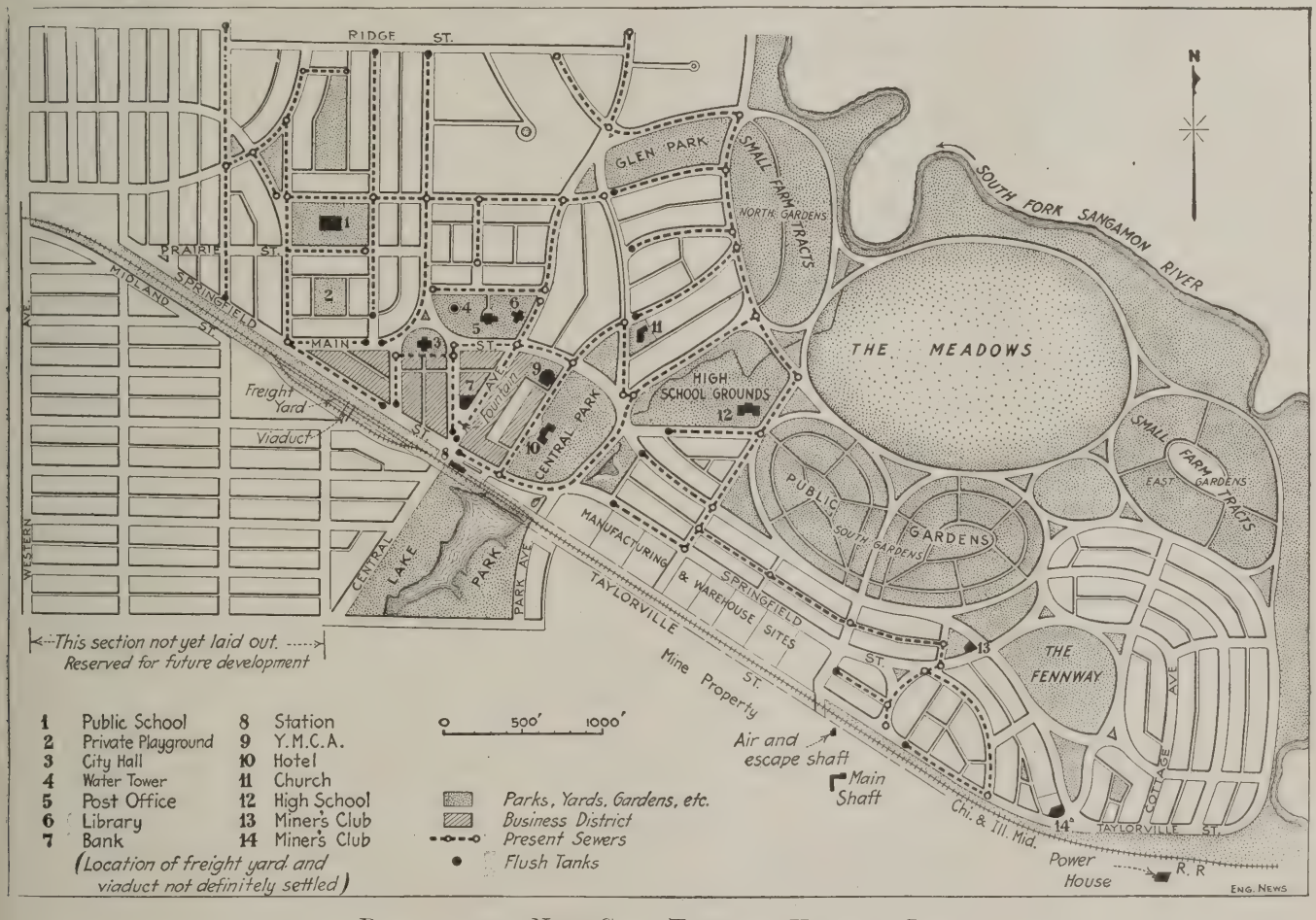
Peabody's New Coal Town in Illinois

SYNOPSIS—F. S. Peabody and S. Insull are building a model town for coal miners and others, at Kincaid, Ill. The builders planned their town with the help of John Mitchell, formerly president of the United Mine Workers of America.

A new town now under construction in Illinois is of special interest in that it is located in open farming country at some distance from any center of population, and that its design has been unhampered by any considerations or conditions of existing utilities. The distinct and interesting feature of this enterprise is the application of practical town-planning ideas for an average population in a coal-mining district.

The town is being established by F. S. Peabody and Samuel Insull, of Chicago, mainly as a place of residence for the miners of a coal-mining property recently placed in operation near the townsite and for the operatives of a large electric power station. They represent the Peabody Coal Co. and the Central Illinois Public Service Co.

While the purpose of the enterprise is commercial, it is being carried out on modern lines in regard to planning, public utilities, housing and sociological conditions. At the same time care has been taken to avoid mere beautification and to keep the practical purposes and limitations of the project strictly in mind. For this purpose the owners had frequent consultations with John Mitchell, formerly president of the United Mine Workers of America.



PLAN OF THE NEW COAL TOWN OF KINCAID, ILL.

THE TOWNSITE

This new town, which has been named Kincaid, is almost in the center of the state, about 20 miles south of Springfield (or 200 miles south of Chicago) and 100 miles north of St. Louis, Mo. It is on a short railway line running west from Taylorville, where it connects with the Wabash R.R. and Baltimore & Ohio Southwestern R.R. The line crosses the Illinois Central R.R. at Pawnee Junction, and extends to Auburn, where it connects with the Chicago & Alton R.R., a total distance of 26 miles.

This railway, the Chicago & Illinois Midland R.R., is

Note—Reprint from "Engineering News" of Jan. 8.

owned by the same interests which own the mines and the new city, and affords a connection with the four large railway systems noted above. At present, the miners live mainly at Taylorville, 8 miles distant, and go to and from work by trains on the local railway.

The area of the site is about one square mile. It is located on the south fork of the Sangamon River, partly on low-lying and partly on undulating land, the maximum difference in elevation being about 40 ft. The soil is black loam to a depth of 2 ft., underlaid by compact clay, with the first coal measure at about 35 ft. below the surface. The plan for the city includes a business district, two residence districts for buildings of the cheaper and better classes, respectively, and an extensive area of park and garden lands. The bank will be owned by Mr. Peabody. The miners' clubs will be operated under control, in order that the liquor problem may be regulated. The design provides for a present and ultimate population of 3000 and 5000.

Paved Streets and a Sewer System

The width of the main streets in the business district is 80 ft., with a 40-ft. roadway and 20-ft. sidewalks. In the residence districts the width is 60 to 66 ft., with a 24-ft. roadway and 18- to 21-ft. parking, the latter including 5-ft. sidewalks 1 ft. back from the property line. The sidewalks and parking have a slope of 6 in. in 20 ft. The paving for the business district will be of brick on a concrete base, while in the residence districts it will be macadam. The alleys are 18 ft. wide.

The sources of water-supply are now being investigated by the engineers. It is planned to put meters on all the services, in order to control the proper use of the water while providing an ample supply.

The sewerage system includes separate storm and sanitary-sewer systems in the business district, and a sanitary system in the residence district. Flush tanks are provided at all the dead ends. The manholes and flush-tanks are of concrete. Sewage purification is essential, the effluent to be discharged into the river, and as there is very little water (sometimes none) in dry seasons, all chance of nuisance must be provided against. Complete purification will be adopted.

All the sanitary sewers are of vitrified pipe, 8 to 15 in. diameter. The sewers are laid in the middle of the streets, with the water mains about 10 ft. from them. An exception to this is at the east end, where the slope of the ground makes it necessary to put the sewers in the alley. Electricity for street and interior lighting will be furnished from the neighboring power plant. This also will supply power for domestic use.

A Third of the Land for Public Purposes

A special feature of the design is the large amount of land reserved for park purposes, this representing 25 to 30 per cent. of the total area. A large public park, called "The Meadows," is laid out along the river and two sections of public gardens in the bottom lands have been reserved for the use of the miners. These are laid out in lots, to be rented by householders, and used for growing vegetables, etc. These garden lots are approximately 100x 100 ft. As the bottom lands are subject to overflow, a dike or levee is being built to protect the lower part of the residence district from flood waters. Rows of trees and shrubs will be planted along the streets.

There will be 10 to 12 miles of streets and water mains, and all streets will be provided with sewers. At present, work is in progress on 7 miles of sewers and an equal length of street grading. No contracts for street paving have been let, but the work of building 200,000 sq.ft. of concrete sidewalk has been commenced by a contractor.

The size of the lots ranges from 30x125 ft. for the miners' houses to 50x125 ft. (or more) in the better residence section. The company will have designs made for dwellings of different styles and costs, and purchasers of lots will be allowed a selection from these. The plans will be drawn to provide for modern conditions of good housing, and sanitation, and all buildings will be erected under the supervision of the company's architect. The company will aid in the erection of the city hall, school, high school, postoffice, public library, hotel, and Y. M. C. A. building. A temporary four-room school has been erected already, for the use of the children of farmers in the vicinity. The railway will build a new station. The first stores and prominent buildings of the business district will be designed and built by the company. A number of residences, three store and office buildings and the railway station are under construction, and occupation of the new city will commence within a short time.

The municipal engineers are Alvord & Burdick, of Chicago, who have designed the street, water and sewerage systems and have supervision of the construction. The architect is George W. Maher, and the landscape architect is O. C. Simonds, both of Chicago. All construction work is being done by the Pawnee Construction Co., whose engineer is W. H. Leland. About $100,000 have been spent this year on municipal improvements.

Planning Methods

The office methods of the engineers in preparing the design of the city were as follows: in the first place, a topographical map was made of the entire area, with 1-ft. contours, to a scale of 1 in. to 100 ft. The streets were then located to fit the topography, and profiles and cross-sections drawn. Then the grades were adopted, together with the widths and forms of cross-section of the streets. Next the sewers were laid out, and sewer profiles drawn. Profiles were then made for the grading, these showing the profiles for the center line and both property lines, with cross-sections for each 100-ft. station. A record map or plat was then made, showing all dimensions. Each lot can be located from $\frac{1}{16}$ corners, which are marked with concrete posts 8 in. square and 4 ft. long, each having a $\frac{3}{4}$-in. brass plug or bolt in the top, with a crosscut in the center of the head.

Mines and Power Plant under Same Control

Reference has been made to the large power station built recently in the vicinity. This is about a $\frac{1}{2}$ mile from the southeastern corner of the town, being located near the mines and thus assured of a cheap and ready supply of coal for power development. It is designed for an ultimate capacity of 10,000 kw., and will distribute current within a radius of 25 or 30 miles. The plant was designed by Sargent & Lundy, consulting engineers, of Chicago. It is operated by the Central Illinois Public Service Co., which owns a series of power plants and transmission lines.

Discussion By Readers

Results in Discussion

Letter No. 1—Referring to the question of the adoption of some definite plan or policy that would determine conclusively the safest and most successful measures to employ, as suggested in the inquiry, COAL AGE, Nov. 22, p. 786, it is clearly apparent that this is a difficult matter.

The roads to success are many. To bring the discussion of a question to a successful and practical climax is not always an easy matter. Many of the letters written on the subjects discussed in COAL AGE come from men prominent in the mining industry in this country, men of acknowledged ability. Their letters are, in most instances, expressions of actual experience.

It goes without saying that when a practical man has found that a certain method brings good results, he is bound to advocate its adoption, under conditions that appear to be similar to his own. These conditions may or may not be fully explained and understood by all and to this fact may be attributed the success or failure of the plan when adopted by others.

We are often prejudiced in favor of methods with which we have become familiar. To illustrate this point, permit me to give an incident in my own experience. While engaged in my first work in surveying, I was taught to use a tape 300 ft. in length and employ the method of vertical angles for reducing the measurement on the pitch to horizontal distance.

Being employed, later, in another section, I was forced to use a tape only 50 ft. in length. The practice in that locality was to take all measurements on the horizontal. I did not hesitate to condemn this method, but found, after all, that just as accurate results were obtained by the horizontal measurement.

Argument rarely convinces men of prejudiced ideas. The old Scotch adage, "A man convinced against his will is of the same opinion still," aptly applies to a large number of mining men. Every practical mining man, however, will freely admit that the publication of letters relating the experience of others, is of infinite value to the mining industry. By this means, ideas are brought out that would never find expression in print but for this method of discussion. Without a doubt, many of the ideas expressed in the letters are acted upon by others and their merits proved or disproved as the conditions permit. There is always a wrong and a right way to mine coal, but there are many varieties of the right way.

G. M. SHOEMAKER.

Pennington Gap, Va.

Letter No. 2—Mine Superintendent, COAL AGE, Oct. 11, p. 555, and Charter Subscriber, Nov. 22, p. 786, seem to think that COAL AGE or someone should determine the superiority of the proposed methods of safety in mining; and that it should be possible to point out certain definite conclusions in regard to methods that seem to recommend themselves as being superior to all others in handling the dangerous problems that confront mining men today.

I have wondered if the above mentioned parties fully realize the magnitude of the requests they make. To ask for the best plans and methods to be adopted and definite conclusions relative to unsettled questions is one thing; to produce such plans, methods and definite conclusions, under all conditions in mining, is quite another thing. Almost everyone will acknowledge that it is a difficult proposition to lay down plans and methods of safety in mining that will be universal in their application. We all realize that local conditions have much to do in determining the safest methods to pursue. What might be done with a reasonable degree of safety in one mine would, perhaps, be dangerous practice in another mine, although, perhaps, the conditions are almost identical in the two mines.

We may ask: What are the elements that give rise to dangerous conditions in coal mines today; and the answer will be, in most cases, "gas and dust." However, the danger does not consist so much in the presence of gas and dust as in the carelessness, lack of knowledge and discipline of mine officials and the unsafe methods adopted by them, in dealing with these recognized dangers.

The discussions in COAL AGE have resulted in bringing forward many essential points in respect to safety in coal mining, by men of broad experience. It may be true that each writer has written, more or less, from the standpoint of his own experience and with respect to conditions with which he is most familiar. Nevertheless, any reader who has given careful attention to the arguments advanced has surely reached conclusions that will enable him to adopt better and safer methods of mining. It is true that opinions may differ even among men of like experience, but the preponderance of opinion will generally control and point the way to safety.

As a concrete example of this, out of the 19 letters submitted in the discussion of Mixed Lights in Mining, there were but six in favor of the use of mixed lights in mines generating gas, as compared with 13 that were unalterably opposed to the practice. It is reasonable, therefore, to conclude from this discussion that: *In respect to safety, all mines generating gas, in a single section only, should be operated exclusively with an approved type of safety lamp.*

Again, in the discussion on the Effect of the Safety Lamp on the Eyesight, the statement that the continued use of the safety lamp affected the eyesight of the miner and reduced his producing power was not proven to satisfaction, since it was not shown to affect all miners alike. Attention was drawn to this in a brief editorial note, COAL AGE, Oct. 18, p. 585. In the same discussion, it was not shown fully that the use of the safety lamp in mining reduced the producing power of the miner, as was claimed by some. The one argument advanced against the use of the safety lamp, to which all agreed, was its inconvenience in handling.

The eight letters, thus far submitted, discussing the question of Starting a Fan after an Explosion, in a mine, failed to deal specifically with this subject and to make it clear whether or not it is advisable as a means of safety to life and property, to start a fan that has been temporarily disabled by an explosion, before the work of rescue and exploration is undertaken. The failure, in this case, to arrive at a definite conclusion, is probably due to the fact that local conditions have much to do with determining the answer to this question. It must be admitted, however, that the opinion was pretty generally expressed that the condition of the mine workings should be ascertained, in respect to the existence of fires that may have been started in different parts of the mine by the flame of the explosion; and that this knowledge should be obtained by the use of helmets, or other breathing apparatus that would enable rescuers and explorers to enter the mine workings before again starting the fan. A valuable suggestion was also made in several letters to the effect that the work of exploring the mine and restoring the ventilation therein should be performed in sections, which would greatly simplify the task and reduce to a minimum the danger of a second explosion.

The weight of sentiment expressed in the 10 letters submitted in the discussion of Collapsible Stoppings is unquestionably in favor of building substantial stoppings on all main entries and air courses. There have been, thus far, but six letters submitted in the discussion of the Education and Training of Mining Men; but the sentiment expressed in these letters is in accord with that of the editorial, COAL AGE, Oct. 18, p. 585, which makes such education and training *"the recognized cornerstone of all effort for improving conditions in coal mining."* The unanimous verdict in this discussion was that safety in mining will be achieved only in that direction. Since local conditions must largely control and determine the means and methods to be adopted, the greatest responsibility devolves upon the mine foreman, who must use his best judgment in the selection of plans and methods of working. It is this fact that makes it absolutely essential that the mine foreman, more than anyone else, have this education and training.

JOHN ROSE,
Dayton, Tenn. District Mine Inspector.

Collapsible Stoppings

Letter No. 11—I read with much interest the several letters that discussed the question of the practical use of collapsible stoppings to stay an explosive wave in its course through the mine entries by allowing an expansion at the point of origin. I feel that one point, at least, has not been brought out in that discussion and believe that attention should be drawn to that particular point, which applies with equal importance to air bridges or overcasts, as to entry stoppings.

Personally, I believe that all entry stoppings should be built in such a manner as to permit of their being hermetically sealed to prevent any leakage of air, and strong enough to withstand any ordinary shock due to blasting or concussion of the air due to a fall of roof. On the other hand, I do not think entry stoppings should be constructed so strong (if it were possible) as to resist the shattering effects of a violent gas or dust explosion.

Assuming that a small local explosion of gas or dust occurs at some point midway in the mine, the argument is pertinent that the destruction thereby of one or more entry stoppings will not only allow a further expansion of the air and gases of the explosion; but what is of more importance, perhaps, will short-circuit the air current at that point; and, as a result, the gases of the explosion will pass out of the mine by the main return instead of being carried inby and made to traverse the mine workings where many would be suffocated by the afterdamp of the explosion.

The readers of COAL AGE will undoubtedly recall cases in their own experience where the circulation of the air having been destroyed by the displacement or destruction of an overcast, brattice or stopping, the men inby from that point who remained at their places were rescued later when the circulation in the main entries was established. It will be remembered that, in some cases, men who attempted to escape by the main entries were quickly overcome by the afterdamp, at points outby from the explosion.

Such instances were very notable at the Bellevue disaster, Alberta, Canada, Dec., 1910. The stoppings in that mine, which were built of 2x12-in. plank, readily yielded to the pressure of the explosion, thus permitting a rapid expansion of the air and gases, with the result that the concussion was barely perceptible in the inner workings of the mine. In this case, 21 men lost their lives in trying to escape by the main entry, as the afterdamp of the explosion filled both the intake and return airways outby from the point of explosion. The eight men who had retreated to the face of the entry were rescued 10 hr. later.

The mistake of attempting to escape by the main entries, after an explosion in the mine, has been demonstrated repeatedly by the finding of dead bodies scattered along the main entry, at long distances from the working face. In some cases, it has been possible to observe that the victims of the disaster had discovered their mistake too late and attempted to retreat inby, as shown by the footprints in the soft floor.

J. W. POWELL, Sup't.,
Windham, Mont. Cottonwood Coal Co.

Letter No. 12—All stoppings are "collapsible" when considered in reference to the force of an explosion. The Roslyn, Comax or Cumberland, B. C., the Black Diamond or Western Washington, and, in fact, all the coalfields of the Northwest build their stoppings in practically the same manner.

The general method of construction is as follows: Two props are stood, one on each side of the crosscut, close to the rib, and a third prop in the center, in line with the other two. A double thickness of 1x12-in. rough boards is then nailed to the props in a horizontal position to avoid fitting, which would be necessary if one thickness was laid diagonally. The boards, however, are made to break joints; and, to further prevent the leakage of air, the cracks between the boards and the ribs and roof of the crosscuts are caulked with strips of brattice cloth secured by cleats nailed to the boards.

A heavy blownout shot or a few blows of a sledge will knock down these stoppings so that there can be no question but that they are collapsible. In some mines, the room stoppings are made even more flimsy. In many cases but one board is nailed to the top and another to

the bottom of the props, and brattice cloth stretched across them, with long cleats nailed on the two sides close to the ribs of the breakthrough to hold the edges of the cloth.

But few concrete stoppings are built in these fields, and they are seldom more than 4 to 6 in. thick. The mines of the Northwest, however, as a rule, are carefully managed and thoroughly inspected, the British Columbia mining law being particularly strict in this regard; yet explosions have occurred in them. Comax mine No. 6, Cumberland, B. C.; Lawson mine, Black Diamond, Wash.; and No. 4 shaft, Roslyn, Wash., each have had their explosions, and while the stoppings were all blown out, it would be difficult indeed to say that this fact had any appreciable effect on the force of the explosion.

When an explosion traverses a long entry, having rooms turned off every 50 or 60 ft., making available acres and acres of open space for the expansion of the gases of the explosion, and this fact does not arrest its progress, it does not appear reasonable to suppose that the limited area of the airway made available by the blowing down of the stoppings in the entries would have the desired effect even at the initial point of the explosion. The crosscuts between two airways are generally farther apart than the mouths of the rooms turned off the airways; and, even assuming that the entry stoppings were blown out, the entry space thus made available for the expansion of the gases would not be one-hundredth of the space already open to their expansion in the rooms.

The building of so called "collapsible stoppings" in these fields is the general practice; but this is done for reasons of economy and not for the purpose of limiting the force of an explosion, should one occur.

RALPH W. MAYER.

Roslyn, Wash.

[The above rather sweeping description of the method of building stoppings in mines in the Northwest, submitted to the chief inspector of mines, B. C., Canada, brought the following comment in response.—Ed.]

Your correspondent's description of the methods of erecting stoppings in the mines in this region, I believe, must carry him back many years. The system as described by him is still used in crosscuts between stalls or rooms, in a panel district or when building a temporary stopping to carry forward the air in a pair of headings, pending the erection of a more permanent stopping.

There are quite a few mines in British Columbia equipped with modern high-speed fans, delivering from 120,000 to 225,000 cu.ft. of air per minute, against water gages varying from 4 to 5½ in. It would seem practically impossible to obtain these results in a mine where the main stoppings were built in the manner described. You may recall having observed, at the time of your visit to the Crow's Nest Pass Coal Co.'s mines, in 1904, that the type of entry stoppings, in use in those mines was cedar logs flattened to not less than a 12-in. face, the log being set in concrete and faced with the same.

The general principle adopted by the Crow's Nest Pass Coal Co. today is the four-entry system, consisting of a double pair of entries separated by a pillar of coal 150 ft. thick. This central pillar is crosscut only every 100 yd. Eventually, one pair of entries is made the intake and the other pair the return for the mine, which plan greatly reduces the number of stoppings necessary to control the ventilation.

The statement of correspondent that concrete is not used much in building stoppings in the Northwest is wide of the mark. To my knowledge, one mine alone, on Vancouver Island, used in one year, no less than 10,000 sacks of cement in erecting stoppings and overcasts These stoppings varied in thickness according to the area of the crosscut, from 12 to 24 in. In some mines, timber blocks are laid in fine refuse with cement facings; in others, the crosscuts are gobbed tight with refuse, in the usual manner; and the walls thus laid at either end of the crosscut are faced with concrete. My remarks are intended to refer only to the mines in British Columbia.

THOMAS GRAHAM,
Chief Inspector of Mines.

Victoria, B. C., Canada.

Starting a Fan after Explosion

Letter No. 9—Referring to the interesting discussion, a short time ago, in Coal Age, on the question of starting a fan that is assumed to have been disabled by an explosion in the mine, I thought it would be of interest to call attention to one or two incidents where lives were saved by the immediate or continuous operation of the fan.

Because of the varying conditions not only in different coalfields, but in different mines in the same field and often in different seams in the same mine, this is a difficult question to answer directly. To say that the fan, after being repaired, should be started at once in order to restore the circulation in the mine, would not be safe, in all cases. While some mines are free from gas and dust, others are troubled with one or both of these dangers. I have found this true in the Cahaba coalfield, in this state.

I have noticed that some writers treat this subject from a purely theoretical standpoint and others from a wholly practical basis. Most men will agree, however, that the practical knowledge of mining affords the stronger hope of rescue for the unfortunate survivors in the mine. The letters thus far submitted have proved of much value, in showing the different conditions that may exist and in the caution they suggest. In discussing the question, some assume certain conditions that do not exist in all mines, as, for example, that each crossheading has its own separate air split; and conclude that an explosion occurring in one of these headings would not affect the other parts of the mine or would not at least, result in a general explosion.

The Acton Mine Explosion

The explosion that occurred at Acton, Ala., Mine No. 2, Nov. 18, illustrates the value of maintaining the circulation in the mine entries, immediately following an explosion, at least under many conditions common in mining. The Acton mine was opened by a slope pitching about 24 deg. and cross-entries had been driven to the right and left of the slope, as far as the ninth level. The mine was ventilated on the split system. The fan was but slightly jarred by the explosion and was soon running again, as usual.

Two rescue parties were organized; and, while one was engaged in restoring the ventilation, the other party was searching the cross-entries and succeeded in bringing

out five men who were found alive. Of the 29 men in the mine at the time of the explosion, the remaining 24 were killed, 16 of these being killed by afterdamp and 8 by the immediate force of the explosion, which was of great violence. The explosion started on the eighth left heading and was caused by a blownout shot. Little gas had been found in the mine, which was considered one of the safest in that district.

This explosion traveled out the slope and destroyed every overcast and stopping along its path. In this case, the split system of ventilation did not save the mine from a general explosion, as some have claimed it would. However, it may be stated that the natural conditions in this mine favored the plan of restoring the ventilation at once, as the coal was hard and would not take fire easily.

Explosion in Another Mine

Another explosion occurred some two years ago, in a mine in the same county, in the Wadsworth seam, which was about 3 ft. thick. This mine also was ventilated on the split system. Undercasts were used instead of overcasts and these were driven through the solid rock, so that the circulation in the splits was not affected by the destruction of the air crossing. The mine was dry and dusty, and previous to the explosion I had watered every heading in the mine. The seam pitched 30 deg. Here, also, the cross-headings were driven off the main slope and rooms turned to the rise of these headings were worked on the chute system.

The immediate cause of this explosion, which started at the face of the fourth heading, was the ignition of a keg of powder that the entryman had left there when charging the holes. In this case also, the flames came out of the heading and traveled up the slope. Fortunately, most of the men were below this heading, and no one was on the slope. In a short time, about 2 min., however, these men began to feel the effects of the afterdamp which would have proved fatal but for the sudden restoration of the air current, due to the action of the fan, which had not stopped. Had the fan stopped, all would have been lost in 10 minutes' time. In my opinion, what saved these men was the fact that all the slope stoppings were built of heavy concrete and brick, and the undercasts, as before stated, were driven through the solid strata.

If this condition existed in other mines, it would often result in the saving of many lives that would otherwise be lost. It is important, also, that the fan be set so that it will not be damaged by the explosion.

Robert Gibson.

Helena, Ala.

Study Course in Coal Mining

By J. T. Beard

The Coal Age Pocket Book

Estimation of Air Columns in Practice—In the ventilation of shaft or slope mines or rise and dip workings in inclined seams, the weight of each respective downcast and upcast column is sometimes calculated separately, by multiplying the weight of 1 cu.ft. of air, at a barometric pressure B and a temperature t equal to the average temperature of the column, by the height or depth D of the same column, as expressed by the formula

$$w = D\frac{1.3273\,B}{460 + t}$$

All air columns are of unit cross-section (1 sq.ft.) and the calculated weight of the column, therefore, gives the corresponding pressure in pounds per square foot.

Positive and Negative Air Columns—An air column that acts to assist the circulation in the mine or airway is called a "positive" column; while one that acts to oppose the circulation is turned a "negative" column. In fan ventilation, a negative air column may exist in the downcast shaft by reason of its temperature being greater than that of the upcast, which frequently happens in the summer season.

Conditions—The height or depth D of air column, in any particular case, can only be determined by carefully consider-

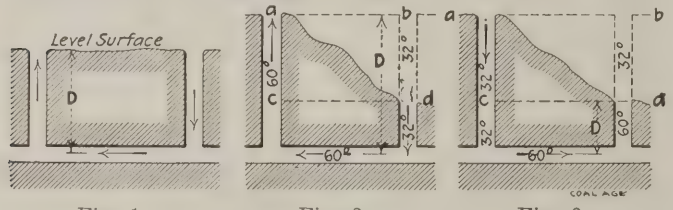


Fig. 1 Fig. 2 Fig. 3

Fig. 1. Level Surface, and Level Seam. Fig. 2. Upcast Deeper than Downcast. Fig. 3. Downcast Deeper than Upcast.

ing the conditions. It is important to remember that, with few exceptions, the temperature of a downcast-shaft column will closely approximate that of the outer air with which this shaft is constantly filled; while the temperature of the upcast column is practically determined by that of the mine or, in furnace ventilation, by the furnace.

When two shafts, upcast and downcast (Fig. 1), are sunk from a level surface or, in other words, have the same surface elevation it is evident that this level marks the upper limit of both columns.

When, however, the two shafts are sunk on a hillside and have different surface elevations, two cases may arise, as illustrated in Figs. 2 and 3, where, for sake of clearness, the outside temperature is assumed as 32 deg. F. and that of the mine as 60 deg. F.

The Coal Age Pocket Book

The cases are as follows:

1. When the shaft having the higher surface elevation is made the upcast, as is usually done, that elevation marks the upper limit of both shaft columns; because the downcast shaft has practically the same temperature as the outer air.
2. When the shaft having the lower surface elevation is made the upcast this elevation marks the upper limit of both shaft columns; because the air in the other (downcast) shaft above this level is balanced by the corresponding column of outside air.

These two conditions, therefore, are simply expressed by the statement that, in either case, the upper limit of both shaft columns is the surface level of the upcast shaft.

In the same manner it can be shown that the lower limit of both shaft columns is the bottom of the downcast shaft when the seam has a general inclination. Hence, the length (D) of both shaft columns is measured, in any case, from the top of the upcast to the bottom of the downcast shaft. This rule does not apply to slopes.

Ventilating Pressure and Shaft Columns—Since the weight of an air column, in pounds, expresses the corresponding pressure, in pounds per square foot; and since ventilating pressure (lb. per sq.ft.) is the difference of pressure between the intake and return; the ventilating pressure, in any given case, is found by subtracting the weight of the upcast-shaft column from that of the downcast column; thus,

Downcast-shaft column, $w_d = \frac{1.3273\,B}{460 + t}D$

Upcast-shaft column, $w_u = \frac{1.3273\,B}{460 + T}D$

$$p = 1.3273\,B\left(\frac{1}{460 + t} - \frac{1}{460 + T}\right)D$$

which can be written

$$p = \frac{1.3273\,B\,(T - t)\,D}{(460 + T)(460 + t)}$$

Calculation of Air Column—The air column corresponding to the above unit ventilating pressure can be expressed in terms of either the downcast or upcast air. The air in the downcast being heavier than that in the upcast, gives a shorter air column for the same pressure.

To find the air column (h_d) in terms of the **downcast air,** divide the above expression for unit ventilating pressure by the weight (w) of 1 cu.ft. of downcast air (temp. = t), which gives

$$h_d = \frac{p}{w} = \frac{(T - t)\,D}{460 + T}$$

To find the corresponding air column in terms of the **upcast air,** divide the same expression for unit ventilating pressure by the weight of 1 cu.ft. of upcast air (temp. = T), which gives

$$h_u = \frac{p}{w} = \frac{(T - t)\,D}{460 + t}$$

Inquiries of General Interest

Organic Sulphur in Coal

I have a question that relates to the analytical chemistry of coal; and, while I know that it is not a simple determination and one that is not often called for, I would like to ask for such information as some of the readers of COAL AGE may be able to give from their experience or knowledge of the subject. I refer to the determination of the organic sulphur that may be contained in coal.

J. V. FREEMAN, Chief Chemist,
Central Laboratory.

Joliet, Ill.

The most common occurrence of sulphur in coal is in the form of pyrites. This occurs either as nodular masses scattered in the coal, or as thin partings interlaminated with the coal, or as finely divided particles disseminated in the mass. What is known as "organic sulphur" is that form in which the sulphur in the coal is combined with carbon or carbon and hydrogen.

In reference to the determination of the organic sulphur in coal, if any of our readers know of a practical method that will separate and determine the sulphur associated in this form, we shall be glad to publish the same.

In this connection, we would draw attention to the editorial that appeared recently in COAL AGE, Aug. 23, 1913, p. 273, relating to the presence of sulphur in the original ingredients that entered into the composition of the coal, and certain erroneous speculations in reference thereto. Also, the short article entitled, Why Sulphur is Found in Coal, Jan. 4, 1913, p. 15.

Rope Lubrication

Can COAL AGE readers give the records or results of scientific investigation or those obtained practically by a reliable party or company, relative to the lubrication of both hoisting and haulage ropes, under wet and dry conditions, in mining practice? This is a question of the greatest practical importance in coal-mining economy and one that deserves attention. What is the best dope and its method of application, and what results have been obtained by its use, in the prolongation of the life of the rope?

A. H. POLLINS, Supt.,
H. C. Frick Coke Co.

Southwest, Penn.

Steel-wire hoisting ropes should be treated periodically with boiled oil (linseed), which is commonly applied by allowing the hoisting rope to run slowly through a wad or bundle of waste on which the oil is poured in quantity sufficient for the thorough lubrication of the rope. This process is repeated at regular intervals, from time to time, as often as the conditions may require. The frequency of the lubrication can only be determined by closely observing the condition of the rope.

In wet shafts, especially where the water has a corrosive action, some standard preparation of crude petroleum and graphite can be used to advantage. Many lubricating firms furnish a good weather-proof graphite grease that gives excellent results.

Haulage ropes require for their protection a dope of greater substance, as, for example, a mixture of pine tar with, say one-tenth raw oil. This mixture is boiled together at a low heat and applied warm. Care is required not to burn the tar, which would destroy its protective quality. It is also important to ascertain that the tar contains no acid; or, if it does, to neutralize it by the addition of slaked lime to the tar. It is recommended that a peck of lime should be used to one barrel of tar, for this purpose. We should be glad to receive figures showing the effect of lubrication to prolong the life of ropes used in hoisting and haulage, in mining practice.

The Mining Expert

I have noticed, in reading various articles, that some writers style themselves "Coal Expert." As I have not a clear understanding of the full meaning that attaches to this title, I would like to ask what education, experience or capability qualifies one for such characterization.

I. S. C.

Indianapolis, Ind.

The term "expert" has been applied by courts to special witnesses supposed to be capable of giving valuable testimony in relation to the technical or industrial details of questions before the court. The person thus designated is assumed to have a knowledge and experience that fits him to speak with authority on the questions concerning which he is called.

Among reputable engineers, the term "expert" has largely fallen into disrepute, owing to its misuse by men of little or no engineering knowledge or experience; but who assume to have a more or less intimate acquaintance with the conditions involved and to be competent judges of matters in question. The self-styled expert generally has no other stock in trade than the title he appends to his name.

Nothwithstanding the stigma that is thus associated with the term, the true mining expert has a standing that gives weight to his conclusions both in court and in consulting engineering practice. This, of course, is dependent on and determined by his reputation as an engineer. All engineers are not experts, just as all so called experts are not engineers, or even good practical men of sufficient experience to warrant the use of the term.

The essential qualities involved in the rightful use of the word or title, are a thorough and complete technical knowledge, the practical application of which has been taught by a long and varied experience in the field, mine, shop, or laboratory; and, even this dual qualification must be cemented by a sound judgment that commands respect and confidence.

Examination Questions

Miscellaneous Questions

(*Selected Questions*)

Ques.—What is the pressure per square inch in a boiler when the entire length of the lever is 32 in.; the distance between the fulcrum and valve stem being 4 in. and the diameter of the valve 2½ in., if a weight of 30⅝ lb. is hung at the end of the lever?

Ans.—The question is assumed to refer to the lever of a safety valve of a boiler, although this is not stated; neither are the weight of the lever, valve and valve stem and the center gravity of the same mentioned; though they are important for the correct solution of the question. However, neglecting the weight of the lever, valve and valve stem, the solution is as follows: According to the principle of moments, the moment of the weight at the end of the lever is equal to the moment of the entire pressure exerted on the valve through the valve stem. Calling this total pressure P, we have

$$P \times 4 = 30\tfrac{5}{8} \times 32 = 980$$

$$P = 980 \div 4 = 245 \text{ } lb.$$

The sectional area of a 2½-in. valve is $0.7854 \times 2.5^2 = 4.9$ sq.in. The unit pressure on the valve is then

$$p = 245 \div 4.9 = 50 \text{ } lb. \text{ } per \text{ } sq.in.$$

Ques.—What thickness of pillar would you leave around the bottom of a shaft 450 ft. deep, the coal being 7 ft. thick and underlaid with 4 ft. of fireclay; above the coal is 10 ft. of soapstone, the balance of the cover being shale, sandstone, clay and soil?

Ans.—Owing to the fireclay floor and the soft soapstone roof of this seam, the safest rule to adopt is that known as Hughes rule for the least diameter of circular pillar or side of a square pillar. This rule allows 1 yd. in pillar thickness for each yard of depth, which makes the minimum diameter of a circular pillar or the minimum side of a square pillar, 450 ft.

Ques.—The indicated horsepower of a pumping engine, raising 1000 gal. of water per min. 500 ft., in a vertical shaft, is 200 hp.; what is the efficiency of the pump?

Ans.—Since no data are given for calculating the friction of the pipe line, in this case, it is only possible to estimate the efficiency of the system, including both the pump and the pipe-line resistances. Estimating the weight of the water as 12 gal. per 100 lb., the total weight of water pumped per minute is $1000 \times 100 \div 12 = 8333+$ lb. The foot-pounds of effective work performed is then $8333 \times 500 = 4{,}166{,}666+$ ft.-lb. per min. The indicated work is $200 \times 33{,}000 = 6{,}600{,}000$ ft.-lb. per min. The efficiency of the system is then

$$\frac{4{,}166{,}666 \times 100}{6{,}600{,}000} = 63.13 \text{ } per \text{ } cent.$$

Ques.—What percentage of marsh gas in the air makes itself apparent in the safety lamp?

Ans.—The answer to this question depends wholly on the kind of lamp used, the oil burned, the ability of the observer to detect the flame cap and the presence or absence of other gases in the mine air. While the presence of fine coal dust floating in the air or a small percentage of carbon monoxide, assists the formation of the flame cap and makes it visible for a less percentage of marsh gas, the presence of carbon dioxide or a depletion of the oxygen of the air retards the formation of the flame cap. Assuming, however, a pure air and using an unbonneted Davy lamp burning a good quality of sperm, lard, or cottonseed oil, a good fireboss can usually detect about 2 per cent. of marsh gas on the flame of his lamp.

Ques.—Find the breaking strain of a ⅞-in. six-strand, 19-wire, crucible-steel hoisting rope; also the safe working load of this rope.

Ans.—The breaking strain of a 1-in. crucible-steel, six-strand, 19-wire hoisting rope being 39 tons, and the strength of the rope being proportional to the square of the diameter, the breaking strain of a ⅞-in. rope of the same kind is

$$L = 39 \text{ } d^2 = 39 \text{ } (\tfrac{7}{8})^2 = 29.86, \text{ } say \text{ } 30 \text{ } tons.$$

In ordinary hoisting practice, for moderately deep shafts, it is customary to use a factor of safety of 5, which makes the safe working load, in this case, $30 \div 5 = 6$ tons.

Ques.—If 20,000 cu.ft. of air is circulated in a mine, under a 1-in. water gage, what water gage will be required to circulate 60,000 cu.ft. per min. in the same mine under the same conditions?

Ans.—For the same conditions in the airway, the pressure or water gage varies as the square of the quantity of air in circulation. In other words, the water-gage ratio is equal to the square of the quantity ratio, which gives, in this case,

$$\frac{x}{1} = \left(\frac{60{,}000}{20{,}000}\right)^2 = 3^2 = 9$$

$$x = 1 \times 9 = 9 \text{ } in.$$

Ques.—If it is desired to double the quantity of air in a mine or airway, how much must the ventilating pressure be increased?

Ans.—For the same mine or airway, the ventilating pressure varies as the square of the quantity. Then, to double the quantity, the ventilating pressure must be increased $2^2 = 4$ times.

Ques.—If a 40-hp. fan gives 120,000 cu.ft. of air per minute, what quantity of air will a fan of 32 hp. give?

Ans.—For the same conditions in the airway and assuming the efficiency of the fan is the same in each case, the quantity of air in circulation varies with the cube root of the power; or, in other words, the quantity ratio is equal to the cube root of the power ratio. Hence, calling the required quantity x,

$$\frac{x}{120{,}000} = \sqrt[3]{\frac{32}{40}} = \sqrt[3]{\frac{4}{5}} = \sqrt[3]{0.8} = 0.9283$$

$$x = 120{,}000 \times 0.9283 = 111{,}400 \text{ } cu.ft. \text{ } per \text{ } min.$$

Coal and Coke News

Washington, D. C.

A final decision in the important case of the Wisconsin Coal Co. vs. The Pere Marquette R.R. Co., and in several other cases grouped together under the same heading, has been handed down by the Interstate Commerce Commission, and is now just made public.

In this case it was contended by the complainants that they were entitled to free reconsignment of coal at Milwaukee, and asked reparation on account of damage suffered as the result of alleged unjustifiable holding of cars at Ludington, including reconsignment and demurrage charges paid on cars detained, as well as damages. The complaint also embraced a charge of discrimination and alleged that the new tariff effective last February was unreasonable. The commission now holds that the complainants were not entitled to free reconsignment at Milwaukee, but were entitled to such reconsignment at a charge of $2 per car. It is held that the detention of cars at Ludington was unjustifiable, and that demurrage charges were improperly assessed and must be refunded. With respect to cars which arrived at Ludington before the receipt of passing notice and proper time for giving disposition orders, the charges were improperly assessed and should be refunded.

Reconsignment Involving Extra Service Must Be Paid For

There is no evidence upon which to measure damage to cars upon which the notice was insufficient. Generally speaking, it is held that the commission has power in its discretion to require the establishment of reconsignment and diversion on the basis of the through rate from the point of origin to new destination with a fair charge for extra sevice. Further, it is held that a carrier may, as a matter of convenience when its terminal tracks are congested, hold cars at some point short of destination, provided that such a course involves no disadvantage to the public. There are several other interesting points in the case that cannot be briefly treated.

The case in question grew out of a controversy concerning the service of reconsignment to be afforded bituminous coal shipped by the complainants to Milwaukee and diverted to destinations beyond. The complainants were coal brokers at Milwaukee. They had no storage facilities. Their practice is to ship coal from the mines in Ohio, Pennsylvania, and West Virginia to Milwaukee under what is known as a "blind billing." The destination given is, for example, "Milwaukee, or beyond," or "Elm Grove," the latter being a station a short distance outside of Milwaukee on the line of the Chicago, Milwaukee & St. Paul.

Reconsignment Is Due to Carriers' Own Default

Some of this coal is ordered and sold by the complainants under contract. The larger portion of it, however, is "free coal," and is sold during transit. In the case of the free coal, reconsignment during transit is, of course, the practice. It is alleged by the complaints that reconsignment is further required because the unusual delays in the movement and carrier's failure to deliver coal in the order in which it is shipped from the mines makes it necessary for the coal brokers to supply their contract and order demands from time to time with substitutions of free coal.

The coal moves to Milwaukee on a proportional rate. Coal actually delivered in Milwaukee for local consumption paid, at the time of the complaint, from the Kanawha fields a rate of $2.50 a ton. Coal going through Milwaukee for delivery to destinations beyond was charged a proportional rate of $1.90 per ton. This rate has since been increased to $2 per ton. Beyond Milwaukee it pays the full local rates of the delivering carriers. The defendant, the Pere Marquette R.R., has engaged extensively in this transportation. It receives the coal from Eastern carriers at Toledo, Ohio, and moves it thence to Ludington, Mich., a distance of about 273 miles. From Ludington the traffic is carried on the Pere Marquette's car ferries across Lake Michigan, a distance of 97 miles to Milwaukee, where the Pere Marquette makes connection with the Chicago, Milwaukee & St. Paul. It is also ferried to Manitowoc, Wis., where connection is made with the Chicago & North Western and the Soo Line.

At Milwaukee, the Pere Marquette has no extensive terminal, but only an interchange track connecting the car ferry with the tracks of the Chicago, Milwaukee & St. Paul road. This track accommodates about 200 cars. The Pere Marquette maintains no motive power in Milwaukee, and the service of switching the cars from the car ferries to the interchange track and subsequently, in the case of outbound movements, to the tracks of the St. Paul road is done by the locomotives and employees of the latter road under a contract for this service with the Pere Marquette.

Reconsignment Must Precede Arrival of Cars at Reasonable Distance from First Destination

In speaking of one of the main points at issue, the commission makes another interesting ruling and says:

We . . . held that it would be unreasonable and an unjust burden on traffic for carriers to exact the reconsigning charge without undertaking the duty of giving notice to consignees, thus affording them an opportunity of giving disposition orders before the arrival of the cars at their destination. We stated on the other hand that if the coal dealers, having such notice, were not able to give their reconsigning orders before the cars reached Detroit, it was entirely just and reasonable that they should pay the charge for the reconsignment service. We believe that this rule properly may be applied in the present case."

The Railroads are Asked to Show Whether Coal Rates Are Reasonable

Request has been made of the Interstate Commerce Commission by counsel for the Pittsburg Coal Co. that it shall require of all railroads involved in the advanced-rate cases a definite statement of the actual cost of transportation of coal (bituminous) from mine to point of delivery, differentiating the different elements of cost, such as haulage charges, terminal expense, etc. It has not yet been definitely decided how far the commission will require carriers to go in this matter, as it is recognized that an attempt to provide, in good faith, the data mentioned by the Pittsburg Coal Co. would involve a large statistical expense. Carriers regard the matter with some anxiety, believing that the granting of the request would establish a serious precedent. Besides the request demands of them data which they hardly believe they can secure with exactitude.

HARRISBURG, PENN.

A strike of all the miners in the bituminous District No. 2 on April 1, or the shutting down of all the mines by the operators, or both, may be the outcome of a meeting held on Jan. 9, of the Association of Bituminous Coal Operators of Central Penn.

The subject of dissolving the association was thoroughly discussed.

This was advocated by many members because of the alleged unfairness of the miners in reference to the agreement between the operators and the men which expires on Mar. 31. However, it was decided finally not to disband.

On the other hand, it is understood that, a change will be made in existing wage rates and the operators, it is said will ask the men to submit to a reduction of wages. Such a step undoubtedly would lead to a strike or a total suspension.

During the last year the proceeds have fallen off considerably in this district, due to the numerous petty strikes, which the operators assert were based almost wholly on the "closed shop" proposition and were in violation of the existing contract.

Many members of the association allege it is useless to make a contract with a labor organization that violates it at its convenience and with apparently no officials with power to enforce the terms of the contract. When the motion for dissolution was finally put up to the executive board, six of the members voted to disband and seven members voted to continue.

It is alleged that the mine workers are scheming to circumvent the clause in the existing agreement that provides there shall be no cessation of work for 30 days, pending a failure to reach an agreement.

It is reported a call has been issued for a convention of the mine workers delegates from all locals of District 2 to be held on Feb. 24 fully a month earlier than has been the custom. It is also alleged that the miners are forcing a meeting of the Scale Committee of both sides late in February, so that 30 days shall have expired by midnight Mch. 31, the date when the existing scale goes out.

PENNSYLVANIA

Anthracite

Wilkes-Barre—One of the most important lawsuits to be tried in years, and which is expected to determine for the first time the rights and liabilities of a coal company to mine under public streets, was called before Judge O'Boyle on Jan. 8. It is the equity suit filed by Plymouth Borough against the Plymouth Coal Co., to restrain the latter from mining coal under the borough streets.

This is said to be the first case of its kind to be tried in the anthracite region and the result will have considerable bearing on the mine cave question and the rights of municipalities as against the mining rights of the coal companies and their liability for surface support.

Harrisburg—Charters issued by Secretary of State McAfee, on Dec. 31, for the incorporation of eleven electric companies, to operate in Bucks County are thought to be a forerunner of an important plant which may eventually supply light, heat and power to the city of Philadelphia. The incorporators of the new company are S. D. Warriner, president of the Lehigh Coal & Navigation Co., Rollin H. Wilbur, S. Davids, and P. F. Baker, Germantown.

A few years ago the Lehigh Coal & Navigation Co. began the construction of an electric plant at Hauto in Carbon County, and the fuel is obtained from culm banks controlled by the company. With this advantage over competitors in not having to purchase fuel, the company can manufacture and dispose of electricity at cheaper rates than other companies.

Bituminous

Uniontown — Two large acreages of the Freeport vein of coal in West Virginia were purchased by J. O. Clark. The coal purchased is in two tracts of 510 acres, one being of 245 acres and the other of 265 acres. The coal was purchased from D. E. Runnion, of Strange Creek, W. Va. The tracts are located on Elk River and Birch River, and are near the tracts owned by the Colonial Coal Co., the Farmers' Coal Co., and the Strange Creek Coal and Coke Co., all owned by Uniontown capitalists.

Charleroi — River shipping coal mines in the Monongahela Valley are threatened with forced suspension by the strike of tow boat engineers. All but three towboats have stopped operations. This means that no coal can be shipped by river and as soon as the barges at the different mines are filled the mines will have to stop work until the strike is settled or the boats start to operate.

WEST VIRGINIA

Moundsville—Four men were burned in an explosion of gas which occurred in room 12 of the First St. mine of the Mound Coal Co. on Jan. 9. None of the men was seriously injured. The accident was the result of a pocket of gas accumulating and becoming ignited. The four men who were burned were working in the room at the time the explosion occurred. Between 75 and 150 men are employed in the mine. The explosion was confined entirely to room 12 and caused very little damage to the mine.

TENNESSEE

Knoxville — The Knoxville Iron Co. has sold its Cross Mountain coal mine, near Briceville, to the Cross Mountain Coal Co., which has been organized with a capital stock of $200,000. The price given for the property has not been announced. It is understood that the two companies are in no way connected. The mine involved is that at which the disaster occurred two years ago, resulting in the death of 80 miners.

Chattanooga—It is said that plans are on foot for the amicable settlement of the litigation in which the Dayton Coal & Iron Co. became involved some time ago following the suicide of Peter Donaldson, principal owner, in Scotland. The receivership will be wound up and the company may be reorganized and put on its feet again.

KENTUCKY

Louisville—Formal announcement was made in Louisville last week of the acquisition and merger by the Pittsburgh Coal Co. of six concerns which have handled Pittsburgh coal for a number of years. The consolidation was practically consummated about six months ago, but several details were not completed until recently. The companies included in the merger are Joseph Walton & Co., the O'Neill Coal & Coke Co., O'Donnell & Co., Rabb & Bohmer, Eclipse Coal Co. and the Camden Coal Co. The offices of the company are to be maintained at 121 South Third Street, where Joseph Walton & Co. have done business for a number of years.

Middlesboro—The construction of an electric railway line to connect Middlesboro and Pineville, eastern Kentucky coal centers, as well as a city railway line for Middlesboro, is again being projected, and definite plans may be formed by spring. Mayor J. L. Manring, of Middlesboro, is much interested.

OHIO

Zanesville—The property of the Saltillo Coal Co., consisting of three separate tracts of land and mining rights, was sold at trusetts' sale in Zanesville to attorney E. F. O'Neal for $17,000. It includes a tract located near Cannellville in Muskingum County which is in operation, a tract near Saltillo in Perry County and a tract near Rehoboth in Perry County. A company will be organized to operate the property.

Columbus — A movement for the regulation of coal mines in Ohio, as recommended by the Ohio Mining Commission in its report to Governor Cox, has recently received support from many sides. It is the first attempt on the part of the state government to regulate private enterprises. Coal mines when owned by individuals or corporations have always been classed as private property. The claim is made that when the private enterprise takes on a public interest that overshadows its private rights, the state has the right to say how it may be handled. Lawyers are interested in the proposed measure and the legal problems it will bring with it.

INDIANA

Terre Haute — The executive board of the Indiana Coal Operators Association has adopted a resolution asking the Interstate Commerce Commission to grant a 5 per cent. increase in freight rates asked by the railroads. The resolution calls attention to the advances in wages and other increased costs of operating the roads.

Indianapolis — The Supreme Court of Indiana affirms a judgment of the Greene County Circuit Court for $8000 damages against the Shirley Hill Coal Co. for causing the death of Frank Miller, by failing to keep the roof of a mine in safe condition. The company's appeal was on the ground that the verdict was excessive.

ILLINOIS

Harrisburg—The City Council recently passed an ordinance that no liquor shall be delivered by the express companies, unless the purchaser shall sign an affidavit that the liquor is to be used for medical purposes, and any person who invites a friend to his home or place of business and gives him a drink, is subject to a heavy fine. All clubs are prohibited from keeping liquors in their rooms. Harrisburg is a dry town and is the center of some seventeen or eighteen mines, which produce practically all of the coal in Saline County.

MISSOURI

St. Louis—A general protest has been made by Kansas City business men against an enforcement of the ouster order, recently rendered against lumber companies operating in Missouri, including the Central Coal & Coke Co. Commercial organizations of Kansas City are planning to enter a formal request for a withdrawal of this feature of the decision. If the ouster is enforced, 1075 miners employed in Missouri by the Central Coal & Coke Company will be thrown out of employment. The operating company, would, of course, have the alternative of selling its mining property, or inducing another company to operate it.

OKLAHOMA

McAlester—An explosion occurred in Mine No. 40 of the Rock Island Coal Co. at Gowen on Jan. 2, killing John Cronis, shot-firer. Another shot-firer in another part of the mine escaped unhurt and was rescued the next day by the party which found Cronis' body. The company will sustain heavy financial loss by reason of the explosion, and 300 miners will be out of employment until repairs can be made.

COLORADO

Cañon City—Arrangements have been completed whereby the convicts at the state penitentiary will mine coal to be used at that institution and at the Buena Vista asylum. This step was taken because the coal companies have been unable to furnish the necessary fuel. Gov. Ammons was one of the parties to the agreement whereby the prisoners will work mine No. 5 near here.

Trinidad—Miners who left the district when the strike was called on Sept. 23 are returning to work in southern Colorado in large numbers, according to reports recently received.

NORTH DAKOTA

Shields—A big lignite coal mine will be opened on the Standing Rock Indian reservation, a few miles south of here, next spring. The district in question is underlaid with a splendid quality of lignite, and the opening of the mine (for which the financial features have been arranged) will give employment to a large number. It is proposed by the operators to give employment particularly to the Indians.

WASHINGTON

Spokane—The Oregon - Washington R.R. & Navigation Co. has announced a voluntary reduction of 45c. a ton on coal from the Wyoming field to Spokane and vicinity, effective immediately, to meet competition from the northern Wyoming field, where rates were ordered reduced by the Interstate Commerce Commission. The rate is reduced to $4 a ton. In addition the railroad will, commencing February, switch coal to industries on other lines in Spokane without switching charge.

RECENT COAL AND COKE PATENTS

Coal Separator. G. H. Elmore, Joplin, Mo. 1,077,876, Nov. 4, 1913. Filed July 7, 1905. Serial No. 268,647.

Stoker. P. L. Crowe, Jersey City, N. J. 1,077,872, Nov. 4, 1913. Filed Oct. 1, 1907. Serial No. 395,466.

Coke Quenching and Conveying Apparatus. A. Brunner and W. Schondeling, Leipzig-Gohlis, Germany. 1,077,255, Nov. 4, 1913. Filed Apr. 30, 1910. Serial No. 558,592.

Furnace. A. O. Gutsch, Sheboygan, Wis. 1,077,405, Nov. 4, 1913. Filed Nov. 18, 1912. Serial No. 732,106.

Gas Producer. W. O. Amsler, Pittsburgh, Penn. 1,077,578, Nov. 4, 1913. Filed Mar. 14, 1910. Serial No. 549,168.

Mining Machine. E. McGowan, Mulberry, Kan. 1,077,419, Nov. 4, 1913. Filed June 14, 1912. Serial No. 703,683.

Bit for Mining Machines. J. J. Moore, Springfield, Ill. 1,077,542, Nov. 4, 1913. Filed Apr. 15, 1912. Serial No. 690,793.

Mechanical Stoker. W. P. Starkey, Harrisburg, Penn. 1,077,494, Nov. 4, 1913. Filed Nov. 19, 1908. Serial No. 463,488.

Steam Superheater for Locomotive and other Smoke Tube Boilers. J. G. Robinson, Manchester, Eng. 1,077,641, Nov. 4, 1913. Filed July 26, 1912. Serial No. 711,681.

Mine Shot Firing System. G. I. Rawson, St. Louis, Mo. 1,078,463, Nov. 11, 1913. Filed May 4, 1909. Serial No. 493,792.

Boiler. T. T. Parker, New York, N. Y. 1,078,252, Nov. 11, 1913. Filed May 28, 1913. Serial No. 770,394.

Mine Shovel. J. C. Cartmill, Lead, S. D. 1,078,255, Nov. 11, 1913. Filed Oct. 5, 1912. Serial No. 724,141.

Apparatus for Regulating Supply of Steam to Gas Producers. C. H. T. Alston and P. T. Houston, London, Eng. 1,078,480, Nov. 11, 1913. Filed June 28, 1913. Serial No. 776,414.

Cutting Bit for Chains of Mining Machines. C. N. Barton, Harrisburg, Ill. 1,078,082, Nov. 11, 1913. Filed Feb. 10, 1913. Serial No. 747,397.

Grate. G. M. S. Tait, Washington, D. C. 1,078,071, Nov. 11, 1913. Filed Nov. 4, 1912. Serial No. 729,482.

Water Seal for Gas Producers Working with High Pressure Blast. A. von Kerpely, Vienna, Austria-Hungary. 1,078,148, Nov. 11, 1913. Filed Dec. 21, 1912. Serial No. 737,974.

Coal Breaker. W. Lloyd, Drifton, Penn. 1,079,301, Nov. 18, 1913. Filed May 27, 1913. Serial No. 770,270.

Boxing for Coal Drilling Machines. A. F. Derwy, Pittsburg, Kan. 1,079,289, Nov. 18, 1913. Filed Jan. 4, 1912. Serial No. 669,501.

Coke Drawing Apparatus. J. Hayes, Uniontown, Penn. 1,079,126, Nov. 18,1913. Filed June 18, 1913. Serial No. 774,456.

PERSONALS

J. C. Law, of Carbondale, Penn., was in New York Thursday of last week on a short business trip.

Frank Clark, who has been mine superintendent for the Piney Mining Co. for the past several years, has accepted a position at one of the operations of the Raleigh Coal Co.

E. W. Luton, of Columbus, Ohio, who is well known in coal circles in Indianapolis, has taken the position of Indiana representative for the New York Coal Co., of Columbus, in the place of Arch Grossman, resigned.

W. J. Brown, outside foreman at the Phœnix Park Colliery, has been appointed superintendent of the Philadelphia & Reading Coal & Iron Co.'s collieries in the Ashland district, to succeed W. A. Sauerbrey, resigned.

A. Vernon Orner, civil and mining engineer, recently with the firm of Hess and Bouton of Dubois, Penn., has been appointed chief engineer and superintendent of the Panther Run Coal Co. at Pardus, Jefferson County, Penn., succeeding Henry Redding the retiring superintendent. Mr. Redding has been with the Panther Run Coal Co. for the past 11 years and expects to retire from active business, while Mr. Orner is probably the youngest superintendent employed by any coal company.

OBITUARY

Stephen Harris Harrington, president of the Harrington & King Perforating Co., Chicago, Ill., died recently.

Grant J. Hamilton, 59 years old, a coal operator of Argentine, Penn., died at his home there on Jan. 6. Mr. Hamilton was general superintendent of the Standard Coal & Mining Co. and superintendent of the Mutual Coal Co.

Chas. Campbell, age 67, recently died at his home at White Gables, Kansas City. He was prominent in commercial and financial circles in Kansas City, and was President and Chairman of the Board of Directors of the Central Coal & Coke Co. He began his career at the age of 15 years, as a grocer clerk at Iowa City, Iowa, and died a millionaire.

E. E. Shumway, President of the Rocky Mountain Fuel Co., and well known financially throughout the West, died, Jan. 11, at his home. Mr. Shumway became ill after having superintended the removal of the bodies of 37 men from the Vulcan Mine at New Castle, after an explosion, Dec. 17. The coal strike also is said to have impaired his health. Mr. Shumway, who was 51 years old, is survived by a widow, two daughters, a son, and two stepsons.

Bernard Corrigan, president of the Kansas City Midland Coal & Mining Co., operating mines at Novinger, Mo., died in Kansas City on Jan. 6 of heart disease. Mr. Corrigan was 66 years old. He was the leading figure in the operations of the mining company, of which he was head, but held many other offices during his career. He was for nine years president of the Metropolitan Street Railway Co., of Kansas City, resigning in 1910. Several sons are connected with the Kansas City Midland Coal & Mining Co., and one of them probably will be made president. Mr. Corrigan's estate was worth something over a million dollars, being smaller than expected.

CONSTRUCTION NEWS

Birmingham, Ala.—The Woodward Iron Co. announces that it will start work immediately upon the construction of 30 modern byproduct coke ovens.

Ellwood City, Penn.—The National Coal & Ice Co. has let the contract for a steel coal tipple to the Niles Forge Co.; work will be started in the near future.

Lima, Ohio—The 300-ton coal dock for the Lake Erie & Western Ry. at Lima, Ohio, has been completed by the Oval Construction Co. of Chicago and turned over to the railway company.

Waynesburg, Penn.—The Pennsylvania Railroad will soon make an extension of its lines to tap the new coalfield recently acquired by the Youngstown Sheet & Tube Co. in Greene County.

Brownsville, Penn.—The Denbeau Coke Co. is planning to construct 64 additional coke ovens at its mine near here. The company has 236 ovens, and the addition will bring the number up to 300, all of which are of the most modern type.

Canton, Ohio—The American Mine Door Co. has just fininished shipping an order for 53 machines to the Clinchfield Coal Corp., for their Dante and Dumps Creek operations. It also filled the last of an order for 75 machines last week for the Illinois mines of the Madison Coal Corp., St. Louis Mo.

Columbus, Ohio—The announcement is made from lake ports that 15 steel freighters are being constructed during the winter months to be placed in coal trade at the opening of navigation in 1914. A number of these boats are to take the place of boats destroyed in the severe storms of last November.

Artemus, Ky.—The recently organized Cumberland R.R. Co. is pushing its plans for the construction of a line of railroad from Wheeler, Ky., to Jellico, Tenn., a distance of 24 miles through a rich coal-mining country. The offices of the company are located for the present at Artemus, Ky., in charge of T. H. Hayden, general manager.

Hebron, N. D.—Plans will be made in a few days for the reconstruction of the state experimental lignite briquetting plant, which was recently destroyed by fire. Dean E. J. Babcock, of the School of Mines, who has charge of this plant, is not certain just when the task will be completed, but he anticipates the success of the movement within a short time.

NEW INCORPORATIONS

Chicago, Ill.—The Chicago & Harrisburg Coal Co., of Harrisburg has increased its capital stock from $55,000 to $1,000,000.

Springfield, Ohio—The Springfield Ice & Coal Co., of Springfield, Ohio, has filed papers with the Secretary of State, increasing its capital stock from $122,000 to $250,000.

Richmond, Va.—The Felton Coal Co. has been incorporated at Tacoma, Va., with a capital stock of $10,000. M. F. Hatfield is president and G. F. Neal secretary, both of Tacoma, Va.

Dover, Del.—Elijah & Winne, recently incorporated at Dover, Del., with a capital stock of $25,000 to manufacture and deal in anthracite and bituminous coal and its products.

Mayland, Tenn.—The Mayland Coal & Coke Co. has been incorporated with a capital stock of $50,000. J. S. Cline, C. H. Sells, T. F. Brown and others are among the incorporators.

Chattanooga, Tenn.—The Kentucky Coal & Iron Co. has filed articles of incorporation. The company will operate coal mines and will probably establish iron furnaces near Chattanooga.

Brazil, Ind.—The Peacock Coal Co. has been organized by Mayor John Bray, and will at once locate a shaft on Bray's farm near Billtown where there is a bed of bituminous coal 6 ft. 8 in. thick.

Indianapolis, Ind.—The Cedar Creek Coal Co. has been incorporated here, with $10,000 capital stock, to deal in coal and coke. The directors are A. V. Grossman, H. Grossman and C. P. Bartlett.

Wellston, Ohio—The Blue Jay Coal Co., of Wellston, Ohio, has been incorporated with a capital stock of $10,000 to mine and deal in coal. The incorporators are W. S. McCloud, H. A. Goddars, Grant McGhoe, John H. Yeager, and C. E. Littler.

Poteau, Okla.—The Claco Mining Co., with a capital of $50,000 has been organized by J. T. Roland and Hugh Dook of Milton, L. S. Bayrell, of Frederick, F. L. Mercer and C. G. Weise, of Poteau and Ed Hayes, of Witteville. The company will open an entirely new coal field at Traby Prairie, near here.

Indiana, Penn.—The Conemaugh Smokeless Coal Co. has been organized and will develop 2000 acres of coal in Indiana County, near the Westmoreland County line. The coal is owned by the Operators' Coal Co. This company has big holdings in Indiana County, having recently acquired 1700 acres. It now owns 4500 acres in the Indiana field.

INDUSTRIAL NEWS

Woodlawn, Penn.—Fire destroyed the coal tipple at the Alliquipa plant of the Jones & Laughlin Steel Co., causing a loss of about $8000.

Johnstown, Penn.—The Cramer Coal, Coke & Stone Co. has begun shipments from a 3000-acre tract which it is developing near here.

Brush, Colo.—While drilling a well on the ranch of Lew Forrest northwest of this town today, a 3-ft. vein of lignite coal was struck at a depth of 6 ft.

New Castle, Penn.—It is possible that the mines formerly operated by the Beaver Coal & Coke Co. will be reopened if present plans of the Board of Trade are carried out.

Frostburg, Penn.—John and William Merbach have discovered a rich vein of coal between Frostburg and Meyersdale. They will begin shipping coal just as soon as tracks can be put in.

Macdonaldton, Penn.—The Roberts & Schaefer Co. has closed a contract with the Brothers Valley Coal Co. for a steel tipple and Marcus conveyor to be installed at Macdonaldton. The contract price for this equipment is in the vicinity of $16,000.

Sharon, Penn.—The production record of the Carnegie Steel Co.'s coking plant was broken in 1913 by approximately 25,000 tons of furnace coke, although only one of the four batteries of ovens was in operation during December. The total output for the year was about 445,000 tons.

Henderson, Ky.—The People's Mining Co., recently acquired 65 acres of coal property from W. T. Lambert, the high price of $46 an acre being paid, this being an unusual figure for that section. A tract of 54 acres was purchased by the same company from J. W. Tood at $25 an acre.

Columbus, Ohio—The annual meeting of the Ohio District of the United Mine Workers was held in Columbus, Jan. 13. Delegates were present from all the mining districts of the state. One of the principal matters considered was the recommendation that the Ohio Mine Commission eliminate screens.

Seattle, Wash.—The 840 union coal miners of the Pacific company's mine at Black Diamond have returned to work, the conditions at which the men complained having been adjusted. After two men had been killed in the mine recently in an explosion, the miners refused to work longer until safer conditions prevailed.

Washington, D. C.—Complaints to Attorney General McReynolds from several Eastern cities that the price of hard coal is soaring, charge that the Pennsylvania state tax on every ton of anthracite mined within its borders is responsible. The attorney general has replied to complainants that some individual will probably bring suit to test the law, and if the department finds it advisable, it may intervene.

Fort Smith, Ark.—There is a prospect of the sale of several thousand acres of coal lands in Logan, Johnson and Yell counties to persons said to have the assistance of English and Dutch capitalists. It is officially announced that negotiations are on for the transfer of land and that an option has been secured. The tract is said to consist of 15,000 acres, most of it in Logan County, east of Scranton.

Washington, D. C.—There is absolutely no reason, according to S. C. Elliott, general counsel for the White Pass & Yukon R.R., why the Alaska Railway Bill, which is soon to come up for consideration in committee after Congress convenes should become a law. According to Mr. Elliott, the proposed legislation would involve the expenditure of $35,000,000 without any certainty of returns, and he asserts the belief that President Wilson is favoring the bill through a mistaken idea.

Pittston, Penn.—The Pennsylvania Coal Co. has received a severe set back in the Schooley Colliery operations, which for several years back have been going on. Recently two powerful electric pumps were installed and the work of lowering the water in the shaft had been progressing very encouragingly, but on Jan. 5 an unlooked for rush of water from some unknown source came upon the workmen so suddenly that the pumps and all apparatus were covered over before they could be withdrawn. The machinery which was but recently purchased at a great expense was covered over with mud and other debris, and it will be necessary to completely clean it before it can again be put to pump the water out of this mine.

Nordegg, Alberta—Development of the extensive property of the Brazeau Collieries, Ltd., near the new townsite of Nordegg, 120 miles west of Blackfalds, Alberta, is proceeding rapidly, and the first shipment will be made in January. The mine is situated on the new Canadian Northern Ry. branch from Stettler, the steel on which is now being laid as quickly as possible. Development has been proceeding for the last 18 months, during which 1400 ft. of tunnels have been driven through two seams 14 and 7 ft. thick respectively.

The coal is of a high grade suitable for locomotives. There are 35,000 tons now ready for shipment, which is under contract to the Canadian Northern. An uptodate plant with a capacity of 2000 tons per day has been contracted for to be installed in running order by Sept. 1, 1914, and in the meantime a temporary chute capable of handling 400 to 500 tons per day has been installed. When fully developed the mines will employ 450 men.

Coal Trade Reviews

General Review

Heavy storms and low temperatures cause a better tone, although situation is still dull. Anthracite output in excess of demand. Bituminous operations much curtailed. Some demurrage coal forced on the market but prices generally well maintained.

Generally severe weather in nearly all parts of the country during the first of the week, started an active movement in the retail hard-coal trade. The change has not been of sufficient duration to affect wholesalers as yet, but there is a better tone generally in all departments. However, producers are still compelled to make concessions in order to move tonnage, while dealers are already beginning to anticipate the possibility of carrying some winter-priced coal over after the Apr 1 discount goes into effect. The production continues in excess of demand, and the situation is particularly unfavorable at tidewater.

The recent cold weather has failed to help the bituminous market, and there is a feeling gradually developing among producers that a general slump can only be prevented by a strict curtailment. Even now mines are working under a heavily restricted output, while consumers are endeavoring to cancel old orders. Little spot business of any kind is being negotiated and off qualities are particularly dull.

Although a decided improvement on domestic business is expected in the Pittsburgh district as a result of the sharp fall in temperature, the demand at the moment is light; a resumption in general manufacturing effective the first of the year will help the situation some, but the absence of sustained cold weather has had a depressing effect. Conditions in Ohio show some improvement as a result of the more seasonable weather and an increase in manufacturing. Anticipation of labor troubles Apr. 1 is also having an effect upon the situation; with the market in its present unsatisfactory condition, operators will be ready to suspend operations indefinitely, if necessary, and the position of the miners is materially weakened.

While shipments from the Hampton Roads piers have fallen off during the week, the effects of the curtailed production over the holiday period are now being felt and accumulations are only about normal. Prices are holding remarkably firm in spite of a general slowing up. The Southern markets are contending with adverse weather conditions and dealers are showing little disposition to buy; an improving tendency is noticeable, but not much change is anticipated before spring.

The anticipated labor troubles next April have had a stimulating effect upon the Middle Western situation, which was also helped out by the colder weather. Large industrial concerns are showing an inclination to increase their stock piles, and the better grades are now commanding good figures. There has been an unexpected shortage of hopper bottom cars. Some demurrage coal is occasionally forced on the market for anything it will bring.

EASTERN MARKET

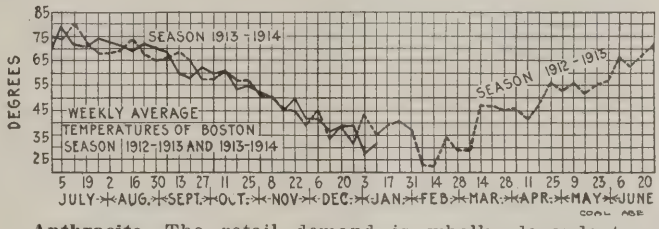
BOSTON, MASS.

More inquiry for bituminous. The Hampton Roads coals generally dull, but buyers begin to show interest in better grade Pennsylvanias. Anthracite demand also slightly improved, although it is still a weather market.

Bituminous—There is little change in the situation of Pocahontas and New River. When buyers are not seeking to postpone shipments on purchases made several weeks or months ago, they are indifferent, and no improvement is looked for in the immediate future. The off-shore demand is fairly steady, due to rather higher prices on the Welsh coals, and that is the only feature that gives any stability to present prices. The Western demand has fallen off materially and apparently a rigid curtailment is all that will prevent a generally softening market.

Georges Creek maintains its usual firm position. For spot shipment there is only a light inquiry and what tonnage is being moved is almost solely on season contract.

Within the week some buying interest has developed in the Pennsylvania grades, especially those that are more favorably regarded. Prices on these coals are more sensitive to the dull market we are experiencing than is the case with the Southern coals, and the few large buyers who have been waiting developments have now come in for hand-to-mouth deliveries. It is not especially significant but the market is so quiet in every direction that any move, however small, is bound to be noticed. The colder weather has improved the outlook but the fact that there is any reliance on its continuance shows how desperately slow the market is on all grades of bituminous.



Anthracite—The retail demand is wholly dependent on the weather. Just now some scattering business is being had and if the balance of the month is moderately cold there is sure to be a better call for anthracite in New England. The dealers are figuring closely so as not to carry winter-priced coal over into April and so confident are they that the companies can now supply cargoes on short notice that they are reluctant to file requisitions until the need for the coal is plainly evident.

Certain of the New York barge companies that advanced water freights 25c. in November to Boston have once more receded and practically all the anthracite shippers are now on a parity, so far as concerns along-side prices on the domestic sizes.

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$1.00@1.50	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.25@2.75	2.50@2.85	2.92@3.02	
New York*	2.55@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.90
Boston†				3.72@3.82
Providence†				3.72@3.82

*F.o.b. †On cars.

NEW YORK

Holiday suspension has resulted in a shortage of some grades of anthracite. Main weakness in the tidewater market. Strike of the bargemen concluded. Soft coal easy and outlook unsatisfactory.

Bituminous—The recent bargemen's strike in New York Harbor came to an abrupt end when two or three of the largest individual towing concerns granted the increase demanded, five days after the strike started. It is said that this was conceded more for the purpose of squeezing out some of the smaller concerns who cut rates in time of slack business.

The market is still easy. The demand is light, and while there are no direct reports of demurrage coal, rumors of occasional lots being offered at $2.40@2.55 would seem to indicate that the market is being forced. Concerns that failed to contract during the active trade last summer have had a rather severe lesson in marketing coal; such operations are all generally closed down now. The car and labor supply are both fully up to requirements, but incipient labor troubles are still an aggravating condition in the mining regions. The anticipated suspension in mining Apr. 1, pending the arrangement of a new wage scale in the central competitive district, will, no doubt, cause some flurry through March, but conditions point to a quiet market through April and May if not longer. If an agreement is not reached on the wage-scale problem, there will be no business to negotiate, while if no suspension occurs, consumers generally will be so heavily stocked that they will not be in the market for some time to come. We quote the New York market off on some grades as follows:

West Virginia steam, $2.60@2.75; fair grades of Pennsylvania, $2.60@2.65 good grades of Pennsylvania, $2.75@2.85; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.

Anthracite—A sharp fall in temperature, accompanied by a heavy wind, approximating a gale, has started an abrupt rush for coal in retail circles. The early part of the week saw the coldest weather experienced in New York in 14 years. The changed conditions have not been of sufficient duration to affect the wholesale business yet; it is variously estimated that from one to three weeks of more or less continuous low temperatures will be required to effect any material difference in conditions. Unless there is considerable cold weather between now and Apr. 1, the companies may carry some winter stocks over into the summer business.

Full-time work at the mines is not yet general, although from weather indications the first of the week, production will soon be rapidly increased. Rice coal at the upper ports is in short supply as is also No. 1 buckwheat. The suspension in December has resulted in a shortage of egg, and there is not much pea at tide; chestnut is generally strong. The bituminous strike talk Apr. 1 may create some activity in the steam grades through February and March. Generally speaking, the main weakness in the market has been on tidewater business, the all-rail situation, as a rule, being comparatively strong.

We quote the New York hard-coal market on the following basis, the figures given not including the Pennsylvania state tax of 10c. on the domestic grades and 5c. on pea coal, as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	$4.50@5.00	$5.05	$4.45@4.95
Egg	5.25	5.15@5.25	5.30	5.10@5.20
Stove	5.25	5.25	5.30	5.15@5.20
Chestnut	5.50	5.50	5.55	5.35@5.45
Pea	3.50	3.50	3.50	3.45
Buckwheat	2.75	2.75	2.70@3.45	2.25@2.70
Rice	2.25	2.25@2.35	1.95@2.20	1.75@2.20
Barley	1.75	1.60@1.75	1.70	1.45@1.70

PHILADELPHIA

Hard-coal trade shows signs of improvement with the appearance of more seasonable weather. Increase in orders slight, however, and supply remains greater than demand.

Under the influence of more seasonable weather the local anthracite trade improved last week, but it has by no means reached a satisfactory state for the operator and dealer. The increase in orders was light, and the supply is still in advance of the demand.

With plenty of coal at hand the producers in many cases have been forced to make concessions in order to sell their product, but despite that fact less coal was sacrificed last week than in the closing week of 1913. There is little expectation of marked improvement in the trade until weather conditions are such as to bring about a greater consumption. Meanwhile dealers here are merely marking time.

The bituminous coal trade showed a slight improvement last week. Small advances in prices occurred in several grades, but there was little significance to these changes as the meager increase merely indicates getting back into the regular routine after the holidays.

BALTIMORE, MD.

Colder weather has helped the anthracite trade. Bituminous continues flat, with prices showing little or no change. Situation at the piers is not encouraging.

Real cold weather has proved quite a boon to the hard-coal trade here. During the past week the local dealers, especially those handling the smaller trade orders, have been busier than for any priod since winter set in. Continued warm weather had induced many to get along with scant supplies, and the change to fairly heavy orders is quite a welcome. Steaming sizes were reported easy the past week, the only scarcity with some dealers being in the smaller prepared grades, for which there was quite a rush in spots. Movement from the mines was easy, however, and no trouble in supply generally is anticipated unless blizzard-like conditions develop.

Interest continues deep here as to the effort to consolidate 20 of the largest retail concerns of the city. Some of these are said to be holding out for more money than is offered by those behind the merger, and the entire proposition looks uncertain for the time being.

Colder weather has so far failed to strengthen the soft-coal trade. Demand continues light for Maryland, West Virginia and western Pennsylvania products as a whole. In West Virginia the soft coals are bringing anywhere from 80@90c., while low-grade Pennsylvania steam coals are selling around 90@95c., and best grades at $1.25.

Coastwise movement continues fair on December chartering, but a lack of chartering has recently developed for late January and February loadings. This includes coastwise as well as foreign trade.

CENTRAL STATES

PITTSBURGH, PENN.

Coal demand poor, but slightly improved; circular prices being shaded, except with slack, which readily commands premiums; mine operations at about 50%. Coke market dull but firm.

Bituminous—On the whole, demand for coal is very light, but it has improved somewhat in the past few days. Many mills were closed over the holidays, and their resumption effects an increase in contract shipments, although resumption is only partial since the mills are operating at only about 60% of capacity. Domestic demand has experienced a slight increase, and a greater increase is to be expected before the week is out as a cold snap has just arrived. Mine operations generally are estimated at 50% of full capacity, the reduction being effected chiefly by operating on alternate days, few mines being closed altogether as it is deemed important to hold organizations together. Prices are rather irregular for mine-run and screened coal, circular figures being frequently cut, while slack is scarce and invariably commands a premium. Operators have themselves bought at $1, while sales to consumers are frequently at $1.10@1.15. Circular prices are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¾-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The market has become quiet. Only two large interests among the operating furnaces failed to contract, and they are quite unwilling to pay prices asked. The $2 operators are reported firmer than ever on this figure, while most of the cheaper coke has already been disposed of. Prompt is in light demand. The next activity will be when the time arrives for arranging February tonnages, since several of the recent buyers covered for January only. We quote: Prompt furnace, $1.90; contract furnace, $1.90@2; prompt foundry, $2.40@2.65; contract foundry, $2.40@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Jan. 3 at 252,151 tons, an increase of 16,000 tons, and shipments at 250,787 tons, an increase of 17,206 tons. The small tonnage the previous week had been due to the holidays.

BUFFALO, N. Y.

Production heavily curtailed and market fails to show any improvement. Consumers refuse to see any serious possibilities in the impending wage-scale agreement. Prices generally weak.

Bituminous—The situation is not materially changed. The weather has been somewhat more wintry, but a thaw has again intervened, and no further stocking up is being done even where more room is available. Mines are running as slow as possible. As a rule, all consumers have more coal than they wish to carry and they are quite uneffected by stories of spring strikes.

Meanwhile the operators and miners are beginning to hold meetings, by way of getting into line for the new wage scale. If the miners insist on the concessions that they are now making up it will take a good part of the summer to arrive at any sort of agreement. Operators are at present quite indifferent to a lengthy shut-down and if the situation does not improve before April they will welcome suspension lasting until the market is clarified and it is possible to sell coal again at a profit. Had the trade remained strong, as it was expected to early last fall, the producers would have been quite at the mercy of the miners.

There are few sellers still claiming that they are getting old prices, although the nominal market is still quotable: $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, with slack doing better of late than sizes. Allegheny Valley prices are about 25c. lower than Pittsburgh.

Coke—There is no improvement in the coke trade and dealers find it difficult to get former figures, based on $4.60 for 72-hr. Connellsville foundry. The light demand would make it appear that the actual consumption of pig iron was decidedly small.

Anthracite—Occasionally a shipper reports that the demand for anthracite has improved but the larger handlers agree that the late showing of winter has had little effect. Based on the consumption so far, there are a good many members of the trade who are ready to declare that they have coal enough to last them till April.

Shippers says that a severe cold snap will change the situ-

ation. Reports come in of heavy overstocks at upper-Lake ports, but indications are that these are all more or less overdone. A severe last half of winter would use the surplus up. Not much Lake tonnage is now being loaded here, as it is hard to get and shippers are not anxious.

COLUMBUS, OHIO

More seasonable weather has caused a better feeling in the trade. The movement is larger and some strength is shown in the price list. Unsettled condition because of the wage scale which expires Apr. 1.

The coal trade has regained some of its lost strength due to more seasonable weather and a disposition on the part of some to stock up to guard against a suspension after Apr. 1. The movement of all sizes is larger than the previous week and a better feeling is shown in all mining districts of the state. Coal men generally look for a gradual improvement from this time on.

One of the best features of the market is the better demand for steam grades. This is due to the resumption of many factories which were closed down during the holiday period. Then again some of the larger steam users have started to stock up in fear of a prolonged suspension after the expiration of the present wage scale. Railroads are also increasing their fuel requisitions and the net result is a better tone in that department of the trade.

In domestic circles things are still slow. Dealers stocks are large and they are not disposed to order at this time. It will require considerable cold weather to bring them into the market again. Most of the large householders have laid in their winter's supply of coal and the retailers have to depend upon small orders. Prices are holding at the level which has prevailed for the past two weeks. Some cutting is being done by the smaller producers and jobbers but the larger companies are busy maintaining the list. There is some demurrage coal on the market which tends to reduce prices.

The output in Ohio is gradually increasing although it is still far below the normal figures. In the Hocking Valley district the production is estimated at 50 per cent. of the average and the same is reported from Pomeroy Bend and eastern Ohio. In the strictly domestic fields the output is probably 40 per cent. of the average.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.75 @ 1.70	.....	$1.90 @ 1.80	$1.70 @ 1.60
3-4 inch	1.50 @ 1.45	$1.20 @ 1.15	1.60 @ 1.40	1.50 @ 1.45
Nut	1.30 @ 1.25	.....	1.50 @ 1.40	1.30 @ 1.25
Mine-run	1.30 @ 1.25	1.10 @ 1.05	1.30 @ 1.25	1.30 @ 1.25
Nut, pea and slack	0.80 @ 0.75	.....	0.90 @ 0.85	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	0.95 @ 0.90	0.80 @ 0.75	0.70 @ 0.65

DETROIT

Production restricted and prices heavy. Supplies large and customary winter business has failed to appear. Possibility of a suspension in April creating some interest.

Bituminous—Production in the various mining regions during the past week has been about 50 per cent. capacity. This was due, of course, to a lack of demand, which latter has also resulted in a sagging market, in spite of the efforts of the companies to maintain circular quotations. Even occasional concessions in prices has failed to stimulate business.

Car and labor supply have ceased to be factors in the situation. Local industrial concerns are working under restricted operations, and as a result the steam demand is light. The domestic business is lacking in the customary winter volume, and supplies on hand are generally large, while the demand is small, fluctuating according to temperatures. The possibility of a suspension in mining Apr. 1, when the present wage-scale expires, is the only uncertain feature in the market.

The local prices are quotable on the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump	$1.65	....	$1.50	....	....	$2.50	$2.50
Egg	1.65	....	1.50	....	....	2.50	2.50
Nut	1.20	....	1.10	....	....	....	....
Steam lump	1.10	....	1.10	....	....	....	....
¾-in. lump	1.00	$1.05	1.05	$1.00	$1.00	....	....
Mine-run	0.90	0.95	1.00	1.00	1.00	1.35	....
Slack	0.80	0.80	0.80	0.80	0.80	....	....

Anthracite—The market is dull with practically no business being negotiated and with scarcely any coal coming in.

Coke—Coke remains heavy, although it still seems to be doing better than any other line. Connelsville sells at $2; Semet Solvay, $2.85, and gas house, $2.75.

LOUISVILLE, KY.

Operators forcing the market in order to keep mines running. Consignment shipments frequently made. Market glutted and prices suffering acutely under adverse conditions.

Unseasonably mild weather for this season, in spite of indications that there would be some real winter, has kept the demand for fuel, down to the lowest possible mark; it can almost be said that the local market is demoralized. The necessity of disposing of the coal produced has forced operators and wholesalers to extreme measures, as an alternative to a complete shutdown. Shipments on consignment, without orders, are becoming common, and traveling representatives of the producers are doing everything in their power to dispose of domestic coal at almost any price. While there is undoubtedly some consumption of the domestic grades, there is still not sufficient being used to make much of an impression upon the stocks which have accumulated. In consequence, the market has been practically glutted, and it seems that only a protracted period of much colder weather than has yet prevailed will help things to any appreciable extent.

The steam market, while in much better shape than the domestic, shows what might be called a sympathetic weakness. In spite of the fact that the production of screenings has been curtailed, prices have undergone a pronounced slump. Western Kentucky nut and slack, usually in fair demand at 65c. was quoted last week down 15c., although this, of course, could not be called the market price. The best grades of Eastern Kentucky block can be had at the purchaser's own figures, $1.65 being eagerly accepted. For block and lump $1.50 is a good price. Western Kentucky domestic could be quoted 50c. lower all around, with light demand. Eastern Kentucky screenings, nut and slack, are in slow demand at 85 cents.

HAMPTON ROADS, VA.

Holiday season has reduced the demand and lower prices are frequently heard. Prices holding fairly well though some cutting.

While coal shipments from Hampton Roads during the week have been fair, they will hardly compare with the dumpings for the first week of December. The holiday season is no doubt responsible for most of the light demand during the past two weeks. However, the accumulation of coal is little above normal as shipments fell off considerably on account of the miners laying off several days during the holidays.

Coastwise shipments of the week have been to Jacksonville, Tampa, Charleston and the New England ports while foreign movement went to Kingston, Dakar, Media Luna, St. Thomas, Santiago, Port Castries, Naples, La Plata and Taltal.

While the demand for all grades has been light there has been little cutting in prices the majority of suppliers holding out for the circular. Some sales, however, have been reported at around $2.75 and lower. New River and Pocahontas run-of-mine has been practically the only coal moving from Hampton Roads during the week.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM, ALA.

Lump coal slightly improved. Steam grades easy and blacksmith normal. Furnace and foundry coke quiet. Some sales of pig iron for first-half delivery. Car situation fairly satisfactory.

There is really not much change in the market this week. Lump coal has enjoyed a slightly better trade, but with prices somewhat under the regular schedule. On account of the exceedingly mild winter so far, the dealers are in no hurry to accummulate large stocks. The retail yards report a better volume of business the last ten days than for some time, which is an encouraging sign. Steam coal is still quiet, though prices are remaining about stationary. Not much improvement can be looked for in this line until spring.

After the spurt on furnace coke, caused by heavy shipments West, made in order to accummulate stocks before the $2 increase in freight, coke has again assumed a normal condition, which is far from satisfactory to the manufacturers. Blacksmith coal is moving on about as usual. The car situation seems to be slightly improved for the time being.

NEW ORLEANS

Stocks on hand large, but supplies are being received in normal volume. Large orders to go forward from Pittsburgh on January rise. Use of anthracite increasing. Street railway company awards contract.

While stocks of coal in New Orleans are large, due to the

mild weather and some falling off in the bunker trade, there will be no decrease in the coal orders to come down the river with the January rise. From the Alabama fields tonnage is decreasing little if any and stocks are accumulating rapidly. One of the features of the local trade is the increased use of anthracite. Not many years ago scarcely a ton of such coal was used in this city but it is now quite general.

A contract for 175 tons of bituminous coal has been let by the street railway company to the Pratt Consolidated Coal Co. Representatives here of Alabama operators report that they are having great difficulty in disposing of their tonnage. Some curtailment is in progress and unless demand picks up quickly, it is likely to become more extensive.

INDIANAPOLIS

The approach of the expiration of the wage contract in the central competitive fields has brought out increased orders. Prices are firmer. Shortage of hopper-bottom cars.

January is producing some weather that is up to the general standard for the month, which has been good for the coal industry, both mining and distributing. The mining end has also been benefited by the approach of the time for making a new wage contract between operators and miners. The negotiations in the past have sometimes been prolonged until after Apr. 1, when the new contract should begin. It has thus become customary for consumers of coal to stock up as this date approached, in order to tide their needs over this idle period. An effort is being made to continue work at the mines this year in case of a delayed agreement, but consumers do not appear to be willing to take any risks. Already there is an increase in orders from the largest industrial consumers and the railroads will soon be increasing their piles.

Whether the larger business that some of the operators report is responsible for an unusual shortage in hopper cars is not known. These are generally plentiful and the gondolas scarce, but the position is now reversed. Most of the large consumers have facilities for handling the hoppers, and a better demand for coal from them would leave fewer available.

There has been no change in mine prices, but they are held more firmly. Retail quotations in this city are still on the basis set Sept. 20. Some of the largest dealers say that a cold spell this month or next will probably make mine prices higher, especially under an expected larger demand, due to wage contracts expiring, and that any advances at the mines will be promptly followed by retailers. Others intimate that any increase would be arbitrary, as stocks are large and there is yet much undelivered coal bought at old prices.

CHICAGO

Indications of a revival, but present conditions are far from satisfactory. Little business is being transacted by anthracite dealers, some of them having shut off shipments entirely. There is small demand for Hocking and the coke trade is light. Prices on several coals have been cut.

While there has been some improvement in local conditions the general situation still remains unsatisfactory. Inquiries received from retail dealers indicate a stronger disposition to buy, but it is conceded that any increase in production or shipment at present would cause a further slump in the market.

Dealers in anthracite coal report an unusually light volume of orders. All sales agents have curtailed shipments and some of them have shut off enirely until conditions improve. Receipts of all-rail coal are far in excess of sales and there is scarcely any movement of anthracite from the docks to interior points. In a number of instances quantities of this fuel have been forced upon retailers at exceptionally low prices to avoid demurrage charges.

There is scarcely any demand for Hocking, the circular price for which has been reduced from $2 to $1.75 by the larger producers. Some of this coal on track subject to demurrage is being disposed of at prices under circular. There has also been a reduction in the price of Franklin County coal. The major producers have named $1.75 as their circular figure and sales at prices ranging between $1.50 and $1.60 have been recorded. The coke market is dull. Scarcely any of this fuel is being absorbed by the domestic trade, about the only activity being in sales to Western smelter interests which have sought this market on account of labor difficulties in the West. Sales of furnace and foundry coke continue light.

Indiana mines are running chiefly on steam coal for the purpose of handling contracts entered into several months ago. Springfield operators are endeavoring to adhere to $1.50 for domestic coal, but sales at $1.25 are not uncommon. Producers of splint have reduced their price on 1¼-in. lump to $1.75 and Eastern Kentucky block coal is selling at from $1.75 to $2.25.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.32	$2.55@2.80	$2.27	
Steam lump	1.97		1.97	
Egg		2.55@2.80		$4.30
Mine-run	1.87	2.30	1.87	3.45
Screenings	1.47	1.75@1.85	1.47@1.57	

Harrisburg quotations are: Domestic lump and egg, $2.55@2.85; steam lump, $2.25; mine-run, $2.25; screenings, $1.75@1.85; No. 1 nut, $2.55@2.85; No. 2 nut, $2.55.

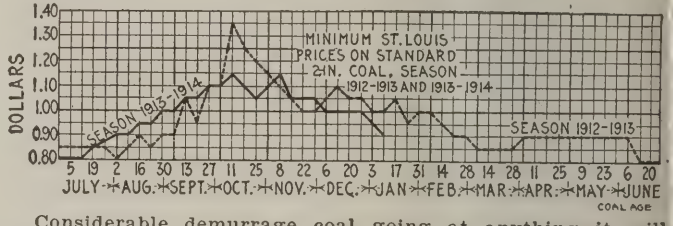
Prices asked for Carterville coal are: Lump, egg and No. 1 washed, $2.55@2.85; No. 2 washed, $2.55.

Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; byproduct, egg, stove and nut, $4.90@5; gas house, $4.65@4.75.

ST. LOUIS

Practically no change in St. Louis conditions, although the weather is slightly colder. Steam market holding up well. Smokeless and coke not moving and little demand for anthracite.

Market conditions the same as they have been or several weeks. The weather has been slightly colder, but nothing like real winter. Still, there is some domestic demand, just about enough to keep the steam market in a healthy condition. Even at that some of the operators are trying to force business and in many instances they cut prices 10 to 15c. a ton on lump and egg from the Carterville field.



Considerable demurrage coal going at anything it will bring, but the higher grade fuels still command a good figure. High-grade screenings are worth 80 to 85c. In the Standard district lump has sold as low as 90c. and screenings are hovering around 50 to 55c. The local car supply is more than ample and some mines have been idle for many weeks with strings of empties on their tracks.

There is little demand for anthracite and the coke and smokeless markets are glutted with consignment shipments.

The prevailing circular is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.90@1.00
3-in. lump	.....	.....	$1.40	.....
6-in. lump	$1.25 @ 1.50	$2.25	1.50	1.15@1.25
Lump and egg	1.85 @ 2.15	.....	.....	.....
No. 1 nut	1.15 @ 1.40	.....	.....	.....
Screenings	0.75 @ 0.80	.....	.....	.....
Mine-run	1.10 @ 1.20	.....	.....	.....
No. 1 washed nut	1.60 @ 1.75	2.25	1.60	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....
No. 3 washed nut	1.15	.....	.....	.....
No. 4 washed nut	1.05	.....	.....	.....
No. 5 washed nut	0.50	.....	.....	.....

KANSAS CITY

Colder weather has stimulated business. Mine operations are being increased.

All available nut coal is being absorbed without difficulty in the Kansas City market, the only weakness being in the lump situation. The demand for nut seems to be largely responsible for the slow movement of lump.

However, the snappy weather is expected to stimulate all lines and the situation is in better shape than for several months. Dealers are ordering fairly well, and a continuation of present weather conditions will result in full-time mining operations in the near future. Most of the Kansas and Missouri mines are being worked to about two-thirds capacity, the prospects being for an extension of output, rather than the reverse. The market is showing more strength under better weather conditions, though no general advance in quotations has yet been made.

PORTLAND, ORE.

Eastern coal shippers look to Pacific Coast with view of handling cargoes through Panama Canal. Open winter for western Oregon and Washington does not tend to sharpen demand for fuel. Conditions practically unchanged.

The Portland Commercial Club has received inquiries from Atlantic Coast shippers asking for information as to the possibility of extending their markets to the Pacific Coast ports upon the completion and opening for traffic of the Panama Canal. It is believed here that with the opening of the canal and cheaper transportation rates the Pacific Coast states will prove an inviting field for the Eastern coal mines, although the production in the West and on the Pacific Coast is stead-

ily developing. The establishment of large coal bunkers to accommodate foreign shipping on the Columbia is also looked for in the near future on account of the increased shipping, as a result of the opening of the canal.

The weather this winter has been unusually mild and the demand for coal for domestic purposes has not been as heavy as in years past. However, the coldest weather here usually comes in January, February and March, and there is still a chance for the coal man. So far there has been no fluctuation in prices since the advance announced a couple of months ago.

PRODUCTION AND TRANSPORTATION STATISTICS

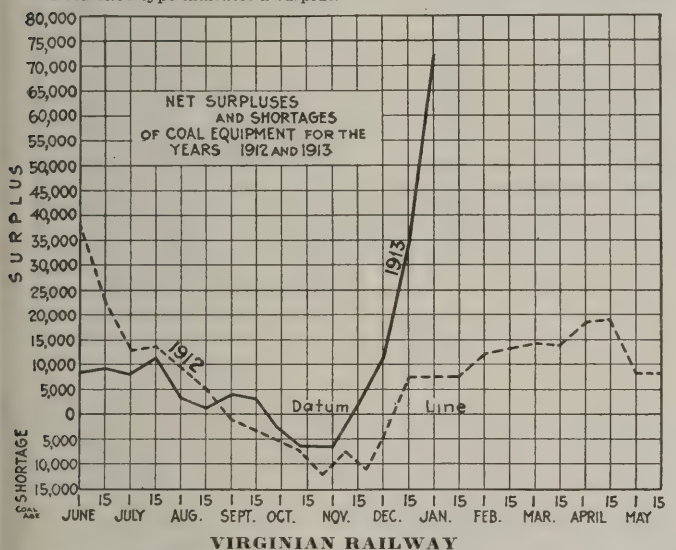
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Jan. 1, as follows:

	Surplus	Shortage	Net*
New England Lines	571	0	**571**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	16,311	0	**16,311**
Ohio; Indiana; Michigan; Western Pennsylvania	36,513	0	**36,513**
West Virginia, Virginia, North & South Carolina	1,811	29	**1,782**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	6,201	0	**6,201**
Iowa, Illinois, Wis., Minn.; North & South Dakota	4,151	2	**4,149**
Montana, Wyoming, Nebraska	300	0	**300**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,563	1	**2,562**
Texas, Louisiana, New Mexico	423	22	**401**
Oregon, Idaho, California, Arizona	3,691	3	**3,688**
Canadian Lines	0	0	0
Total	72,535	57	**34,140**

	Sept. 1	Sept. 15	Oct. 1	Oct. 15	Nov. 1	Nov. 15	Dec. 1	Dec. 15
Surplus	8,689	8,714	7,953	6,014	6,720	10,520	17,621	36,435
Shortage	5,209	7,731	10,393	12,502	12,595	8,477	5,095	2,295
Net*	**3,480**	**983**	2,440	6,488	5,875	**2,043**	**12,526**	**34,140**

***Bold face** type indicates a surplus.



VIRGINIAN RAILWAY

The total shipments of coal over this road for November, 1913, were 421,971 tons as compared with 316,504 tons for the same month last year. For the first eleven months of 1913, the shipments were 4,190,394 tons as compared with 3,177,243 tons in 1912.

ANTHRACITE SHIPMENTS

Anthracite shipments for the calendar year 1913, were 69,069,628 tons as compared with 63,610,578 tons in 1912 and 69,954,299 tons in 1911. Production in 1912 was, of course, much curtailed due to the suspension in mining pending the arrangement of a new wage scale.

The feature of the anthracite movement in 1913 was the heavy shipments of the Lehigh Valley. For the first time in the history of the anthracite shipments, this road takes first place in the tonnage movement for the year, exceeding the Reading Co. by 100,000 tons. This is not indicative of a reduced capacity of the Reading mines, or a largely increased capacity of the Lehigh Valley. The Reading sales department was compelled to carry the new 2½% Pennsylvania State Tax throughout the bulk of the year, which materially narrowed the market for their product. Reading was also forced to restrict operations more during unfavorable market conditions, showing an inclination to conserve their supplies rather than attempt to force business.

The shipments for December 1912 and 13, and for the two years were as follows:

	December		12 Months	
	1913	1912	1913	1912
Phila. & Reading	1,058,723	1,223,880	12,914,887	12,852,386
Lehigh Valley	1,062,578	1,108,765	13,011,370	11,791,601
Cent. R.R. N.J.	663,395	760,479	9,092,433	8,342,477
Del. Lack. & West	839,384	850,977	9,903,541	9,065,622
Del. & Hudson	590,158	598,969	7,094,258	6,361,238
Pennsylvania	546,976	543,361	6,351,746	5,548,193
Erie	709,431	667,532	8,192,352	7,435,697
Ont. & Western	191,973	190,539	2,509,031	2,213,382
Total	5,662,618	5,944,502	69,069,628	63,610,578

COAL FREIGHT DECISIONS

I. C. C. No. 4604—Traffic Bureau (Nashville, Tenn.) vs. Louisville & Nashville R.R.

1—Conditions affecting the transportation of coal from Louisville & Nashville R.R. western Kentucky mines to Louisville, Ky., Memphis and Nashville, Tenn., not found to be so dissimilar as to preclude a comparison of the rates from the same fields to the three cities.

2—Rate of $1 per ton on coal to Nashville from Louisville & Nashville western Kentucky mines found to be unreasonable and rate of 80c. prescribed. A like rate from Nashville, Chattanooga & St. Louis Ry. mines in Tennessee and Alabama found to be unreasonable and rate of 90c. prescribed.

3—Complaint as to unreasonableness of $1 rate to Nashville on coal from Illinois Central western Kentucky mines not sustained.

4—The value of ton, car, and train mileage statistics in fixing rates discussed.

5—The Louisville & Nashville and the Nashville, Chattanooga & St. Louis interswitch all traffic, including coal, at Nashville. They refuse to switch coal to and from the Tennessee Central, which road retaliates by refusing to switch coal to or from the rails of either of the other two. Upon complaint;

Held, That the practice of all three roads is unreasonable, and further, that of the Louisville & Nashville and Nashville, Chattanooga & St. Louis is unjustly discriminatory. Discrimination required to be removed and reasonable practice prescribed.

6—"Terminals are either open or they are not" and a carrier may not exercise an arbitrary discretion, based upon a strained construction of the proviso of section 3, in saying for what roads and for what traffic it will open its terminals and for what other roads and traffic it will decline so to do.

I. C. C. Nos. 5650 5650, (Sub.—No. 1), 5650 (Sub.—No. 2) —Wisconsin Coal Co. (5650); Elmore Benjamin Coal Co. (5650 [Sub.—No. 1]); Callaway Fuel Co. (5650 [Sub.—No. 2]) vs. Pere Marquette R.R. Co. et al.

Complainants contend that they are entitled to free reconsignment of coal at Milwaukee and ask reparation on account of damage suffered as the result of alleged unjustifiable holding of cars at Ludington, including reconsignment and demurrage charges paid on cars detained, as well as tort damages. The complaint also embraces a charge of discrimination, and further alleges that the new tariff, effective Feb. 9, 1913, is unreasonable because of its failure to provide for reconsignment at Milwaukee: **Held:**

1. Complainants were not entitled to free reconsignment at Milwaukee under the tariff of Oct. 2, 1912, but were entitled to reconsignment at a charge of $2 per car. The detention of cars at Ludington was unjustifiable and demurrage charges were improperly assessed and must be refunded.

2. With respect to cars which arrived at Ludington before the receipt of passing notice and proper time for giving disposition orders, the charges paid were improperly assessed and should be refunded. There is no evidence upon which to measure damages as to cars on which the notice was sufficient. Damage regarding these lies in the difference between the value of the reconsignment service at Milwaukee and at Ludington. No damages were proved as the result of granting reconsignment to complainants' competitors and denial of the service to complainants.

3. The Commision's jurisdiction to award tort or general damages, as distinguished from rate damages, discussed in Jaynes v. P. R.R. Co., 17 I. C. C., 361, and in Hillsdale Coal & Coke Co. v. P. R.R. Co., 23 I. C., 186. In the present case there should be no award for damages of this nature. This conclusion rests on the general principle of the law of torts that one who suffers a tort damage must use due diligenec to minimize or avoid his loss.

4. The Commission has power, in its discretion, to require the establishment of reconsignment and diversion on the basis of the through rate from the point of origin to new destination, with a fair charge for the extra services performed.

5. A carrier may, as a matter of convenience, when its terminal tracks are congested, hold cars at some point short of destination, provided such a course involves no disadvantage to the public.

6. Tariff provision with regard to the giving of passing notice at Toledo should be made. If after the receipt of such notice shippers fail to give disposition orders before the cars reach Milwaukee, they shall be charged for the service $2 per car; otherwise the service is to be free.

7. The power of Congress to regulate interstate commerce is not hampered by contracts made by individuals, L. & N. R.R. Co., v. Mottley, 219 U. S., 467. A corporation cannot disable itself by contract from the performance of public duties and thereby make public accommodation or convenience subservient to its private interests. Gibbs v. Consolidated Gas Co., of Baltimore, 130 U. S., 398.

8. The question of detention is one that must be worked out by itself, and the advantages of reconsignment cannot be thrown away in order to avoid abuses that can be remedied in other ways.

FOREIGN MARKETS

GREAT BRITAIN

Jan. 2—Owing to holiday influences, inactive conditions are in evidence. Approximate quotations as follow:

Best Welsh steam	$4.80@4.92	Best Monmouthshires	$4.26@4.3
Best seconds	4.56@4.68	Seconds	4.02@4.14
Seconds	4.44@4.56	Best Cardiff smalls	2.64@2.78
Best dry coals	4.56@4.68	Seconds	2.52@2.64

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, exclusive of wharfage, and for cash in 30 days.

BELGIUM

Exports and imports into Belgium for the first nine months of 1912 and 1913 were as follows:

	Imports		Exports	
	1912	1913	1912	1913
Coal	6,689,148	5,954,292	3,713,154	3,741,741
Coke	851,911	691,920	813,345	738,589
Briquettes	355,394	329,684	470,363	482,579

AUSTRIA

During the first nine months of this year the production of coal in Austria totaled 12,234,247 tons, as against 11,656,476 tons in the corresponding period of 1912; the output of briquettes of coal was 151,179 tons, as against 120,855 tons; and the make of coke 1,909,235 tons, as against 1,716,143 tons. The lignite production during the same period was 20,710,900 tons, as against 19,490,252 tons; and the make of lignite briquettes was 175,502 tons, as against 175,256 tons.

FRANCE

Exports and imports into France for the first seven months of 1913 and 1912 were as follows:

	Imports		Exports	
	1912	1913	1912	1913
Coal	8,713,200	10,777,100	1,206,397	779,428
Coke	1,550,900	1,911,100	104,307	132,736
Briquettes	632,300	633,900	121,192	120,299

The "Daily Consular and Trade Reports" says regarding the situation in Southern France:

The production of coal in the departments of Gard, Bouches-du-Rhone, Basses-Alpes, and Hautes-Alpes amounted to 2,832,257 metric tons of 2204.6 pounds each in 1912, as compared with 2,723,915 metric tons in 1911. In view of the insufficiency and the poor quality of the native coal supply, large quantities are imported. During 1912 1,470,158 metric tons of coal, 21,036 metric tons of coke, and 62,030 metric tons of patent fuel were imported, while 702,237 metric tons of coal, 560 metric tons of coke, and 99,578 metric tons of patent fuel were exported. Of the imports, 17,423 metric tons of coal and 15,911 tons of coke came from the United States.

In this connection the following article, which appeared in the "Liverpool Journal of Commerce," of October 10, is of interest:

The freight rate from the United States to Marseille was about 17 shilling 6 pence ($4.26) last year. The freight rate paid last September was 13 shillings ($3.16). This sharp drop in freight rates is a point in the American coal exporter's favor, and as there seems a probability of freight rates dropping still further in the near future, it is anticipated that an increased business in America's foreign coal export trade will be shown.

No. 12,258. Coaling Plants and Sand Houses—The American consulate general at Ottawa, Canada, reports that the Commissioners of the Transcontinental Railway at Ottawa have advertised for tenders, to be received until January 7, for the construction of six 200-ton mechanical coaling plants with sand houses complete, to be erected at the following points on the line of the railway: Monk, Bridge, Fitzpatrick, Parent, Doucet and O'Brien, all in the Province of Quebec. Plans may be seen and forms of tender and specifications obtained at the office of the mechanical engineer at Ottawa.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Jan. 10:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	84†	82†	84†	82	82
American Coal Products Pref	..	..	105	....	....
Colorado Fuel & Iron	31	28⅞	30½	31	28½
Colorado Fuel & Iron Pref	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com	48	48	48	48½	48
Island Creek Coal Pref	84½	84½	84½	85	83½
Pittsburgh Coal	19¼	18	18½	19¼	17⅝
Pittsburgh Coal Pref	88¼	86	86	88¼	86
Pond Creek	19⅝	18⅜	19	19⅜	18⅜
Reading	170⅜	167⅛	169½	170⅜	166½
Reading 1st Pref	87½	87½	87½	88	87½
Reading 2nd Pref	91½	91	91	91½	91
Virginia Iron, Coal & Coke	40	40	40	40	40

Bonds	Closing Bid	Asked	Week's Range or Last	Sale	Year's* Range	
Colo. F. & I. gen. s.f.g. 5s	90⅞	93	91½	91½	90	99⅛
Colo. F. & I. gen. 6s	102½	106½	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	78½	79	76½	79	75	85
Cons. Ind. Coal Me. 1st 5s	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s	..	92	87⅜	Dec. '13	87	87⅜
Gr. Riv. Coal & C. 1st g 6s	..	..	102½	April '06	..	..
K. & H. C. & C. 1st s f g 5s	93	..	92¼	Dec. '13	91	98
Pocah. Con. Coll. 1st s f 5s	..	85½	86	Oct. '13	85	87½
St. L. Rky. Mt. & Pac. 1st 5s	75	77	77	Dec. '13	73	80½
Tenn. Coal gen. 5s	98	99¼	99	99	96	103
Birm. Div. 1st consol. 6s	101	102½	101	101½	100⅝	103
Tenn. Div. 1st g 6s	101	101½	101	101	100¼	102
Cah. C. M. Co. 1st g 6s	..	..	103	July '13	103	103
Utah Fuel 1st g 5s	..	..	..	....	..	..
Victor Fuel 1st s f 5s	..	84	80	May '13	79¼	80
Va. I. Coal & Coke 1st g 5s	93	95	92½	93	92	98

*For the full year 1913. †Sale involving less than 100 shares.

DIVIDENDS

Burns Brothers—Regular quarterly dividend No. 2 on the common of 1¼%, payable Feb. 15 to holders of record Jan. 31, and regular quarterly No. 4 on the preferred of 1¾%, payable Feb. 2 to holders of record, Jan. 15.

New River Co.—Regarding the proposed sale of this company to a British Syndicate, it is stated that the property is optioned at $90 per share of preferred stock with accrued dividends of $30 per share and $5 per share of common. When this stock was issued, a decade ago, two shares of common were given as a bonus with each share of preferred, so that according to the terms of sale, stockholders still retaining all their original holdings will realize $130 per share on their stock.

St. Louis Rocky Mountain & Pacific Co.—This company is said to enjoy the distinction of having the largest coal tract under private ownership in the United States. The company has 13 mines in operation, and has a gross capacity of 10,000 tons daily. Dividends of 5% per annum are paid on the $1,000,000 outstanding preferred stock. The balance sheet to June 30, 1913, showed current assets to be practically double the liabilities.

Canadian Coal & Coke Co.—Fully three-fourths of the authorized issue of $1,000,000 notes of this company have been sold, and the $500,000 advance from American bankers who were handling this arrangement, has already been made. The money received will wipe out the present indebtedness of the company and provide about $350,000 for completion of new development work. It is expected that the present average capacity of 1500 tons a day will be increased to 4000 tons when this new work is completed.

Philadelphia & Reading Coal & Iron Co.—According to a statement of this company, filed with the Massachusetts secretary of state, its coal lands are being depreciated at the rate of $500,000 per annum. Thus the assets show the coal lands to be valued at $49,403,659 in 1912, and $48,905,221 in 1913. The total assets of the company in 1913 are placed at $88,301,880.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 4
Issued Every Saturday
Hill Publishing Company

NEW YORK, JANUARY 24, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

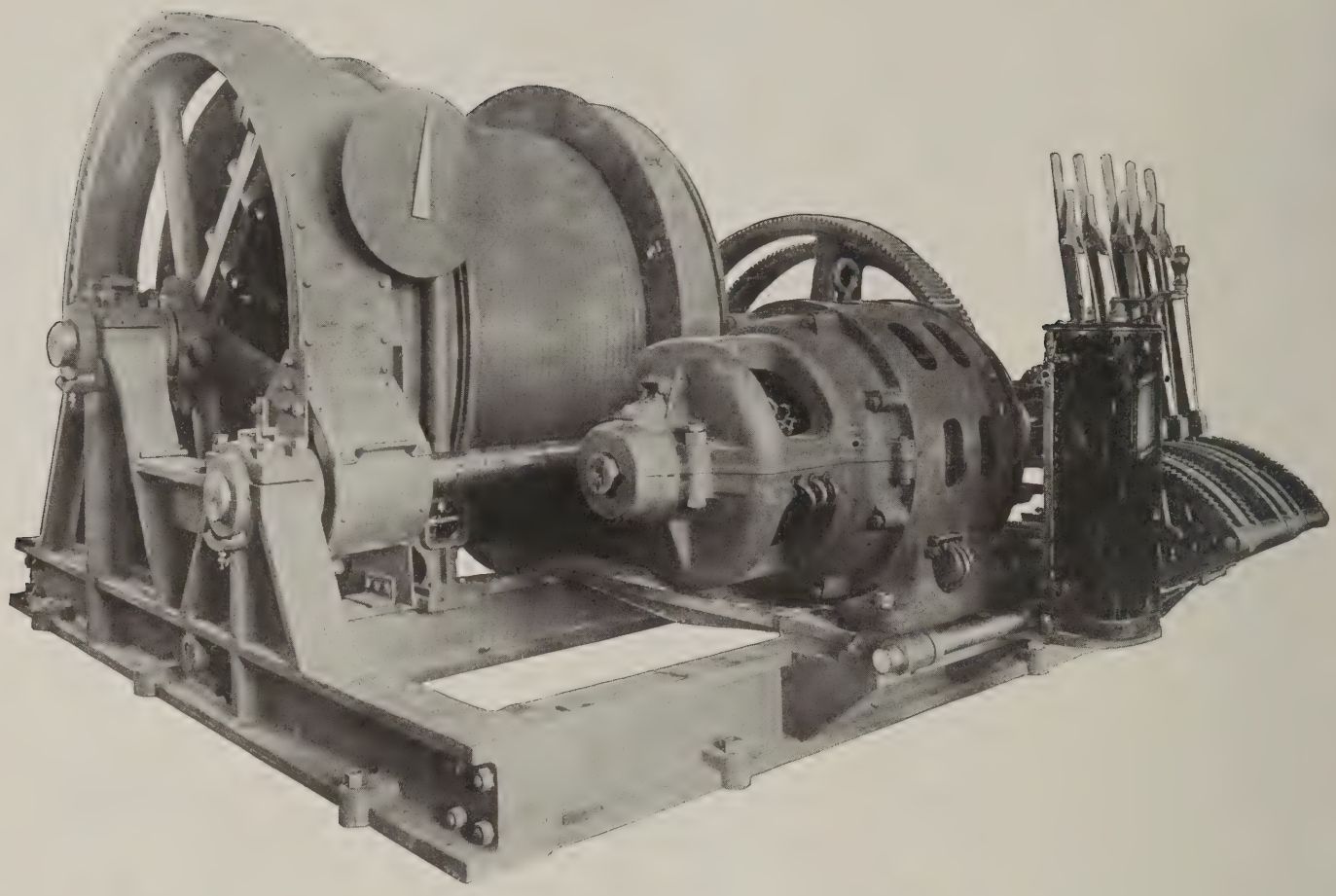


Loading Station and Head of Aerial Tramway

The Arctic Coal Company, an American Concern, is Mining Coal in an Ice-Bound Region Only Accessible a Small Part of the Year



Ship Loading Station and Auxiliary Storage Pile



Westinghouse Motors For Moderate Sized Hoists

While manufacturing the electrical apparatus for the largest mine hoist installation ever undertaken in the United States, the Westinghouse Electric and Manufacturing Company has devoted very careful attention to the design of motors for moderate sized hoists.

No attempt is made to take motors designed for some other purpose and adapt them to mine conditions. **They are hoist motors and are especially designed in every respect for this service.**

These motors have unusually heavy pulling power for their horsepower rating. The revolving part is small in diameter to permit quick stops and reversals. Low power consumption insures economical operation.

They are particularly designed to allow ease of inspection and dismantling, if necessary. All coils are form wound and placed in open slots, making repairs, in case of accident, as simple as possible.

Our nearest office will be pleased to furnish full information about Westinghouse Mine Hoist Motors upon request.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

ATLANTA, GA.
BALTIMORE, MD.
BIRMINGHAM, ALA.
BLUEFIELD, W.VA.
BOSTON, MASS.
BUFFALO, N. Y.
BUTTE, MONT.
CHARLESTON, W. VA.
CHARLOTTE, N. C.
CHICAGO, ILL.
CINCINNATI, O.
CLEVELAND, O.
COLUMBUS, O.
*DALLAS, TEX.
DAYTON, O.
DENVER, COLO.
DETROIT, MICH.
*El PASO, TEX.
*HOUSTON, TEX.
INDIANAPOLIS, IND.
JOPLIN, MO.
KANSAS CITY, MO.
LOUISVILLE, KY.
LOS ANGELES, CALIF.
MEMPHIS, TENN.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
NEW ORLEANS, LA.
NEW YORK, N. Y.
OMAHA, NEB.
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ORE.
ROCHESTER, N.Y.
ST. LOUIS, MO.
SALT LAKE CITY, UTAH
SAN FRANCISCO, CALIF.
SEATTLE, WASH.
SPOKANE, WASH.
SYRACUSE, N. Y.
TACOMA, WASH.
TOLEDO, O.
WASHINGTON, D. C.

*Westinghouse Electric & Mfg. Co. of Texas.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JANUARY 24, 1914 NUMBER 4

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 151

Outlines the policy of "Coal Age," stating in brief that the paper is an independent forum for the discussion of mining subjects by all responsible men. COAL AGE, Vol. 5.

*AMERICAN COAL MINING AT 80 DEG. NORTH: *Pages* 152-156

Describes the most northerly mining operation in the world. The miners are paid from $1.35 to $1.90 per day; living expenses average about 41c. per day. Even in midsummer, the temperature rises but little above the freezing mark. C. A. Tupper. COAL AGE, Vol. 5.

*THE SYSTEM OF MINING IN THE POCAHONTAS REGION: *Pages* 156-159

The breakline, or line of fracture, should be kept straight and should not exceed 2400 ft. in length. In order that the pillar-slices may all be exactly of the same size, the crosscuts are laid out methodically, so as to come where pockets would normally be driven in retreating with the pillar. Careful work in new mines results in a recovery of 95 per cent. of the coal. W. H. Grady. COAL AGE, Vol. 5.

*CEMENTATION IN SHAFT SINKING: *Pages* 160-162

A description of methods employed, particularly in the north of France, to effectually exclude water from shafts both during sinking and subsequently. COAL AGE, Vol. 5.

*PORTABLE STEEL LADDER: *Page* 162

NOTES ON THE PREVENTION OF EXPLOSIONS IN COAL MINES: *Pages* 163-165

The paper gathers together a number of the most important facts relating to explosions, most of which have appeared but may have been overlooked by readers. Noteworthy remarks are that rock dust is proved to be of value and should be used, and that an explosion can as readily originate in stagnant as in moving air, except perhaps where several shots are fired following each other. In that case the speed of the current may keep the dust in suspension and so make it readily susceptible to inflammation. Geo. S. Rice. COAL AGE, Vol. 5

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 181

COAL AND COKE NEWS: *Pages* 182-185

*ROCK CASTLE MINE EXPLOSION: *Pages* 165-166

An explosion of gas at the Rock Castle mine, located at a town of the same name near Abernant, Ala., killed 12 men out of 90 in the mine. The explosion was quite local. Four men may have been overcome by afterdamp. COAL AGE, Vol. 5.

AN ANALYSIS OF THE OHIO MINING COMMISSION'S REPORT: *Pages* 167-170

The gradual leaning toward paternalism, on the part of both state and federal governments, is becoming more and more marked. The investigation of the Ohio legislature is the most important step that has been made in this direction, so far as concerns the coal industry. The changes proposed are of such a radical nature and will indubitably be so far-reaching in their effect on legislation in other states that coal engineers in all parts of the country are closely following the progress of the movement. A. T. Shurick. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 171-172

Seismic Disturbance in Its Relation to the Flow of Gas into Mines—Once More: A Criticism of the Coal-Land Policy of the U. S. Geological Survey—Explosibility of Coal Dust.

GEORGE OTIS SMITH REPLIES TO EDITORIAL CRITICISM: *Pages* 173-175

The Geological Survey's reports on coal sales, while probably not absolutely in agreement with those of the Land Office, were compiled with full intent to obtain correct results. The statement that the increase in the price of public coal land has reduced production and raised the price of coal in the West is disproved by statistics. COAL AGE, Vol. 5.

THE BICKNELL EXPLOSION: *Page* 175

DISCUSSION BY READERS: *Pages* 176-177

*Working Coal under Sandstone Cover. Letter No. 11—The Certificate Law. Letters Nos. 11, 12 and 13—Working Coal under Watery Strata. Letter No. 1—Coal Production in Saskatchewan.

STUDY COURSE IN COAL MINING: *Page* 177

INQUIRIES OF GENERAL INTEREST: *Page* 180

Ventilation in Airways—Fan Ventilation.

COAL TRADE REVIEWS: 186-190

ADVERTISING INDEX: *Page* 32

CIRCULATION OF THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers

Sanity versus the Bearded Lady

The Weekly Ad-Talk Page

We have had a good deal to say in this department about the *sanity* of present-day advertising writing as compared with the stuff that some of the old-timers were wont to foist on an open-mouthed, pop-eyed public.

Once in a while, though, some reincarnated spirit of the original Barnum is loosened upon the world and straightway rushes to its natural channel—printers' ink.

And this is the sort of "break" it delights in:

"Lend Here a Patient Hearing to the Unfolding of a Bargain Story That Will Go Resounding Down the Corridors of Time as the Most Sensational and Attractive Ever Provided the Purchasing Public—

"Pants—Regular Value, $2.50—$1.25.

"Don't Overlook this Store on the Pants Question."

All that mass of words, covering six columns of newspaper space, about a pair of pants.

Doesn't that conjure up visions of the Tattooed Man, who never wears pants on exhibition, and the Bearded Lady, who always wears them when the show is over?

We have seen pants which look as though they might have resounded down several corridors of time. But they are not the kind of pants we choose to encase our shapely nether limbs in.

Rather are they the kind that we carefully avoid, lest their wearer make a touch for a new pair.

We have seen pants that one could buy for $1.25 a pair, but nothing could induce us to believe that they were worth $1.26, much less $2.50.

The quoted advertisement is fundamentally wrong in two points—it tells nothing about the advertised article and it leads the reader to infer that the concern is of a philanthropic nature—or is lying.

And, since we know that businesses exist on *profits*, we are prone to call them liars and shop at less superlative places.

Let us confine our exaggeration to circus advertising. None of us object to being beguiled into spending a dime for the side show. The "magnificent, marvelous, munificent, mind-maddening Albino Beauty" may be Maggie Hennessy, the waitress at Hyde's Hotel, done up in a frizzy wig—we don't care particularly. It's all in the day's fun.

But when we come down to the business side of things, let us cut out the Bombast, the Bunk and the Piffle. Let us have our advertisements clean-cut, informative, convincing and truthful.

We have a story to tell—tell it straight, tell it simply, tell it sincerely.

Then confidence is promoted and the shyster dethroned.

We believe that every advertiser in this paper makes a consistent effort to adhere to the straight line in writing his advertisements.

Hence, we know that they are full of *information*—dependable, instructive information.

The salesmen who call on you, the Selling Section of Coal Age—here are two wonderfully rich mines of engineering knowledge. The pay streak runs wide and deep. Work it for all it's worth.

COAL AGE

Vol. 5 NEW YORK, JANUARY 24, 1914 No. 4

The nature of some of our recent correspondence causes us to use this page to clear up a point or two. It concerns the policy of Coal Age.

There has never been the slightest deviation from a settled editorial aim since the birth of the paper. One word covers our entire plan of procedure—Justice—to all, from miner to owner; at the same time not forgetting the rights of the fuel consumer, who, in the final analysis, is a most important party in our industry's struggle for commercial success.

In line with this idea, we hold that the pages of Coal Age are open to every responsible person who has any interest, directly or indirectly, in the production of coal.

We insist that the paper itself, its owners and editors, be held responsible only for their editorial views. We are opposed to the establishment of a rigorous censorship to pass on the acceptability of matter submitted, only reserving the right to determine that articles and letters sent us for publication are sensible and truthful.

The ideas of the contributors need not conform to the beliefs of the editors, any more than they must coincide with the views of other individuals in the industry. We have published innumerable articles by responsible men, whose statements were opposed to our own conception of the subject in hand.

If you read a biography in the Who's Who columns of Coal Age that covers the life and work of some fellow you dislike, don't hold a grudge against the paper. Maybe, in some ways, we don't like him any better than you do.

Or, if John Henry, superintendent of the "Snow White" mine, expresses views on the liquor problem, the labor question, miners' education, or ventilation, which do not agree with your own opinions, please remember that John Henry is no kin of ours, and we are not responsible for his ideas. Lock yourself in a sound-proof room and cuss him to your heart's content, but refrain from directing your remarks at us.

The coal industry is a business that has nothing to hide. It will profit by having the confidence of the entire population. A journal devoted entirely to the interests of the operators, or one printed solely for the miners, must needs be prejudiced, and such a paper will have small influence with the outsider when its voice is raised in time of real distress.

Nor can a journal conducted in the interests of one class in any business observe and obey the great truth that whatever course of action will benefit the whole people of the United States, will eventually benefit all those who gain their livelihood in any one of our great basic industries.

We prefer the solid approval of a few to the empty praise of many. As for criticism, it is the sure sign of accomplishment. The proof of justice does not always lie in the voice of the majority. The paper that buys popularity at the sacrifice of honor and truth pays too dear a price.

Surely, now, our position is plain. Coal Age is an open forum where every responsible coal man may express his honest opinion. If you fail to refute a statement that seems in error when the privilege is yours, certainly you should not strike from ambush at the fellow who stands in the open and invites your attack.

This paper has doubled the effectiveness of its educational campaign through its course of independent action. No effort has been made to create a masterpiece of literary art. We want to be correct; we have been human, and we intend always to be fair. We aim to do, not what we may, but what we ought, and we shall never plead a cause where our pen will be confuted by our conscience.

American Coal Mining at 80 Degrees North

By C. A. Tupper*

SYNOPSIS—Describes the most northerly mining operation in the world. The miners are paid from $1.35 to $1.90 per day. Living expenses average about 41c. per day. Even in midsummer, the temperature rises but little above the freezing mark.

Recent agitation on the part of English, Norwegian and Russian interests for an international commission to fix the status of property rights in Spitzbergen and provide for some governmental regulation of its affairs, calls the attention of the mining public to a district hitherto generally regarded as beyond the bounds of commercial exploitation. There has, for some years past, been much talk of mining in the Arctic regions, including southern Greenland; but, outside of Alaska and the Scandinavian peninsula, where conditions are comparatively favorable, it has remained for an American concern, known as the Arctic Coal Co., to give the first demonstration of what can be done in a region that is literally ice-bound and only accessible for a small part of the year.



Mouth of Adit with Loading Pockets Below



Coal Pockets Were Constructed from Hillside Stone

Spitzbergen, the "No-Man's-Land," which does not fly the flag of any country and, until quite recently, was considered unworthy of notice, is an archipelago lying between 76 and 80 deg. north latitude and due north of Norway, or about midway from Greenland to Nova Zembla. It comprises the five large islands of West Spitzbergen or New Friesland, Northeast Land, Edge Island, Barents Island and Prince Charles Foreland, as well as the Wiche and many other small islands. The chief island of the group, West Spitzbergen, which has an area of 15,200 square miles, is shaped like a wedge pointed south and deeply indented on the west and north by long branching fjords, one of which is known as Advent Bay. Here, in 1900, coal began to be worked, for sale to whaling steamers, a seam 10 ft. thick being found below 40 ft. of fossil ice and 20 ft. of limestone.

The backbone of the island consists of a mass of pre-Devonian granites, gneisses and schists. Resting upon these there is a succession of sedimentary rocks, lying nearly horizontal, among which the Carboniferous period is well represented, and the developments at Advent Bay may be considered as only the beginning of similar operations in the future.

Coal Sells for about $5 per Ton

The coal found in Spitzbergen is of good quality. It averages, for the deposit mentioned, not more than 2 per cent. of red ash and is free from slate, burning freely in an open grate fire. The prices obtained for the coal are good. At last reports it was bringing 19 to 20 kroner in Trondhjem or Narvik, on the Norwegian coast, equivalent to $5.13 to $5.40 per ton, and for direct sale to the whalers entering Advent Bay the price charged was 14 kroner, or $3.78 per ton. These amounts, however, are moderate in comparison with the prices heretofore asked for English coal in the Arctic regions. At Hammerfest, for example, a ton of the latter has seldom been obtainable at less than 26 kroner, or $7.02.

The Arctic Coal Co., whose headquarters are in Boston, Mass., has staked out at Advent Bay a coal field nearly four miles long. Exploration with steamers and landing parties also resulted in the discovery of a good coal bed in Saxon Bay, at an elevation of about 400 ft. above sea level and another at Cape Bojan. The latter is of excellent quality, but the shore has a heavy surf which will make loading to vessels difficult. At Green Harbor the company has taken over an existing property, formerly used as a spasmodic source of supply by whalers, who maintain a station there for trying out blubber, and this yields a good, hard steam coal which can be readily recovered and transported to vessels by some such method as that described below. Thus the prospects for more extended operations in the future are excellent.

Coal from the present mine at Advent Bay, where the operations in general are along the lines of modern colliery practice, is brought to the surface through an adit,

*Consulting engineer, Milwaukee, Wis.

the mouth of which lies about 600 ft. above sea level and at a distance of fully 4300 ft. from the nearest point where vessels can be moored. The primary condition was the rapid and, so far as possible, automatic loading of the ships after arrival, in order that the maximum number of round trips might be made during the short summer months. The sea around the island is shallow and ice readily accumulates on its shores, with great glaciers pushing down from the mountainous interior. Although these glaciers do not give rise to icebergs as huge as those of Greenland, the smaller bergs and the pack ice are thick enough to prevent access to Advent Bay except for a relatively brief period, and even this would be hazardous except for the warm drift from the Atlantic, which tends to moderate the climate of Spitzbergen and leave an open passage for vessels to approach the coast in summer.

Spitzbergen Has No Native Population

Another requisite, under these conditions, was to concentrate labor upon actual mining and to avoid the use of many hands for anything connected with conveying the coal from the mouth of the mine and loading it upon steamers. Spitzbergen has no native or otherwise permanent population, and every workman has to be brought from the mainland of Europe at considerable expense. This consideration, therefore, eliminated the project first proposed, of running a gravity road to the shore, dumping to a storage plant there and conveying the coal in lighters to ships lying at anchor in deep water outside the surf, even apart from the slow loading which this would involve. It was practicable but not very profitable.

The logical solution was an aërial tramway from the mouth of the adit to a ship-loading station at the sea.

In the accompanying reproductions of photographs, the system constructed is clearly illustrated. As the coal from the mine reaches the adit mouth, it is dumped to a storage plant built on the hillside in the form of a silo, which is provided with chutes for the automatic loading of the buckets attached to the ropeway carriages. Here, during the loading of a ship, only two workmen are required, one for placing the empty buckets in position for filling and the other for operating the bin gates. Arriving in the ship-loading station at sea, the buckets are tripped and automatically dumped to a hopper, when they are discharged into one of the holds of the vessel through an adjustable telescopic spout.

At this point two men also suffice, the duty of the one being to guide the carriages around the return loop and of the second to see that the loading spout is in proper position. As the loads are small and follow each other in quick succession, the amount of labor involved on the vessel itself in properly distributing the cargo is slight, and the crew of the ship can readily take care of both this and the work above referred to, including that at the adit mouth if required.

As soon as the vessel is loaded fore and aft, a bell signal is given to the loading plant at the mouth of the mine, so that the operation of the aërial line will be suspended until the ship can take up a new position. This is easily effected by ropes and windlass, and the telescopic spout is shifted by means of a small slewing crane. By the system described a steamer can be loaded in 6 to 12 hours, according to its carrying capacity.

The saving in time which it effects is graphically shown on the other side of the bay where an English corporation has opened what are known as the Fangen Mines. There the coal is brought down a distance of only 650 ft., but by means of an ordinary incline, and is then dumped into lighters, which carry it through the surf to the steamers anchored in deep water, where it must be handled by cranes and manual labor. With these means it takes several days for even the smaller loads.

In the construction and operation of the aërial line, which was designed and built by Adolf Bleichert & Co., of London and Leipsic, there are many features of suggestive value for similar conditions elsewhere.

The Tramway Is Self-Operating

The longitudinal profile shows a line with heavy down grade from the mouth of the adit to the loading station at the sea, which is built on pile work. Owing to the fall, the line, of course, requires no driving mechanism. On the contrary, an excess of power is developed which must be braked. For this purpose a brake regulator from the firm J. Schrieder, Saeckingen-am-Rhein, Germany, is installed in the mine loading plant. This consists essentially of a rotary pump with a balanced sliding throttle



Bringing in Tramway Material from Sea, over Pack Ice

valve, which is driven by a belt from the countershaft. The pump draws in oil or soap water from a reservoir in the box foundation and forces it back into the latter through the apertures of the adjusting slide. The latter is actuated by a centrifugal governor on the driving shaft of the tramway. As soon as the number of revolutions of this shaft reaches a predetermined limit, owing to the excessive loading of the down line, the governor closes the valve proportionately and retards the action of the rotary pump, which thus acts on the shaft as a powerful brake. The position of the regulating mechanism is shown in the illustrations.

The details of loading at the mine are also to be plainly seen from the cuts. At the left-hand upper of one of these the adit mouth will be seen, with a slide leading to the coal pockets at the beginning of the aërial tramway. The coal is here shunted by hand to the various pockets. These pockets terminate in lock chutes, before which the loading track of the tramway is laid. A short rail siding is also provided for any carriers not needed in the operations. The carriages, with their buckets as loaded,

are pushed by hand over the end return loop or over the intermediate switch to the station exit, where they couple automatically to the constantly moving traction rope.

The line has a length of about 4400 ft., runs over 15 timber supports and will carry daily 1000 tons or more, according to the capacity of the ship to be filled.

into vessel chutes. Eventually more coal pockets will be built at the mouth of the mine.

Outside Work Is Suspended during Winter Months

In the erection of the tramway there were great difficulties to be overcome, as a result of the climate and the nature of the country. Unfavorable ice conditions, when



Start of the Aërial Tramway, Showing Miners' Houses in Valley Below

The unloading station at the sea, as revealed by the illustrations, consists primarily of piles driven to bed rock at a considerable depth and carrying a platform on which an end return sheave is fitted. The aërial carriages uncouple automatically on arrival and dump to the hopper, being then pushed around the loop to a point where they again grip the traction rope and are whirled away upward. A narrow gangway connects the station to the shore; but between the last support and the station at sea there is a clear span of over 800 ft. The shore terminus is reinforced by rubbish dumped around the last land support, and this is being extended outward, so that in time the length of span over the water can be decreased if found desirable.

The silo-like storage plant at the mouth of the mine cannot take all the coal mined during the winter, and, aside from what can be conveniently held underground until vessels are loading, a coal dump is provided on the shore by dumping from the open line of the tramway. In order to take coal from this dump during the summer months, a temporary track is run on piles to the ship-loading station, where the cars are tipped by hand

the work was commenced, prevented any approach directly to Advent Bay until the summer season was far advanced, thus necessitating transportation of material many miles over treacherous pack-ice. The ground, which is frozen even in the warmest months, caused further trouble, as all excavations for the supports of the tramway had to be blasted out. Under these conditions, the end of the third summer had arrived before the line was completed. During the winters, operations had to be entirely suspended above ground, although the mine itself continued to be worked.

In the building of the loading station at the mouth of the mine some of the most disheartening obstacles were encountered. The steep incline of the hill was thickly covered with sandstone boulders, like much of the glacial drift of arctic America, and these were cemented by masses of ice. Before blasting for the foundation itself could be commenced, this frozen strata, many feet thick, had to be removed. Then the small rocks were collected, shaped and used as building material, for bringing in brick from Europe would have been expensive; and the resulting structure, although of irregular, unat-

tractive appearance, is much better suited to withstand the rigors of the climate. In using a mortar binder, it was necessary not only to keep this at a proper temperature, but also to heat the rocks themselves. During the warmest period the atmosphere on Spitzbergen rises only slightly above freezing point under the direct rays of the sun, and everything immediately congeals again in the shade. The building material and parts for the tramway were raised over an incline by means of ropes and winches.

The construction of the aërial tramway, in its various details, was of a character to suit the severe climatic conditions as well as the capacity and duty which would be required of such a line in an ordinary colliery district of the United States or Europe. The track cables used are of the "locked-coil" cable type, so named from the fact that the outer wires, which are drawn to shape, interlock one with another. The smooth surface thus obtained results in a uniform distribution of wear which not only lengthens the life of the cable itself, but also of the carriage wheels that run on it. To keep the track cables coated with oil or compound there is a special traveling oiler. This consists of carriage underhung by a receptacle in which there is an oil tank and a small pump. The latter is so connected to the moving wheels of the carriage that it is kept constantly in operation and sends a light spray between them onto the carrying cable.

The traction cable is of equally good quality and strength for the operating requirements. It is made of strands coiled about a hemp core in the usual way, each strand being composed of steel wires. Both are twisted in the same relative direction, which differs from the usual practice. For coating the traction rope there is another ingenious device. This is a U-shaped receptacle containing the compound, which is suspended near the upper terminal sheave. The cable passes first over a small roller in this receptacle, which in revolving slushes it with the coating material, and then between brushes placed a little farther along, which wipe off the drip.

Arrangements for anchoring and applying tension to the cables are in accordance with usual engineering practice for lines of this kind. In tightening the cables, however, chains have not been used, as they are apt to snap in the severe cold of Spitzbergen, but the tension weights are hung by steel-strand cable of special make. All cable lengths are fastened together by a patent coupling originated by the tramway builders.

Each carriage consists of two steel side plates, between which are mounted two cast-steel wheels fitted with phosphor-bronze pins, so designed that, as the upper surfaces become worn, they can be turned underside up. The hanger pins are of machinery steel. In order to provide carriage grips which would adapt themselves to varying cable diameters due to wear, as well as to changes in grade, the carriers were provided with what are known as "Automat" couplings, with underhung grips, which operate automatically. These hold the loads securely in vertical position at any grade and are self-adjusting to variations in cable thickness. For the track or carrying cables, there are also special shoes which prevent springing. For these there have been provided steel hoods, with hinges, that cover the cable on both sides of the shoe or saddle and protect it from undue wear.

Care was taken in the erection to have the terminal



END OF AËRIAL TRAMWAY AND STEAMSHIP PRIOR TO LOADING

rails at the loading and unloading station, as well as the intermediate saddles, exactly in line with the track cables, so that there is no jar or reaction as the loads enter or leave.

The Supporting Towers

The supporting towers are built of logs and roughhewn timbers of Norway pine, and the entire construction is as simple and inexpensive as it could be made, consistent with strength and operating economy. Not only is the plant the most northerly of its kind in the world, but it is also a good example of how mineral deposits inaccessible to transport by ordinary means, *whether on a coast difficult of approach or in badly broken or mountainous country*, can be brought to a stage of profitable development by a simple system of delivery to a loading point.

While abroad not long ago, I saw many aërial tramways, which are far more extensively utilized in Europe and in European colonies than in the United States, Canada or Mexico. The system above described has, however, been introduced to some extent in this country by a company now forming part of the American Steel & Wire Co., the present American licensees. Other successful aërial systems are those of the Broderick & Bascom Rope Co., A. Leschen & Sons Rope Co., John A. Roebling's Sons Co., the Painter Tramway Co., Macomber & Whyte, the Riblet Tramway Co. and the Vulcan Iron Works.

It was stated to me, while in northern Europe, that many attempts had been made to get at the mineral riches of Spitzbergen, but that the Arctic Coal Co. was the first to undertake the work on a proper financial basis and with adequate equipment of a permanent character. Operations are divided into two parts, the summer and the winter campaigns. For the former, which lasts from the beginning of June until the middle of September, about 200 men come from Norway to Advent Bay in the company's steamer "Munroe." During the winter months only half the force remains. They work 9¾ hours per day and live in company houses, having quarters for from 8 to 20 men each. These houses are built of heavy boards, fourfold, with thick building paper between all boards; and, with the additional heat insulation provided by the snow and ice on the outside in winter, the men are kept very warm and comfortable.

Wages paid are 6 to 7 kroner for miners and other skilled laborers, 5 kroner for muckers, trammers and laborers generally, and higher-grade employees in proportion. From these amounts, 1½ kroner per day is deducted for board and lodging; so that, with good behavior, each man has at the end of the season an ample surplus to carry back to Norway. Except for whalers caught in the ice, the employees of the Arctic Coal Co. were the first to winter in Spitzbergen, and they may, therefore, be regarded as pioneers in the settlement and systematic development of the islands.

The System of Mining in the Pocahontas Region

By W. H. Grady*

SYNOPSIS—The breakline or line of fracture should be kept straight and should not exceed 2400 ft. in length. In order that the pillar-slices may all be exactly of the same size, the crosscuts are laid out methodically so as to come where pockets would normally be driven in retreating with the pillar. Careful work in new mines results in a recovery of 95 per cent. of the coal.

I have had occasion to examine mines which produced during 1912 an aggregate of about 15,000,000 tons of coal. The conditions in which this coal was found admitted of the use of all the different methods of opening a property and the seams and overlying and underlying strata varied in their character so as to give, in some cases, the best and in others the most unfavorable conditions. Though the observations were all made east of the Ohio and Mississippi Rivers, the principles I shall advocate are applicable anywhere to room-and-pillar work.

It is a bad practice to drive up a room and allow the pillars to stand in the expectation of drawing them later. A better method is to start to "stump off" the pillars as soon as the room is completed by cutting across the rib as at *A*, in Fig. 1. The track should be laid so that cars can be placed conveniently for loading out both the coal in the cut and also that mined when the stump is drawn back.

Driving "Pockets" in Pillars

In this method, the miner is always protected by solid coal and the losses are reduced to a minimum. Room No. 6 shows the pillar and the heading stumps completely removed; room No. 5, a pocket just starting in; room No. 4, a pocket finished and a stump partly drawn back. Room No. 3 shows the pocket finished and work just starting on the stump; room No. 2 shows the pocket being driven, followed by a second pocket, which is only extended as far as a man can conveniently load the coal without a track turn, in order to avoid the necessity for frogs and switch points. Room No. 1 shows the pocket just starting.

The width of this pocket and the thickness of the stump depend largely on the nature of the roof and the mine equipment. With poor roof, which falls unexpectedly or within a few hours after the removal of the coal, the thickness of the stump should be such that a miner can reach all the coal safely and easily without venturing too far beyond the rib line of the pocket. If

*Chief mine inspector, Pocahontas Coal & Coke Co., 133 Giles St., Bluefield, W. Va.

Note—Second part of article entitled "Some Details of Mining Methods with Special Reference to the Maximum of Recovery," read before the West Virginia Coal Mining Institute, Dec. 9, 1913. Two of the illustratrons in this article appeared in a description of "Mining in the Pocahontas Field," by Audley H. Stow, Vol. 3, pp. 596 and 597, and we owe an apology to our readers for reproducing them. Because they are necessary to the text, which is in every way original and because they were received with approval at a leading institute and further because the method described is so worthy of general adoption, we venture to repeat them in this issue.

the roof is good and does not fall soon after the removal of the stump, the thickness of the small pillar may be increased and the number of track turns required per pillar may be reduced.

In the application of mining machines to the robbing of pillars, the distance between centers of pockets should be such that the thickness of stump left will form, under bad roof, one machine cut, or under good roof, two cuts of the machine.

How Slate Is Kept Out of Coal

The more common practice where the roof falls soon after the extraction of the stump, is to leave a small shell of coal to protect the miner from the gob and also to prevent him from loading fine slate into the car of coal. This results in a loss of coal that can be avoided at an expense for timber, which, under ordinary circumstances, is less than the value of that coal.

A practice which has been advocated and has proven

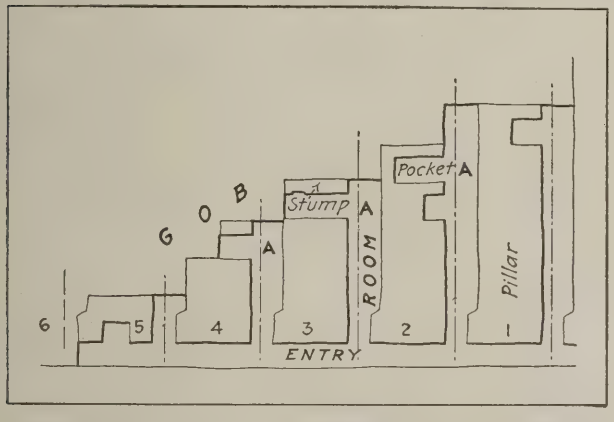


Fig. 1. The Pillars Are Repeatedly Split in Their Shortest Direction as at *A*, and the Narrow Stumps Removed on the Retreat

successful, is to place a row of props on the lower rib of the pocket, before the removal of the pillar stump has begun. When the next pocket to the outby is driven, it will be found that practically the entire stump may be loaded out without any admixture of gob and a greater percentage of lump coal will be obtained. This precautionary row of timbers is especially desirable where machines are used on the pillars.

I have noted that the roof over a robbing line exceeding 2400 ft. in length, sometimes begins to sag in the middle and renders the removal of the pillars in that immediate section difficult.

How the Fracture Line Is Kept Straight and the Recovery at a Maximum

The breakline should be kept as uniform as possible at all times. A method in practical every-day use, which is to be recommended is as shown in Fig. 2.

The engineers, as they take their monthly measurements, mark the pocket centers on the robbing rib of the room, and the foremen are required to drive their crosscuts on the line of a pocket as at *A*. The object in keeping the break line uniform is to insure against pillars extending back into the gob and acting as a fulcrum, or the knife-edge of a scale beam, upon which the roof teeters. This almost invariably causes additional timber expense and sometimes losses of coal, both of which could have been avoided had the break line been kept uniform.

Plan Suited to Needs in Development

Fig. 4 is the general plan of mining advocated by the Pocahontas Coal & Coke Co. The essential features of the plan of mining are: Provisions for tonnage during the development period; provisions for meeting the market demand; large barrier pillars insuring against squeezes and rendering impossible the destruction of coal over an extended area; four-entry system for all extensive main entries, using two as intakes and two as returns with breakthroughs between only at the points where the cross-entries turn off, rendering unnecessary the building of expensive masonry brattices every 80 ft. and insuring the maximum quantity of air for ventilation at a minimum cost for brattices and ventilating power; cross-entries with narrow chain pillars permitting the rapid advance of the entry.

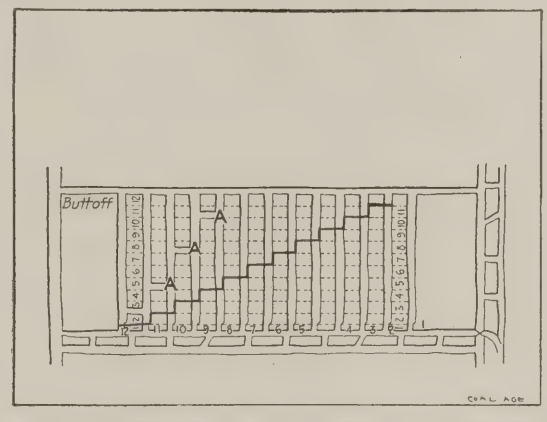


Fig. 2. Crosscuts Are Located at Carefully Chosen Distances as at *A*, so as Not to Interfere with Lifts from Pillar

In general all robbing must be done retreating with rooms driven after the entry is nearing completion, insuring against slate falls and rendering possible the extraction of all of the coal in one operation, thus combining first development and robbing.

Variations in Plan

The depth and number of rooms on an entry vary greatly at different mines, depending on local conditions of the seam; whether the haulage is by mule or gathering motor, whether the undercutting is performed by pick or machine, and not infrequently on the personal equation of the mine executive, for sometimes the manager of a plant will contend that he obtains the best results when he drives 25 rooms 500 ft. deep to the entry, and another manager working on an adjoining property under identically the same physical conditions and with the same type of equipment, not 1000 ft. away, will say that he gets the best results when his rooms do not exceed 300 ft. in depth and when there are only 15 rooms to the entry. The better policy is to encourage individual initiative and allow freely such modifications in any plan of mining as may be desired, provided that the modified plan embodies all the principles of modern methods and sound mining practice.

In the successful operation of any mine some general scheme of mining must be agreed upon, subscribed to by

all parties in any way concerned with the matter, including the land owner, if the property is a leased one. Then no omissions in, additions to, or deviations from that plan of mining should be permitted without the written consent of the lessee and lessor.

RECOVERY OF COAL IN MINES OF POCAHONTAS COAL & COKE CO.

Plant	Thickness of seam in feet	Acres of entry-mined	Acres of rooms mined	Acres of pillars mined	Total acres mined	Total tonnage mined	Tons mined per acre	Theoretical tons per acre	Percentage of recovery	Proportion of seam rejected
1	6.15	3.06	4.57	11.03	18.66	165,254	8,856	9,922	89.3	0.24
2	5.65	4.40	4.80	14.80	24.00	188,391	8,185	9,115	89.79	0.22
3	5.16	2.68	6.52	15.80	25.00	180,386	7,215	8,325	86.6	0.22
4	4.42	5.88	8.65	13.09	27.62	192,437	6,960	7,131	97.6	0.23
5	5.94	7.00	10.09	19.20	36.29	334,005	9,203	9,582	96.0	0.22
6	4.32	2.11	3.64	9.20	15.04	94,427	6,278	6,969	90.0	0.31
7	5.34	3.31	6.34	0.00	9.65	83,000	8,601	8,614	99.8	0.20
8	5.42	3.72	6.06	9.72	19.50	144,769	8,181	8,777	93.2	0.20
9	4.65	8.10	16.80	2.34	27.24	201,044	7,380	7,534	98.0	0.18
10	8.03	5.20	8.47	10.09	23.76	262,975	11,068	12,923	85.6	0.23

The Annual Balance Sheet

After the general plan of mining has been decided and operations begun, its success or failure will depend largely upon the degree of watchfulness exercised. The mine should be accurately surveyed and mapped at least once every 90 days. Frequent inspections should be made of the mine, minute attention being given to the condition of the working faces and the robbing line. At least once a year the theoretical yield of the property should be balanced against the actual tonnage delivered at the tipple. Accurate and complete records should be kept of the number of acres of entries, rooms and pillars driven each year and of both the percentage of recovery per acre and the state of exhaustion of the property.

That the above method of mining will yield the maximum of recovery is testified by the table above, the figures of which are typical of the results obtained by the Pocahontas Coal & Coke Co. in the Pocahontas field, and these, so far as I know, are not excelled anywhere. In this connection it should also be noted that the percentages of recovery are based on the total seam, including the portion rejected.

Recovery Lowered by Slipshod Work of Earlier Years

The lower percentages of recovery in the table result from the fact that in some instances, pillars are now being robbed that have been standing for many years. In the mines of the United States Coal & Coke Co., at and near Gary, W. Va., where all the work has been opened in recent years, the average percentage of recovery per acre since the beginning of operations, has been better than 95 per cent., and of the area mined, over one-third has been final mining. Digressing for the moment, if I may, from the main subject of this paper, I would say that perhaps nowhere is more thought being given to the subject of economical and safe mining than at the mines of the United States Coal & Coke Co. I have visited all the so called "model mines," including those of the anthracite field, for the express purpose of studying them, and it is a pleasure to be able to say that here in West Virginia, at Gary, by the untiring efforts of Edward O'Toole, general superintendent of the above company, a mining organization has been created which, for efficiency, is unsurpassed. Not only are the present methods of mining efficient, but the O'Toole combination, coal cutter, loader and transporting machine bids fair to revolutionize the present method of mining coal for coking purposes. Any one wishing to visit Gary is always welcome and the officers of the company will go to extremes in making your stay instructive and entertaining.

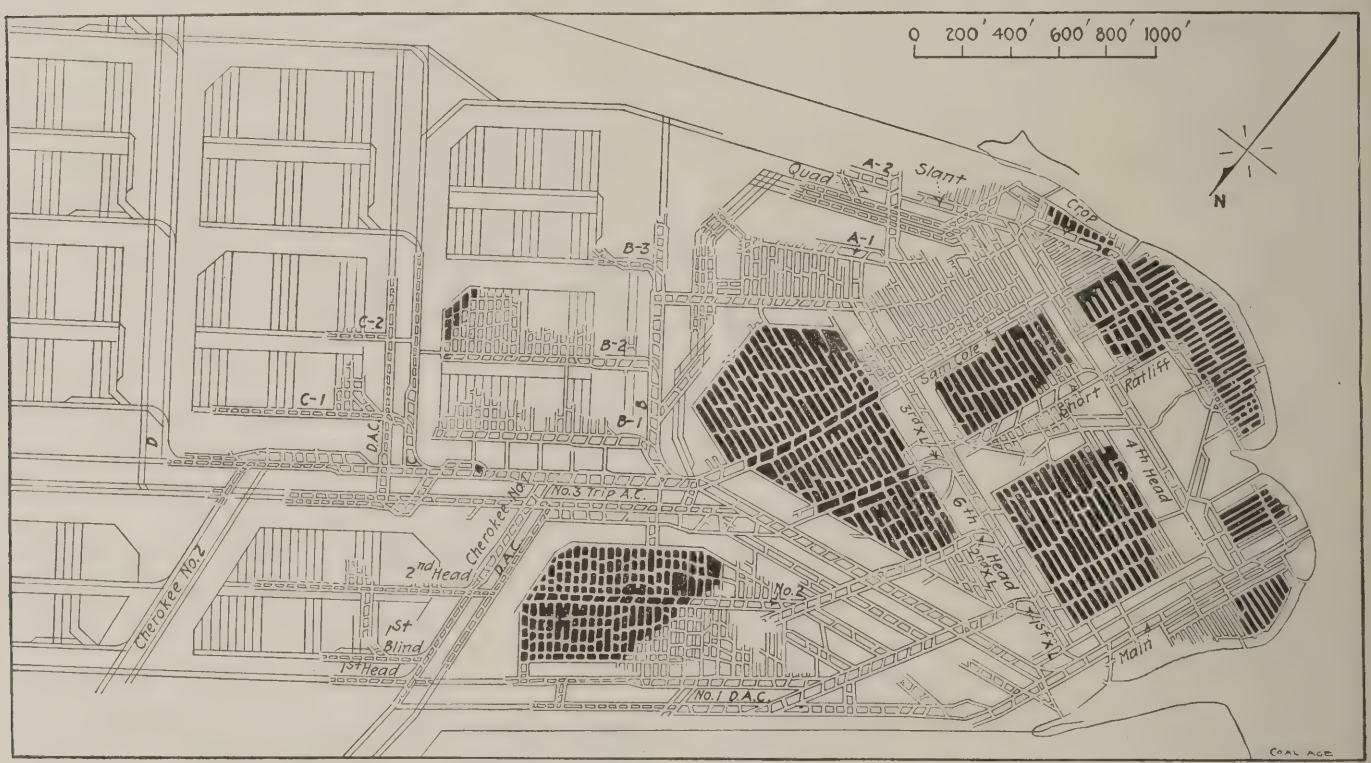


Fig. 3. The Old and New Methods at the Angle Colliery. The Former Are Illustrated by the Detailed Portion on the Right and the Latter in Skeleton Form on the Left

Cheaper Than Wasteful Methods

Returning to the main subject of the paper, I would say that the cost of production of room and entry coal by

this method is the same as in other methods of mining, while pillar coal is produced at less expense than is incurred in other methods.

In addition to the statement quoted all operating companies, I presume, have a statement showing the revenue derived from operations per ton of coal mined based on the net receipts from operations divided by the tonnage. By placing a value, which could be closely approximated, on the recoverable coal lost, and adding it to the net receipts a figure could be obtained showing what revenue would have been derived from the operations had the coal been mined without unnecessary waste. Dividing this by the tonnage a figure could be obtained for the statement which would show the profit that would have been derived per ton produced if the coal in the seam had been worked by the most conservative methods.

Bonding Value of a Well Managed Property

Statements of the above nature have a further value from a financial point of view for if it can be shown to a bonding concern that a property contains, let us say $500,000 worth of coal in the ground, 90 per cent. or more of which will be mined, it is certain that a greater asset value will be placed on the property than would be credited to it if the engineers of the bonding house report that under the methods of mining pursued, only 50 per cent. of the coal in the ground will be mined and the rest irretrievably lost.

In conclusion I desire to express thanks to all those who have in any way contributed to this paper, and especially to Thomas H. Clagett, chief engineer, Pocahontas Coal & Coke Co..; W. A. Phillips, general manager, Ashland Coal & Coke Co.; James Elwood Jones, general manager, Pocahontas Consolidated Collieries Co., Inc., for the use of the maps included in my paper.

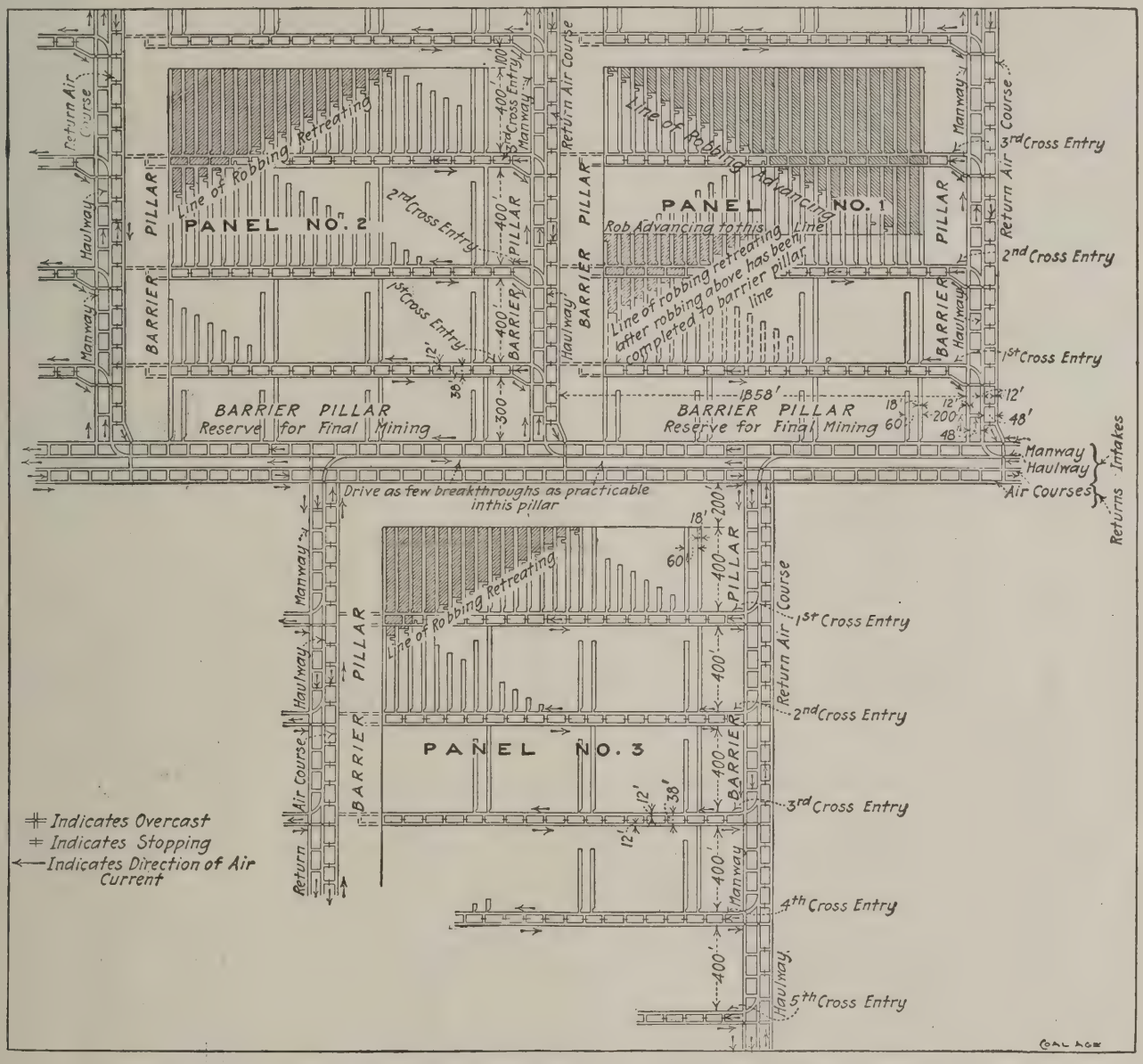


Fig. 4. General Plan of Mine Development of Pocahontas Coal & Coke Co.

A Prosperous Mining College

The short session for mining men at the College of Mines, University of Washington, Seattle, Wash., opened on Jan. 5 with a registration of 44 mining men from 10 states, Alaska, and five foreign countries. The course lasts three months and is arranged in sections for quartz, placer and coal miners.

Cementation in Shaft Sinking

Special Correspondence

SYNOPSIS—A description of methods employed particularly in the north of France to exclude water effectually from shafts both during sinking and subsequently.

Considerable attention has been paid recently to methods involving the use of cement during shaft sinking in cases where the strata would otherwise present difficulties either mechanical or due to the infiltration of water both during sinking operations and subsequently.

At the International Congress at Liége, in 1905, the report of Monsieur Portier showed the excellent results obtained in the north of France by the cementation of water-bearing strata during the sinking of pit shafts.

Since then J. Lombois has described cementation methods of water-bearing territory, adopted by the Compagnie des Mines de Béthune in the bulletin of the Society of Mineral Industries, while later Monsieur Saclier has described in the Annales des Mines de France similar methods adopted by Edouard Agache in the sinking of shafts. These descriptions have called attention to the value of cementation methods, such as are now adopted extensively in France.

In these processes the operations succeed each other somewhat as follows: First, boreholes are sunk of sufficient number and proximity to each other to render the ground impermeable at the completion of the process. Then, thin cement grouting is injected into these holes either simultaneously in all of them or by sections, the third stage is the sinking of the shaft itself.

This method of operation which has been successful in the cretaceous area of the north of France is not necessarily applicable without modifications or extensions to other circumstances which are encountered in sinking operations. It has been found, for example, in the porous ground, such as the sandstone of the Vosges where there are a large number of small crevices that the penetration of the cement would not be sufficient for those pits much over 640 ft. in depth, the time taken by the various operations being too long. With these points in view, advances have been recently made in cementation methods which are worthy of attention.

Where Numerous Fissures Are Met

Suppose that cement grouting is injected through one or more boreholes at a time in a stratum of ground containing numerous fissures. This condition is represented in Fig. 1 where *A* is a fissure of considerable width of opening, *B*, one which, although of considerable capacity, has a narrow neck or mouth to the borehole, *C* and *D* are fine cracks, while *F* is an extreme case of a capillary fissure.

The cement method to be entirely successful must adequately deal with all these types of fissures. It is, however, well known and always evident that all the grouting tends to enter the large openings, such as that at *A*, and during the time that it is penetrating these openings the pressure possible in the boreholes is not high. Furthermore, until considerable pressure is established, the cement will not enter into the more restricted crevices.

When the pressure increases somewhat, the cement is able to make enlargements in constricted fissures, such as *B*, but finally when the pressure has become high, say for example, 10 atmospheres, a considerable proportion of the fine fissures such as *B* and *D*, and also the capillary fissures *F* have become clogged at their entrances, and the cement grouting is unable to penetrate. In other words, during the period of low pressure, the grouting traveling down the boreholes deposits itself to a certain extent upon the walls and sides, with the result that when at last the higher pressure is attained the smaller openings are sealed.

When the duration of injection exceeds two hours from the first introduction of the cement, the inconvenience

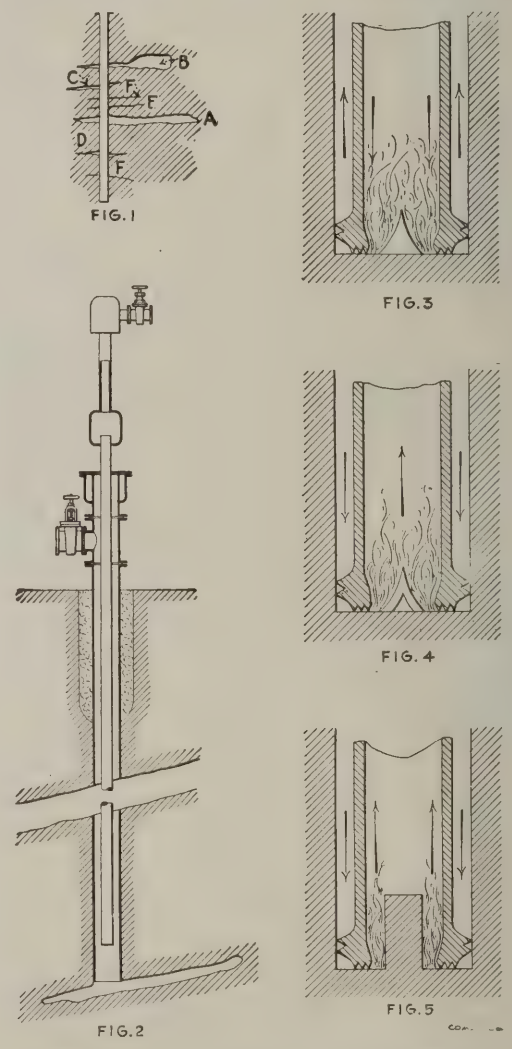


Illustration of Boring and Cementation Conditions

becomes so great that the value of the method is questionable. To the well known fact that the injection of cement should be carried on under the highest pressure, the further statement may be added that this high pressure should be established in the boreholes as rapidly as possible. Otherwise the efficiency of the method will be reduced.

Treat the Fissures Individually

In order to obtain the high pressure quickly, it is essential that the grouting shall not at any one time en-

counter a large number of exits such as a number of fissures in its path. This leads logically, therefore, to the necessity for a method of cementation by which each fissure or small group of fissures is dealt with individually

It is known, of course, that in boring methods employing a current of water, the gage on the in-going pipe always indicates a certain pressure, which depends on the depth of the bore, the diameter of the rod and of the hole, and the volume of water being circulated. As soon as the bit upon the end of the boring-rod encounters a fissure in the earth, this pressure gage indicates a sharp variation, generally a drop. It then becomes advisable to inject into this fissure, cement grouting under a pressure of 10, 15, or even 20 atmospheres.

In order to do this, a certain distinction must be made between methods applicable to small holes or shallow depths and those which have great depths. As soon as

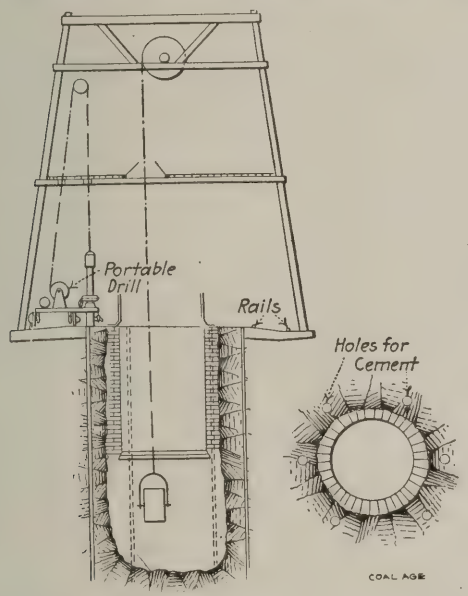


FIG. 6. ARRANGEMENT OF SINKING AND CEMENTATION APPARATUS

the bit touches the fissure indicated by the pressure gage, the rods are withdrawn, the boring apparatus removed to another hole, and there started to work, while in the meantime cement is brought to the first hole and there prepared for injection.

The grouting is forced into the interstices either by pump or compressed air, or by water under pressure as an intermediary. It is necessary also when following the above procedure that the apparatus for boring and cementation be light and transportable. It should be mentioned also that at small depths it is not usually possible to use high pressures, since under these circumstances communication between the fissures and the surface may be established.

THIS METHOD IMPRACTICABLE AT GREAT DEPTHS

If the depth is in excess of approximately 500 ft., this method of working becomes impracticable. In order to withdraw the 500 ft. of boring-rod, about half an hour would be required, and it would not be advantageous to perform this operation frequently. Moreover, a boring 6 in. in diameter, and 500 ft. deep, would have a capacity of 3¼ cu.yd. That is to say, in order to bring direct pressure upon the grout it would be necessary to handle 3¼ cu.yd. of material before the fissure would be placed under pressure.

This method, therefore, is too long. Furthermore, at the close of the operation there would be a considerable amount of cement in the hole. It is advantageous, therefore, in order to convey the cement to its destination in the least possible time to cause it to travel through a tube.

In practice, the tube is the boring-rod itself. The head of these rods and the head of the borehole are both closed by cocks or valves, in order to allow the passage into the boring of water or cement grouting, to control these liquids either as a direct or reversed current or even in both directions at the same time as explained later. Another object is to maintain in the borehole a pressure which can be regulated at will.

The two cocks disposed in this way are characteristic of the boring apparatus invented by J. V. Drejcha. They allow great rapidity in operation.

While it is true that the injection of cement through the boring-rod carries with it the easily seen danger of wedging the rod and the bit in the hole, if, during cementation, these parts are given a slow movement of rotation, this danger is much diminished.

A considerable number of operations carried out in the sandstone of the Vosges Mountains have shown that the earth exerts no elastic pressure upon the cement. That is to say, that the filled fissures do not give back their contents to the borehole when pressure upon the grout is removed.

A case or so to the contrary has, however, occurred, and the phenomenon has been attributed to the fissure being of such wide extent that the grouting under pressure raised the earth. When the pressure was withdrawn, the earth settled back, the cavity lost a certain amount of its volume, and a cement pat was ejected into the boring.

It is evident that in such a case it would be necessary to imprison the pressure in the hole at the close of the injection by closing both cocks, which would make impossible the withdrawal of the boring-rods. Consequently, the injection of cement through the boring-rod is not practicable where fissures have a tendency to return the cement grouting. Neither is this method applicable for a similar reason when the water encountered by the boring is of a spouting nature.

In such cases it becomes necessary to apply the first method as in borings of small depth. Practice shows, however, that in such cases since the volume of cement to be injected is large and the operation important, the relative inconvenience of removing a rod and filling the hole with grout is decreased. On the other hand, in the general case of fissures which do not return the cement, it is possible after the injection to continue boring which is in this way only slightly interrupted by the work of methodical cementation.

THE VARYING DENSITIES OF THE GROUT

As has been stated above, cement injection should be carried out rapidly. Now the density of cement grouting that can be employed may vary in practice from 3 per cent. to 20 per cent., according to the apertures of the fissures encountered. In continuously employing a 3 per cent. grouting, the operation takes an inconveniently long time; but if a grouting of 20 per cent. is uniformly employed, as appears to be the general tendency, one apparently obtains a rapid and efficacious result.

Unfortunately, however, this cement does not penetrate into the small fissures, with the result that, during deep sinking, fissures which have not been closed are likely to be found.

In order to convey a light cement into restricted fissures and a dense cement into open ones, it becomes necessary to conduct a preliminary examination. That is to say, to predetermine the pressure necessary to introduce a certain volume of water per minute into any particular crevice.

Such a measurement involves merely a determination of the constant of the sinking apparatus, taking account of the diameter of the rod and the depth of boring, these measurements, of course, possess only a relative value and indicate with certainty only that in any particular borehole the fissure which has to be cemented is more or less open than those previously treated. From this, however, one can get some kind of idea as to the capacity of the opening.

French engineers, who have given thought to operations of this description, have shown clearly that the dirt produced by the work of boring has a tendency to enter the fissures and prevent the cement from taking due effect. The various methods which have been adopted to execute boring with a current of water or by washing the fissures by pumping are convenient for small depths, but these palliatives unfortunately cannot be applied to depths of over, say 330 ft., since they then become slow, costly and not altogether efficacious.

Reduce the Amount of Dirt

In case of greater depth it becomes necessary to apply other principles. The borings should be made of small diameter in order to obtain as little dirt as possible. They should be made, if practicable, with the crown bit, which gives heavier pieces of material than does either the saw or trepan. The work should be done in a reverse current of water, and the cement injected methodically to each fissure as soon as encountered by the boring tool.

The favorable influence of the reverse current of water is clearly illustrated in Figs. 3, 4 and 5. It will be seen that the current exercises at the bottom of the cutting a suction action, relative of course, while it has a tendency to throw the dirt about. The facility of ascension in the rod is easily observable by the spectator who notices the cuttings coming out of the discharge during the course of work like small projectiles.

Boring contractors know well that a reverse current is dangerous because it produces in the boring falls of material with consequent jamming of the rod. Methodical cementation of fissures or frequently introducing into the borehole, cement under a pressure of 15 to 20 atmosphere, converts a hole which would otherwise have many loose particles along its side ready to fall to the bottom into a veritable tube of compressed concrete, effectually preventing any dislodgment of material.

The Three Essential Features

The three special features of this method of cementation are, therefore, boreholes of small diameters, the use of a reverse current and methodical cementation. These operated together form the characteristics of the method employed by the Société Anonyme de Forges et Enterprises Minières Trefor of Brussels.

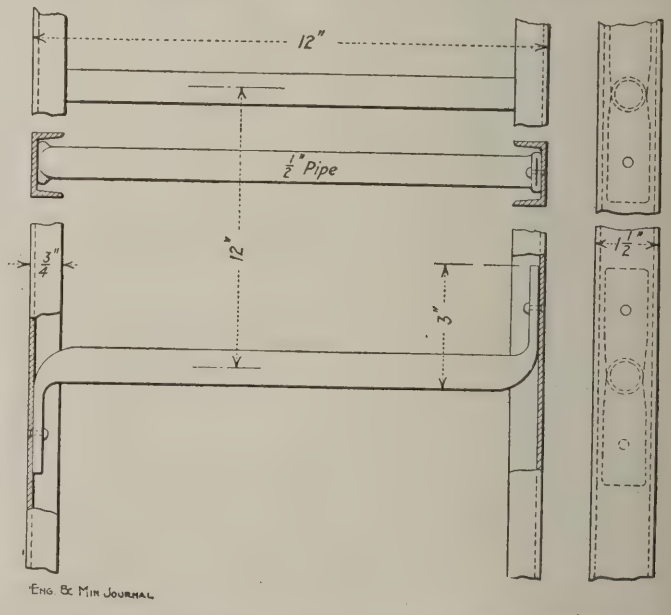
Mining organizations which are forced to sink deep shafts have, of course, as a particular object the saving of time. From this point of view, methods which consist of boring a ring of holes and injecting cement through them before beginning to sink a shaft require long periods for great depths.

With methodical cementation on the lines described above, effected by light and transportable apparatus, it is possible, however, to keep the section of the shaft free from boring apparatus, and to actively carry on shaft sinking at the same time. By this means the work of cementation progresses simultaneously at from 45 to 60 ft. in advance of the shaft sinking. The work of the sinkers is, therefore, executed in ground which is practically a monolith.

Fig. 6 shows the arrangement of apparatus for such shaft-sinking methods carried on under the Trefor patent, and needs no explanation. This system is being adopted with considerable success, not only in France and Belgium, but also in Great Britain and other countries.

Portable Steel Ladder

The Penn Iron Mining Co., on the Menominee range, is adopting an all-steel ladder underground and its introduction into coal mines having steep pitches is well worthy of consideration. The following note is taken from the columns of the *Engineering and Mining Journal*. The illustration shows the type used in stopes and manways where the installation is more or less temporary. The ladder is 12 ft. long, 1 ft. wide and weighs a little under 50 lb. The sides are 1¼x¾-in. channels with the flanges inside; the rungs are of ½-in. pipe. The



Light All-Steel Ladder of Pipe and Channel

ends of the pipes are bent at right angles in opposite directions, flattened and riveted to the channels, the rivets being countersunk on the outside. The ladders are of unusually light construction, but are found to stand up well in service and are extremely convenient to carry about and place as needed. They are found preferable to the type first tried, built of heavier channels and ¾-in. pipe and weighing nearly twice as much. For permanent installations, as in the shaft, a much heavier ladder is used, built also entirely of steel.

Notes on the Prevention of Explosions in Coal Mines

By George S. Rice*

SYNOPSIS—The paper gathers together a number of the most important facts relating to explosions, most of which have appeared but may have been overlooked by readers. Noteworthy remarks are that rock dust is proved to be of value and should be used, and that an explosion can as readily originate in stagnant as in moving air except, perhaps, where several shots are fired following each other. In that case the speed of the current may keep the dust in suspension and so in such a condition that it is readily susceptible to inflammation.

Although the explosibility of coal dust without the presence of gas (methane) has been universally conceded by mining men in this country, so that a mining man considers the statement trite that coal dust in the form of a cloud will explode, yet, nevertheless, the development of means of preventing explosions has not made as rapid advance during the past year or two as it did during a few previous years. In certain mines in which disasters have occurred, investigations made by the engineers of the bureau have shown that there have been extensive stretches along the roadway and the sides of passageways in which there was much dry coal dust.

The Moisture Must Be Everywhere

Here and there on such roads there have been wet patches, some of considerable length, and these the mine officials have thought gave sufficient protection against a widespread explosion. Also during warm weather dust precautions have been neglected in many mines, possibly because the emphasis laid on the greater danger from dust in winter has caused relaxation of effort in warm weather.

Further, many mine officials have thought that there is no danger if the entering air has a high relative humidity, although this condition is not in itself an assurance against an explosion. It is only as the current deposits moisture that protection is given. In mines where only scattered places have been wet, an explosion well started has been known to jump the wet places, carrying its own ammunition of coal dust in the advance air wave, and gaining fresh energy on reaching dry places beyond.

Several great disasters during the past few years have occurred in mines rated as "nongaseous." A miner has gone to the face of a working place with an open light, unaware that there had been an accumulation of gas since the last inspection, or since he had fired a shot; the gas has been ignited and the flaming has been sufficient to stir up coal dust and start a great coal-dust explosion that has swept the mine. Some of the mines so swept by explosions were well ventilated and their return air currents carried merely a trace of gas, but methane had suddenly escaped at certain faces where faults or clay slips had been encountered.

One conspicuous result of the investigations of the mining engineers of the bureau is that in not one of the many extensive explosions since the mine-accident investigations began in 1908, has there been anything perplexing or mysterious as to the agent that propagated an explosion through a bituminous-coal mine, although the origin of a few explosions may have been in doubt. Wherever an explosion has passed there has been ample evidence that there was sufficient or more than sufficient coal dust to feed it, if not at every point, then in accumulations at places along the passageways.

Shotfiring in Still Air or in a Current

In the western interior region a theory prevails that explosions are less likely to occur if there is little or no ventilation at the time of shotfiring. Tests at the bureau's experimental mine at Bruceton, Penn., have indicated that an explosion may start from a single shot as readily in a quiet atmosphere as in a strong current.

However, if there has been preliminary raising of coal dust in the air by rapid shotfiring, undoubtedly the dust is more likely to remain suspended in the air when there is a strong current than when the air is quiet, so that possibly the danger of a dust explosion being propagated is slightly increased by the current.

On the other hand, if a mine makes any gas, it is probable that any lessening of the danger of propagation by stopping the fan is offset by the accumulation of gas (methane) at the face. Moreover, it must be remembered that explosions have been propagated by coal dust alone through the experimental mine where before the explosion there was a perfectly quiet atmosphere.

What We Know about Dust Explosions

Tests have demonstrated (*a*) that an explosion of coal dust may become rather violent after it has traveled three or four hundred feet along a passageway; (*b*) that it may reach a violent stage in 500 to 800 ft. from the origin, depending on conditions; (*c*) that an explosion may be made at will in an entry or passageway in which the roof, sides and floor are wet to the touch, if sufficient dry coal dust is present; (*d*) that a high relative humidity of air, which may even be nearly 100 per cent., has in itself no appreciable effect in preventing a coal-dust explosion originated by a blown-out shot, a result that may appear to nullify the recommendation to humidify the ventilating current, as advocated by the Bureau of Mines and by various persons, but does not, since, as repeatedly emphasized, the purpose of humidifying is both to prevent an unsaturated air current from absorbing moisture from the coal dust and to cause moisture to be deposited along the roadways; (*e*) that a single shot improperly placed and loaded with long-flame explosive may cause the ignition of coal dust; (*f*) that it makes no perceptible difference, so far as the origination of an explosion is concerned, whether the air is moving* one way or the other

*Chief mining engineer, Bureau of Mines, 40th and Butler Sts., Pittsburgh, Penn.

Note—Abstract from technical paper 56 of the Bureau of Mines, entitled "Notes on the Prevention of Dust and Gas Explosions in Coal Mines."

*Experiments have not been made to ascertain the effect produced when the air is moving at very high velocities.

at the point of origin or is quiet, but that the important factor is the presence of sufficient dry coal dust; (*g*) that pressures as high as 120 lb. per sq.in. have been measured at right angles to the movement of the explosion, the pressure in the line of advance of the explosion being no doubt much greater; (*h*) that comparatively small quantities of coal dust, 1 lb. per linear foot of entry, equal to about one-fifth ounce per cubic foot of space, will propagate an explosion; a smaller quantity has not yet been tried in the mine†. This small quantity scattered on roof, side projections and floor is barely noticeable.

Are You Sure the Dust Is Wet?

The bureau's experiments have indicated that an explosion cannot originate in thoroughly wet coal dust, because the dust will not be thrown into the air as a cloud by the shock from a shot or by other means, but that it is not easy to wet piles of coal dust even with well humidified air currents. This is an important feature not fully understood hitherto. When a saturated air current passes through a mine it dampens the roof, floor and sides, but the coal dust itself when in accumulations appears to repel drops of moisture; even with long exposure dust like that from the Pittsburgh seam takes up only 1 or 2 per cent. of moisture, though the walls and floor may become damp.

The surprising result of this series of experiments makes it evident that it is necessary to remove coal-dust accumulations, so that, after a passageway has been well dampened, any particles of dust falling on wet surfaces will themselves become wet. It has been observed after some dust-explosion disasters that the explosion has traversed entries in which there was standing water along the bottom, but on the other hand, examination of the benches and projections along the sides of such entries has disclosed quantities of dry dust. Also it has been observed that timbers frequently carry on their upper surfaces quantities of dust sufficient to propagate an explosion. Consequently, the bureau is led to emphasize two precautions, namely, *first remove all accumulations of dry dust and then keep the entries wet or use a coating of rock dust. There will then be little danger of explosion.*

Bureau Commends Rock Dust

At the bureau's experimental mine, experiments have been made with rock or shale dust as an alternative to watering. The dust has been made from the draw slate over the Pittsburgh bed with a hammer crusher having a fine screen, 95 per cent. of the dust passing through a 20-mesh sieve. Tests have been started only recently, but the results obtained supplement and corroborate those obtained at the experimental galleries in France and England, showing that when inert dust or rock dust is placed on all projections and on the floor (even if some coal dust be present it will be buried) the mine will be free from the possibility of an explosion of coal dust.

The bureau's work has not gone far enough to permit the determination of the precise amounts of rock dust necessary, but it is believed that there should be at least twice as much rock dust as coal dust. If the amount of rock dust even equals that of coal dust the chance of an explosion starting is very much lessened; but as more coal dust is apt to be present than is supposed, the only safe plan is to put on the rock dust abundantly.

Taffanel Barriers Are Good But Don't Rely on Them

The bureau has made numerous experiments with the so called "Taffanel barriers," consisting of 10 shelves one-half yard wide and 2 yd. apart, placed over the roadway and piled with rock dust as high as possible, thus forming an obstruction of about 15 per cent. of the cross-section of an ordinary passageway, if this roadway is less than 7 ft. high. More shelves can be employed if the conditions seem to require it. In tests with such barriers explosions have been checked within a few hundred feet after the explosive wave has encountered them. In one test the pressure recorded was 120 lb. immediately before the barrier and only 12 lb. 300 ft. farther out.

In the French gallery the experiments were equally successful; but in the Clarence mine disaster in France, in 1912, in certain places where there was a light explosion and consequently little pressure, the explosion passed the barriers without displacing the shale dust. The failure of the explosion to displace the shale dust was somewhat exceptional and should not lead to condemnation of the barriers as a secondary defense.

Therefore the use of barriers is suggested by the engineers of the bureau as suitable, for example, at the entrance of the ventilating splits, particularly in haulage ways, where there is nearly always an accumulation of dust, and at intervals along the main entries, but they should be considered only as supplementing the other means.

Watch Dust in Gobs and Don't Use It for Ballast

As regards means to lessen the danger of explosions, the prime essential is to reduce the production of dust. The excessive use of explosives, particularly in shooting off the solid, causes large quantities of dust to be blown into the gobs and other inaccessible places.

It is unwise to use broken coal or machine or hand cuttings as ballast for haulage. Even if the coal is in lumps, sooner or later it will be crushed to dust. If an incipient explosion starts, this inflammable material will be thrown into the air and be a source of danger. Use either rock, clay or cinders for ballast.

Shooting "Cracking" Shots Condemned

The use of permissible explosives would prevent many disasters that occur in parts of the Southwest, where so called "cracking" shots are employed. Such shots made by drilling holes 12 to 14 ft. straight into the solid and using five or six sticks of dynamite are a menace both to shotfirers and to the mine and cannot be too strongly condemned.

Permissible explosives of the stronger kinds should also be used in lifting bottom, breaking rock bands or brushing top. There is often as much danger in using dynamite for this purpose as for shooting coal, as coal dust is liable to be present in dangerous quantities. A number of explosions have been caused during the past few years by this use of dynamite.

Mine Car Which Leaks Dust May Later Serve as a Hearse

The second greatest agency in dust making is the mine car. It is often loaded with coal 9 to 18 in. above the

†The theoretical amount of Pittsburgh coal dust, if complete combustion takes place and all the oxygen is consumed, is 0.12 oz. per cubic foot of space.

sides. The coal on a car so loaded may strike the timbers or roof, or be so jarred that it is dislodged and thrown into the roadway, where it is ground to dust by the car wheels or by men and mules or horses. Again, cars with gates or open joints leak dust.

The remedy is drastic, but should be followed. Tight cars and, wherever possible, cars without gates should be used. Wagons of the latter type can only be dumped with a revolving tipple. In Europe, except in Wales and Scotland, tight cars without gates are universally used in coal mines. Side-revolving tipples are employed for dumping the cars, and by proper arrangement the coal is dumped with little breakage. In building or buying mine cars the endeavor should be to get a car as tight as possible, and enough cars should be supplied so that the miners will not be compelled to pile the coal up above the sides.

In addition to tight cars, automatic sprinklers adjacent to the gathering places and sidings should be used so that the cars may be drenched as they pass under a spray. The automatic spray system, operated by a lever depressed or moved by the passing car, is effectively used in a few mines in this country and in many abroad. If well arranged it washes the dust from the top of the car and prevents it from being dropped or blown off by the air currents along the roadway.

Rock Castle Mine Explosion

Special Correspondence

SYNOPSIS—An explosion of gas at the Rock Castle mine located at a town of the same name near Abernant, Ala., killed 12 men out of 90 in the mine. The explosion was quite local. Four men may have been overcome by afterdamp.

Twelve men, five white and seven colored, were killed in a gas explosion which occurred at 8:45 a.m., in the Rock Castle mines of the Davis Creek Coal & Coke Co., at Rockcastle, Ala., on Saturday, Jan. 10, 1914. The mine is located in Tuscaloosa County, about 35 miles south of Birmingham, on a branch of the Louisville & Nashville R.R.



Tipple at the Rock Castle Mine, Where a Recent Explosion Killed 12 Men

Foreman or Helper Ignites Gas

The gas was probably ignited in the 21st room on the 17th right entry, by Mine Foreman Wood W. Quarles and a brattice man, Frank Tillery. All the men killed by the explosion worked on the 17th right entry. Most of those who met death were terribly burned and apparently all but four were killed instantly. Four bodies were found along the heading and it is possible they were those of men who were overcome by afterdamp.

On the morning of the explosion, the fireboss, W. Lawrence, discovered some gas in the 21st, 22nd and 23rd rooms of the 17th right, all of which rooms were idle, and, as usual, he reported them to the mine foreman before the miners entered. Shortly after the miners had gone to their places, Quarles and Tillery, carrying safety lamps, went down to investigate the rooms reported by the fireboss. Just what they did can never be known, as they and all the other men on this heading were killed by the explosion. Mr. Tillery's body was found in the 21st room, about 50 ft. from the mouth and Mr. Quarle's body was on the heading. The 17th right contains 29 rooms, but only those inside of the 24th were being worked.

The mine has generated some gas, during the past year, but has never been considered dangerous and all the men worked with open lights. The mine has been working for a number of years and no fatalities from gas explosions have ever been reported. Some afterdamp was created by the explosion, but most of the recovery work was done without the aid of helmets. All the bodies were recovered by 7 p.m. Some 5 or 6 brattices on the 17th right were destroyed by the explosion, but no other damage was done to the mine and work will be resumed in a few days. No evidence of the explosion was visible on the 17th heading outside of No. 20 room. About 90 men were at work inside the mine when the explosion occurred.

Rescue Work

News of the explosion reached the Birmingham office of the company about noon and almost immediately offers of assistance were received from the Tennessee Coal,

Iron & R.R. Co., which volunteered to send down its car. J. C. Maben, Jr., vice-president of the Davis Creek Coal & Coke Co., decided that the "Tennessee" car could not reach the scene of the accident in time to render service, but requested that the Government auto truck be started immediately. It was found that G. B. Sutton in charge of the Government rescue station was out of the city, delivering a lecture at one of the mines of the Alabama Fuel & Iron Co.

Mr. Hamilton, of the DuPont Powder Co., and Mr. Newby, of the Jefferson Powder Co., were then communicated with, as they had made several runs with the automobile rescue car and they consented to take the truck to Rockcastle at once. They arrived there about 3 o'clock. Chief State Mine Inspector, C. H. Nesbitt and assistants, F. Hillman and D. Kelso, left at once in an automobile, as did also J. C. Maben, Jr., vice-president of the company. Assistant Inspector Smith, who happened to be in Tuscaloosa County, was notified by wire, and joined the others at Rockcastle.



Scene at the Mouth of the Slope after the Explosion

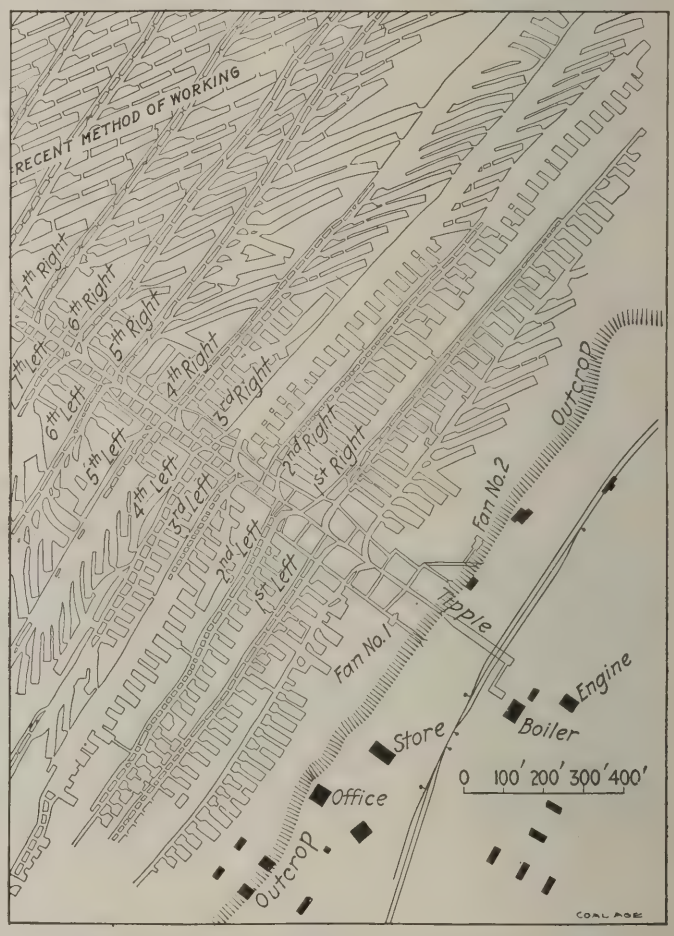
Those who lost their lives are: Wood W. Quarles, mine foreman, Frank Tillery, brattice man, 3 Austrians, Phil Malner Joe Bosneck, John Hondlin, and 7 colored men, John Brown, Elmore Lyons, Nathan Blakely, Sam Brown, Harry Tinker, Charles Fancher and Dennis Thomas; Nathan Blakely and Sam Brown being drivers.

Only the men in the headings above and below the 17th right knew that anything unusual had happened and some of them immediately rushed outside and notified George Kuffner, the superintendent. Word was then sent to all the men in the mine to come out immediately. As soon as Mr. Kuffner was sure that all the men were out, with the exception of those working in the 17th right, he had a brattice put across the slope at that heading and reversed the air current, making the heading the intake so that all the incoming air was forced up into that entry. When this was done, the rescuers were able to penetrate to the face of the 17th right without helmets, but they did not attempt to go into the rooms, until the helmets arrived. Eight bodies were located before that time. A. H. Witt, the mining engineer of the company, accompanied the rescue crews, as, next to the mine foreman who had been killed, he was most familiar with the mine workings.

Mining Conditions

The mine is opened on the Jagger seam which pitches at about 18 deg. at this point and consists of a single slope, with an airway on either side. Right- and left-hand entries are driven off this main slope. Roof and top are excellent and taking into consideration the thickness of the seam, which is 6 ft., mining conditions are good. The coal is mined with picks and shot down with the permissible explosive "Monobel." Ventilation is induced by two blowing fans, one on either side of the main slope, and has always been considered ample.

The mine was opened eleven years ago by J. C. Maben, Jr., who was then a young mining engineer, almost fresh from college. The venture was so successful and reflected so much credit on the young man's management, that two years ago he was elected vice-president of the Sloss-Sheffield Steel & Iron Co., one of the largest iron and coal corporations in the South. He still retains his holdings and office in the Davis Creek Coal & Coke Co. Geo. Kuffner, superintendent of the mine, is a brother of a former assistant state mine inspector.



The Rock Castle Mine, Rockcastle, Ala.

The workings in the 17th right where the explosion took place are like those in the 7th, 8th and 9th right.

As in all mine accidents, the scenes at the pit mouth, following the explosion, were pathetic in the extreme. There, huddled together, anxiously waiting, were the sorrowful wives and mothers of some whose fate was all but guessed, and watching with them, stood the young man whose enthusiasm, but a few short years before, had brought them there.

An Analysis of the Ohio Mining Commission's Report

By A. T. Shurick

SYNOPSIS—The gradual leaning toward paternalism, on the part of both state and federal governments, is becoming more and more marked. The investigation of the Ohio legislature is the most important step that has been made in this direction, so far as concerns the coal industry. The changes proposed are of such a radical nature and will indubitably be so far reaching in their effect on legislation in other states, that coal engineers in all parts of the country are closely following the progress of the movement. The issue is of such importance that the recent report of the commission appointed to investigate the situation justifies more than the ordinary review. The present installment of the review takes up the preliminary considerations.

In the face of severe criticism on the part of the coal press generally throughout the country, Ohio has quietly persevered in its determination to solve the problem of providing an equitable basis of payment for her miners. In pursuance of this plan, a report has been compiled dealing with this question in all its ramifications. The report, as a whole, reflects creditably upon the commonwealth and, incidentally, forms one of the most valuable treatises on certain branches of technical coal literature that has ever yet been published. It is such a report as could only be compiled by months of careful and painstaking research work.

It is obvious to the most casual readers that the authors have approached their task with minds open to conviction. They have consulted and examined reputable authorities recommended by both sides of the question and have shown a keen insight where any attempts at misconstruing the actual conditions were made. They visited most of the mines in their own state, and some in others, as well as a number of the large consuming plants and distributing centers. Their conclusions are honest, accurate, and, in the main, founded on the soundest practice in coal mining.

While the subject has been handled in a masterful manner, it is none the less true that the commission has placed itself on record as favoring concededly radical innovations—changes which are regarded by some as the visionary effervescence of the impractical altruist. But it is equally true that our best students of mining economics are agreed that it is only a question of time until some of these proposed changes become accepted practice.

The pioneer in new thought lays himself open to much criticism from the more conservative element, and since the province of the reviewer is destructive rather than constructive, impartial and unbiased issue is freely taken throughout this paper with many of the findings of the commission.

Geology and the Coal Reserves

As becomes a monograph of this character, designed as it is rather for the *dilettante* than the professional, a labored effort is made throughout to maintain as non-technical phraseology as possible. The report opens with a brief and clearly expressed synopsis on the modern theories of coal formation. It is regrettable in this connection that local authorities are quoted to the exclusion of all others; surely, Dana, Le Conte, or the more modern Salisbury and Chamberlain would have carried greater weight with the well informed reader. This almost provincial disregard for the world's accepted authorities naturally affects the prestige of the report in the minds of the professional.

In addition to this, the paper is rather overburdened with considerable speculation regarding the actual coal resources and what these might have been under other conditions. "Something like 10,000 square miles" is given as the estimate of the coal-bearing area in Ohio. It is rather strange here that the United States Geological Survey reports should have been so completely ignored, particularly since these give actual tonnage figures and not the rather meaningless square miles.

Thus we find the geological survey estimates the area "known to contain workable coal" at 12,660 square miles, containing originally 86 billion short tons of coal. From the earliest time for which records are available, in 1838, to Jan. 1, 1913, the total extraction has been only 646 million tons, or 0.0075 of the total original supply, less than 1 per cent. In view of the fact that the commission lays considerable emphasis on the importance of conserving the coal resources, it seems only fair that the best information available on this subject should be included.

It also appears that the commission might advantageously have quoted like figures for other coal districts, in order to give the reader a basis for determining the relative status of Ohio as compared with other fields. For instance, the situation might aptly be compared with conditions in England where the coal reserves are estimated at 147 billion tons. The *annual* production there is at the rate of 270 million tons, or about 0.002 of the total supplies, while Ohio's *gross production* during the three-quarters of a century since the inception of mining is only 0.0075 of the reserves, as already pointed out.

Conservation and Competition

Mining and conservation of the coal is the next topic taken up. The commission reiterates the already generally accepted conclusion that more effective systems of mining must be employed in order to obtain a higher recovery. As compared with other states, a rather broad hint is given at the backwardness among Ohio operators in adopting modern methods of mining.

After justifying its position in taking up the conservation phase, the commission goes into a detailed discussion of this question, particularly from the point of view of the mining man. A regrettable feature of the investigations along these lines is the persistent policy of giving preference to the testimony of geologists. The problems arising in this connection are those of the engineer entirely. It is essentially a question as to whether the coal can be economically mined in such a manner as to

effect the maximum recovery, and this is clearly one for the engineer and not the geologist. It is not within the province of the geologist to determine issues in practical mining, and it is a disappointing feature of the report that utterances based upon the impractical altruistics of men entirely uncontrolled by the economics of competition should be given such weighty consideration.

It is here noted with much interest that the commission takes a sharp rap at "our drastic anti-trust laws, both National and State." It has been pointed out repeatedly that conservation and competition in the coal industry are *concordia discors*. On the one hand the operator is accused of despoiling the Nation's coal reserves and urged to adopt systems and methods for eliminating this waste. On the other hand, he is being forced to market his product under the most adverse conditions conceivable, and often at a figure that scarcely covers the cost of production. Where, then, are the additional funds necessary to the adoption of more efficient methods of working to come from?

Thorough Preparation Must Be Assured

Passing over half a dozen pages on the nomenclature of the Ohio coal horizon with comments upon the economic possibilities of the different seams, we arrive with interest at the opening gun on the mine-run discussion. In a general prologue the commission emphatically states that: "Unless the Ohio coals are carefully mined and are reasonably free from impurities, they will reach the Northwest in a less satisfactory condition than the coal of other fields, and in such keenly competitive fields, the margin of profit is very low." The commission further states that "the Ohio operators would soon be driven out of their most valuable markets" unless they can "guarantee clean coal, mined in such a way as to bear transportation in large lumps."

Much testimony was taken by the commission to bring out the proportion of coal lost by the present systems of mining in Ohio. The different authorities examined placed this, under normal conditions, at a minimum of 25 per cent. to 35 per cent., the commission itself, from the results of its examinations, being of the opinion that from 35 per cent. to 40 per cent. was left in as pillars, while it often ran as high as 40, 45 and even 50 per cent.

Systems of Mining

Following this the commission naturally turns to the various systems of mining used in the state, in order to demonstrate how these losses occur and prescribe remedies for same. The report segregates the systems in this country, under four general headings as follows: Wide room and narrow pillar system; narrow room and thick pillar system; the panel system, and the longwall system.

Wide Room and Narrow Pillar System—It would be surmised from the report, that this system is used mostly in small operations, where little consideration is given toward effecting a large recovery. One of the principal objections which the commission takes to this method, as regards the present controversy, is the difficulty in getting miners to work pillars which have been badly crushed by the abnormal load thrown upon them. Naturally such coal would yield a maximum proportion of slack, which the miner is not paid for, and the objection is well founded.

..*Narrow Room and Thick Pillar System*—This method differs from the one just described in that larger pillars are left with a view to ultimately recovering these when the mine is abandoned. It is estimated that as high as 90 per cent. of the entire seam may be worked out by this system, although probably on an average of from 75 to 80 per cent. is about all that is generally mined.

The Panel System

Panel System—After a brief description of this method the commission goes into a detailed discussion of it. Obviously it meets with great favor. As pointed out in the report the method is not adaptable to districts where land values are high, because of surface subsidence, but inasmuch as the mining regions of Ohio are generally hilly and of little value for farming purposes, this objection loses in importance.

It is noted here that the commission shows a commendable leaning toward the more advanced methods of mining, particularly those now practiced in West Virginia. Thus the Gary, W. Va., mines of the United States Steel Corporation, operated under leases granted by the Pocahontas Coal & Coke Co.,* are heartily commended by the commission.

Taking up the question as to why Ohio operators have not voluntarily adopted the panel system of working, the report ascribes this partially to a general belief that this method involves a much greater initial expenditure. This, the commission thinks, is due to the erroneous belief that all narrow work must be driven out to the boundaries before the work of extraction on a large scale can be undertaken. The report correctly disabuses this theory by stating that active mining may be prosecuted as soon as sufficient development work has been done to open up a single panel. While this, of course, is true, it none the less conveys a wrong impression, since the expenditure necessary to accomplish this is ignored; it is difficult to conceive a system of panel working that would not require at least half a mile of development work, consisting of from two to four entries. Driving such an amount of narrow work obviously involves not only a large expenditure but an important interval of time.

As the main reason for the objection of the operators to the adoption of the panel system, the commission believes that this is due to the extra expense incident to driving entries and working narrow places. It must, of course, be conceded that this system requires a greater amount of entries, and the operators are indubitably justified in their stand in this matter, providing a proportionate increase in the market value of their product cannot be obtained.

In so far as this objection applies to driving narrow rooms the position of the companies is not so well sustained. While it is true that the use of narrow rooms is commonly applied in the panel system, this is not by any means essential. As a matter of fact, the system originated in fields where the roof could not be held except with narrow places, such as, for instance, the Connellsville district. While roof conditions in Ohio, as a rule, are not particularly favorable, there would hardly be any logical reason for adopting the narrow rooms used in the panel system in West Virginia. The miners also

*A complete detailed description of the panel system in the Pocahontas field will be found in "Coal Age" this week. Descriptions of other systems used in West Virginia will also be found in Vol. 1, pp. 278 and 305.

find objection to this method, under the present basis of payment, for the reason that it does not yield such a large proportion of lump coal.

Longwall System—Although the commission says: "This is undoubtedly the best system of mining wherever it is practicable," the report disposes of it in a single brief paragraph. This it does on the grounds that "it is generally admitted by practical miners and mine operators that this system could not be employed to any considerable extent in Ohio." In a report so replete with innovations of every character, it is rather disappointing to see this system passed over in such a casual manner. To the true conservationist the longwall system is looked upon as the millennium.*

Regulating the System of Mining

As to a general corrective, the commission rightly points out that no one system of mining could be specified for the reason that many mines now operating could not conform to such a system or could do so only at a prohibitive expenditure. But the commission does boldly advocate a departure from accepted practice by recommending state supervision of the systems of mining employed. It is worthy of note in this connection that many conspicuous figures in the coal industry today, as for instance Francis S. Peabody[1] and other of our ablest thinkers, look with favor upon some such regulation.

The first question that naturally arises is how such a plan will work out where the Ohio coals come into competition with those from adjoining states not so handicapped. While the plan certainly has much to recommend it and indications are that the no far distant future will see it in general practice, it is none the less inevitable that the pioneers will suffer a certain economic disadvantage. The measure is similar in many respects to the building laws in effect in all cities, and aside from the economic aspects there are no reasonable grounds why it should not be a success, providing it is not made the toy of unscrupulous politicians.

In justification of legislation along this line, the commission points out the fact that there is similar supervision exercised by the Pocahontas Coal & Coke Co. in connection with the leases of that concern. This is rather an unfortunate comparison. As is well known, the Pocahontas Coal & Coke Co. is essentially a holding concern, controlling practically the whole, or at least the best part of the original Pocahontas coal. Since this is one of the highest-grade fuels, if not the highest, in the country, it commands a ready market at any time. The marketing of coal at a profit is the most vital problem in the fuel industry today, and it is obviously unfair to compare Ohio, with her relatively lean coals with a district so advantageously provided for in this respect.

The commission concludes Part I of its report with flattering comments on the safety precautions at Gary, W. Va.[2] The report says: "Nowhere has this commission seen such elaborate and complete precautions taken to prevent accidents as are to be found in the mines operated under these leases by the U. S. Steel Corporation."

The Fatality Problem

Part II of the commissioner's report deals with "Prevention of Accidents." After justifying itself for taking up this phase of the question, the commission states in a general prologue that the adoption of the panel system of working would not only be an important conservation measure, but would also tend to lessen the number of accidents due to falls of roof and coal.

Attention is called to the well known fact that most of the fatal accidents are due to this cause, and the commission is of the opinion that most of these could be prevented by the adoption of similar strict rules as those already mentioned at Gary, W. Va. Comments are also made on the fact that one-half the fatal accidents in the Ohio mines are sustained by men of foreign birth, and some well defined conclusions are drawn on the lack of experienced miners in the Ohio field. It is generally conceded by all coal engineers that this is a prolific cause of fatal accidents.

Having thus prepared the way for further departures from accepted practice, the commission promulgates its recommendation: "Need of Safety Foremen." Casting about for a means for justifying its position in this matter, the commission lights upon its illuminative, if not convincing, analogy between coal mining and railroad-maintenance work. Thus it is pointed out that every few miles of railroad has a section gang of six or eight men under the direction of a section boss, while "there are often times found many miles underground workings in which are employed one or two hundred men with only the supervision of a boss and one or two assistants."

Considering the personnel of the commission, it is indeed surprising that such an obviously unfair comparison should be allowed to creep into their records. As everyone knows, railroad work of this character requires continuous and experienced supervision to insure sustained effort on the part of the workmen, and that the work be properly executed. On the other hand, the miner, once started, works in a purely mechanical manner and is remunerated in direct proportion to the amount of labor performed.

As is pointed out in succeeding paragraphs, however, a closer supervision of mining work will no doubt do much toward reducing the fatality rate. Coal mining naturally does not attract a high class of labor which accentuates the dangers and makes essential that the work be carefully watched.

A Study of the "Safety Foremen" Proposal

The commission places itself on record emphatically and positively, as recommending the enactment of a law requiring the employment of a safety foreman for each 25 miners. In addition, it is of the opinion that these safety foremen might well be given police powers for the purpose of arresting miners violating the rules. It is proposed that these foremen be required to fire all shots, which is undoubtedly a commendable provision, since it places this dangerous work in the hands of what should be, at any rate, experienced and competent men. This proposition to inject a tone of militarism into mine operations, although a new departure in this country, still has much to commend it. This has been developed, to a large extent, in European mines, particularly in Germany, and with gratifying results.

In this proposal to engage safety foremen we again encounter the question of economics, but it is noted with satisfaction that the commission faces the question square-

*An interesting paper on longwall and conservation appeared in "Coal Age," Vol. 1, p. 475.

[1]See "Coal Age," Vol. 3, p. 691.

[2]See "Coal Age," Vol. 3, p. 347 for a detail description of these safety precautions.

ly. The report agrees that the operators would naturally take issue with this condition on the ground of the additional expense, but it is rather surprising to find that it says further: "The expense of operation would not be increased by the full amount of these wages and probably not at all." Presumably, this is to be accomplished by having the safety foremen devote a portion of their time to other duties. Such a scheme is hardly to be recommended for the reason that the distinguishing line between the ostensible occupation of these men and the other duties they were called upon to perform would gradually disappear with the result that their usefulness in this connection would ultimately be destroyed. Such has been the experience in most instances where a firm stand has not been taken in the matter, and the men held closely to a single duty.

Cost of the Safety Foremen

In order to arrive at an approximation of what expenditure would be involved in the employment of these safety foremen, let us assume there are 35,000 men* in Ohio engaged in mining coal at the working face. If one safety foreman be employed for each 25 of these men, this would necessitate 1400 additional men, which, at $3.50 per day, would mean $4900 per day. Assuming the mines to work 200 days[1] this would mean an annual expenditure of $980,000. Computed on the basis of a production of 34 million tons, this amounts to 3c. per ton. Whether the Ohio coal industry is prepared to carry this additional burden is a grave question and one that must be given serious consideration.

The commission further points out that, under the new workman's compensation act, the 100 deaths occurring annually in the Ohio mines, as the result of falls of all kinds, will involve an expenditure of $375,000 in indemnities, and suggests that a reduction in a considerable proportions of these would wipe out much of the cost involved in employing the additional men. Properly carried out, this system will, no doubt, effect an important reduction in the death rate, as has been proved at Gary, but even the complete elimination of all fatal accidents which, of course, is not conceivable, would only reimburse the operators for one-third of their loss.

One rather gathers a feeling at this point that a tone of partiality is creeping into the report. The commission is so obviously in favor of their recommendation that they have quoted the exponents of their theory to the exclusion of all others. It is true that the opinions of the engineers of the Pocahontas company are due every consideration. But the fact that a single large and powerful corporation, operating under abnormally favorable conditions, should see fit to apply concededly altruistic policies in the conduct of its affairs is certainly not sufficient grounds to justify the Ohio Legislature in forcing like measures upon their operators who are not so economically favored.

Efficiency tests for the miners is the next topic taken up by the commission. This was a measure advocated by the miners themselves and had for its purpose the testing of applicants for work in the state to determine their competency. It was proposed that all miners should be compelled to pass an examination and obtain a certificate before being permitted to accept employment. The ineffective results obtained by like measures in other states made the adoption of any such system impracticable in the opinion of the commission. Part II of the report closes with a few remarks on shooting coal off the solid.

"Unusual Character of the Miners' Demands"

Part III of the report, dealing with "Screened Coal vs. Mine-Run System of Payment," is turned to with much interest. The beginning of this part is taken up with the history of the controversy in which it is pointed out that the screened-coal basis of payment originated when the finer grades had no commercial value. When it was later found that this coal was of value, the miners repeatedly found fault with the system of payment. As early as 1883 a commission was appointed to report on this matter, and the present commission states that the controversy remains much the same, as regards the arguments of both the miners and the operators, as at the time of the previous report.

In this contention one immediately perceives the "leveling process of unionism" with a tendency to consider the successful accomplishment of a highly speculative business venture (as all mining investments are regarded) as an economic crime. The argument lacks nothing in persuasiveness but even sympathizers with social reformation will not concede the general assumption that all capitalistic interests are to be regarded as wealthy malefactors. Surely the men whose fortunes, brains and courage have been boldly flung in the balance are entitled to reap the reward of their efforts.

Under the subheading, "Unusual Character of the Miners' Demands," the report points out that these are unusual because of the fact that they call for "legislative interference in a matter which is usually left to contract between the parties concerned." It further states that such demands are usually made in behalf of women workers or children and others unable to protect themselves, while in this case the legislature is asked to interfere in the interests of the "strongest labor organization in the country." In fact, one is much impressed with the feeling that the demands savor somewhat of a labor official's boast, made during a conference between certain railroads and their employees, to the effect that: "You will give us the advance we ask across this table or we will go down to Washington and get it."

The commission finds the situation particularly incongruous in this instance, because of the fact that the wages paid to the members of this organization constitute a large share of the total wealth produced by their labor. But when it is noted that the report says further, "and when one considers the hazards of the occupation he cannot wish it otherwise," an obviously wrong impression is conveyed. In point of numbers the coal-mine fatalities are exceeded by such elemental risks as child birth, and burns and scalds, while railroads head the list by a large margin. In 1906, the fatality rate per thousand in the bituminous-coal mines was 2.77, being exceeded by eight other vocations, that for railroad switchmen being 4.50 and the trainmen being 7.46.

It is a rather notable fact that the commission concludes its comments on this phase of the question without justifying legislative interference in any way.

(To be Continued)

*See annual report of the inspector of mines, Ohio, 1912, p. 14.

[1]See the "Production of Coal in 1912," issued by the United States Geological Survey, p. 160.

Editorials

Seismic Disturbance in Its Relation to the Flow of Gas into Mines

For a number of years past this subject has received growing attention on the part of mining men, especially those engaged in the work of investigating the causes of mine explosions.

The excellent paper presented by N. H. Darton, geologist, U. S. Geological Survey, Friday evening, Jan. 16, before the New York Section of the American Institute of Mining Engineers, on the subject, Mine Gases, gave rise to an interesting discussion of the possible effect of a more or less severe seismic disturbance at one point on the globe, to cause an increased inflow of gas into distant mine workings.

While it was freely granted by all that any simultaneous occurrence of one or more mine explosions, accompanying or shortly following an observed and recorded seismic disturbance, could not be taken as produced by one cause; yet such coincidences at least suggest a possible relation between such phenomena.

Numerous notable examples of *danger periods in coal mines* occurring simultaneously with *periods of seismic unrest,* it was generally agreed, make it a reasonable matter for careful study and investigation. As examples of such coincidences in recent years, may be cited the Mount Pelée period, 1902, marked by the loss of 550 lives in four mine explosions; the Formosa, Japan, 1906, costing several thousand lives and $45,000,000 property loss, marked by the terrible Courrières explosion in which 1200 lives were sacrificed, the Takashima explosion, 307 lives, and a number of less fatal explosions in West Virginia and Colorado; which was almost immediately followed by the San Francisco disaster that destroyed $300,000,000 worth of property and over 2000 lives, the entire period covering less than two months and followed four months later by the destructive Valparaiso earthquake with a property loss of $250,000,000 and 7000 lives, which was almost immediately followed by a remarkable series of mine explosions at Bluefield, W. Va., 30 lives; Raton, N. Mex., 15 lives; Windgate, Eng., 25 lives; Johnstown, Penn., 7 lives; Pocahontas, Va., 35 lives, etc.

This was followed, again, by the Kingston, Jamaica, disaster, January, 1907, with a $10,000,000 property loss and 1000 lives, which was coincident with the renewed activity of Mt. Ætna and earthquake in Sumatra, costing 1500 lives. Simultaneous with this outbreak was the loss, in mine explosions, of 24 lives at Primero, Colo.; 250 at Essen, Germany, 12 at Lorentz mine, 84 at Stuart and 25 at Thomas, W. Va., and numerous others in other states.

In September of the same year seismographs at Washington, D. C., and in the Isle of Wight told of a severe earthquake as having occurred in the Arctic or the South Atlantic Oceans, followed by the loss of 200 lives by mine explosions in Texas, Rock Springs, Wyo., and Wilkes-Barre, Penn.

The remarkable concomitance of these periods of seismic unrest and danger in mines due to prevalence of gas point to the consideration of the globe as a unit, sensitive in a varying degree to the physical changes in its crust.

Once More!

The reader will forgive our repeating much of what we said on Jan. 3, because G. O. Smith, director of the Geological Survey, in a letter which we publish in this issue, declares to all intents and purposes that he misapprehended our editorial.

The reader will remember that we said on Jan. 3 that not all the coal lands sold since June 30, 1907, had been classified by the Geological Survey and were sold at the price set by the Bureau. We said, therefore, that the statement of "sales at *all* prices" which was presented in a declaration to prove that coal lands were held at reasonable figures was misleading.

We also said that the sales listed as made before the date mentioned were a small fraction only of those which actually took place. That all other sales were void in law is doubtless true but it does not invalidate our statement that coal-land sales of a valid character were prevented by the notion that valid titles could be obtained at less cost. This statement also was amply proved by official testimony and other witness could be given from G. O. Smith's own bulletin published in 1913.

We further said that as prices had been changed the sales at an early date did not establish the reasonableness of present-day prices. We believe, therefore, that the comparison was misleading. How much of an inaccuracy was introduced we cannot say positively, for from what we learn no account has been kept by Land Office or Geological Survey as to the sales of unclassified land since that date nor as to the invalid land patents prior thereto. We thought we made plain what our difficulty was, but Mr. Smith does not seem to have realized it despite reading our correspondence with him and with the Land Office. We made careful inquiry as to the volume of unclassified lands sold and got no statistical answer.

We did not take an exception, as Mr. Smith appears to think, to the differences between the Land Office and the Geological Survey in estimating sales. It is true we sent the Land Office the figures of the Geological Survey, and we received a letter stating that our figures were wrong and the writer did not know where we got them. But we made no reference by word or implication to this fact.

Now we cannot condemn Mr. Smith for this inaccuracy. His explanation of it is, however, amusing. He states that he could not tell from an inspection of the books when sales were made. This frank approval of the frequent contention of the Western patentee is refreshing. He has been complaining for years that he didn't know when he had effected a purchase and loudly has he berated the Land and Attorney General's offices, mostly, however, behind closed doors. Rightly or wrongly he be-

lieved the way to secure his holdings was to refrain from adverse criticism of governmental departments and bureaus. We are glad that by Mr. Smith's letter the uncertainty of his tenure has in our columns received official recognition.

Mr. Smith regrets that we did not copy the more elaborate table in his report of 1912 showing "Sales of Coal Lands at Various Rates since July, 1907." It is an omnibus list which does not segregate classified from unclassified lands. What, therefore, does it import to this controversy?

The 1913 report which Mr. Smith quotes, in a way which might make the reader think we have seen it, has not been received by us, the New York Library or the Engineering Societies' Library. We have the honor of being on the exchange list of the Geological Survey and should be favored with all such bulletins as soon as any one.

The latter part of Mr. Smith's letter refers to the condition of the coal business in the West. The prices of coal in the public-land states, as we showed editorially Jan. 10, have been comparatively steady since 1907 and we are prepared to concede that the jump in that year was not necessarily chargeable to the action of the Interior Department. But the prices in the public-land states are and have been for many years much higher than in the United States as a whole and show a climbing tendency. The difference between the figure $1.15 for the whole United States, given by Mr. Smith as against $1.65 for the public-land states as given in our editorial of Jan. 10, is sufficiently marked and perhaps we may consent to overlook the well known statistical rule that when you want to compare the wage of Sam and John per day, do it; don't compare the wage of Sam with the average wage of both.

In other words, the price of coal in the *West* should be compared with the price in the rest of the United States. His table of prices is the second table in Mr. Smith's answer to our editorial and we would like to call it "Exhibit A" and use it in rebuttal of his charges as it shows how much higher Western coal prices are than those in the East.

The first table is also one which to our statistical friends is, by nature, anathema, though it has, at times, an appropriate purpose. If you wish to find how much the output of coal in the Appalachian regions has increased, compare it with itself and not with the whole output of the United States or any other quantity.

If John puts out 99.5 tons per month and Jack 0.5 tons, together they produce 100 tons per month. Next month John decides to raise his percentage and mines 199 tons. Jack still puts out a miserable half ton. John's percentage of the whole output is 99.75 despite the fact that his actual production has doubled. By the method of investigation pursued in the table, his increase in output is from 99.5 per cent. to 99.75 or a beggarly ¼ of one per cent., whereas, by every reasonable rule of calculation, it is 100 per cent.

Such a table is misleading, though not, of course, to the degree used in the illustration. As a matter of fact from 1906 to 1912, the bituminous output of the pushing West increased 25 per cent. and in the rest of the Union 31 per cent. We would expect the West like the United States to forge ahead and the East like England to drag behind. For the East is relatively effete, that is, the opportunities for development are more largely already effected. It is interesting to note that from 1910 to 1912 a decline in output was recorded in the public-land states.

There remains for us another statement in civics. Mr. Ashley asked us to say the Survey did not sell land, Mr. Smith desires us to admit that it doesn't make the law. Can Mr. Smith contend that Congress makes prices of coal land when the law of 1873 still holds and some land has risen in that time from $20 to $600 and the law is still the same except that the Geological Survey has been authorized to evaluate the land? The prices are made without approval of Congress, without the signature of the President, according to rules over which neither have exercised any control and Mr. Smith has been the adviser from the beginning.

Did not he and Garfield designate coal land, as land containing a 2-ft. coal bed or coal not over 1500 ft. deep? Did not he and that same conservationist make a new declaration in 1908 and less than 3 months later make another, dubbing land containing coal 3000 ft. below the surface and coal 2 ft. thick, coal land?

Did not he and Ballinger make new regulations dignifying a seam 14 in. thick as coal under the act of 1873 and then finally did he not in the year just passed make a new code with Mr. Fisher so complicated that probably none but a member of the Survey could understand it? Not only is the present scale his scale, but he has repeatedly defended it. If he did not believe in the scales and opposed them his advice was rejected by three successive secretaries and he was not "intellectually honest" in his defense of what he considered wrong. We are sure, however, he *does* believe in these scales and is "intellectually honest" in his approval of them and therefore we cannot refrain from holding him responsible for their framing. They are too complicated and reveal too well trained a mind to emanate from men like our secretaries who have never, perhaps, entered a coal mine.

When Mr. Smith says he does not make the laws, we presume he must mean that he is not chargeable with having maintained the present selling system as opposed to leasing. This we readily grant, and we give him every credit for wishing and urging a change, but we have all the time urged that present prices are altogether too high and we hold that he *is* largely responsible for that fact.

Explosibility of Coal Dust

Perhaps one of the most interesting findings of the British investigators who have been working on the problem of mine explosions, deals with the question of coal dust as a factor in such accidents. It is pointed out that the inflammability of such a dust depends more on the percentage of "paraffin-yielding" constituents than on the total content of volatile matter in the coal. However, when once inflammation has been effected, the presence of matter capable of readily yielding inflammable gases on heating is not essential for the propagation of a serious explosion. That such constituents in dust are not necessary for the propagation of a violent combustion has been proved by explosions obtained with wood-charcoal dust, which element does not contain any volatile matter. The scientific conclusion, therefore, is that the violence of a dust explosion depends, not on the volatility of the coal, but on the calorific value of the dust. If this is true, anthracite dust, though difficult to inflame, will ultimately produce an explosion as violent as those produced by high-grade bituminous coals.

George Otis Smith Replies to Editorial Criticism

SYNOPSIS—The Geological Survey reports on coal sales, while probably not absolutely in agreement with those of the Land Office, were compiled with full intent to obtain correct results. The statements that the increase in the price of public coal land has reduced production and raised the price of coal in the West is disproved by statistics.

In your editorial in COAL AGE for Jan. 3, you say: "All in all, the report made year after year to the President is misleading in the extreme. The public have been deluded. The high cost of living is being raised in the West by the restriction of competition in that section."

In replying to your editorial, I do not care to match skill in invective but merely to answer two charges; the one concerning my intellectual integrity and the other relating to the adverse effect of the present policy upon the ultimate consumer in the public-land states.

THE GEOLOGICAL SURVEY ENDEAVORS TO PRESENT THE WHOLE TRUTH

"Misleading" and "deluded" charge intent to deceive. Apparently, you expect to find the administrative report of even a scientific bureau taking the same liberties with facts as a paid advocate. My associates, I am glad to state, condemn special pleading wherever found and we consider that any member of a Government scientific bureau who might withhold a single pertinent fact or "cunningly arrange" facts so as to support an opinion or theory is unfaithful, both to the people he serves and the science he represents.

In the U. S. Geological Survey we may misinterpret the facts at our command and thus reach unwarranted conclusions, but when, because of new facts or of a new viewpoint, we recognize an error, we intend to present the new opinion with the frankness that should ever characterize the search after truth.

If the simple table quoted by you from the Director's report for 1912 did not satisfy you as a fair presentation of the matter, you had only to look on the next page to find the more elaborate table, not reprinted by you though utilized in your argument, which table shows the sales at each acre price from $10 to $410. This table is brought forward a year and printed, on p. 148, in the 1913 report. Comparison of these tables shows that more than 80 per cent. of the sales for the intervening 12 months were at minimum prices, verifying the statement in the 1912 report that "purchases will continue to be made mainly at the minimum prices."

ACCURATE STATISTICS HARD TO CULL

It is difficult to cull from the voluminous and complex records of the General Land Office accurate statistics of coal-land entries and sales. Uncertainties as to what should be considered the actual date of sale, the cancellation of final certificates and even patents, and the necessity of assembling reports from the numerous registers and receivers, complicate matters. The Survey heretofore has compiled, as best it could, from the files of the General Land Office the records of sale for inclusion in the Director's annual report. This compilation has usually preceded that made by the Land Office for its own purposes. That, notwithstanding our care, these figures have later been found to differ from the final figures issued by the Commissioner is, of course, to be regretted, although these differences have not been regarded as a matter of importance.

The only difference that possibly could have misled the reader is the larger number of entries cited in the Survey table, plainly due to duplication in the effort to itemize the acreage sold at the different prices. As our conclusions have been based not upon a comparison of the number of entries but only upon the acreage sold, there is evidently not the intent in this oversight that you have charged.

THE DISCREPANCY BETWEEN LAND OFFICE AND SURVEY FIGURES

The Land Office figures, further, effectually dispose of any implication that the Survey has deceived the President and the public by an exaggeration of the actual number of sales or acreage or returns. For, as reported to you by the Commissioner of the General Land Office under date of Dec. 3, 1913, instead of 829 entries of 133,000 odd acres, bringing $2,461,000 odd, as set forth in the Survey's report, there were 940 entries of 146,246.79 acres which brought $2,780,283.10, during the period July 1, 1907, to June 30, 1912.

Finally, I believe that the figures presented in the two tables in my report for 1912, as well as those published by the Commissioner of the General Land Office—which, by the way, show a larger acreage sold during the fiscal year 1912-13 than during the preceding year—fully justify my statements that coal land has continued to sell at the new figures at a moderate rate, and one comparable with that of the earlier years, and that "these sales indicate that the suggestion once made that coal lands would not sell at the new figures was not well founded."

GEOLOGICAL SURVEY ONLY ADMINISTERS LAWS

Whether or not my interpretation of these facts agrees with yours may not be essential, but it is all-important that the available facts have been fairly presented by the Federal Bureau.

It will be regretted by all men who seek the truth that a journal of the standing which the COAL AGE should have, considers it advisable to inject, into what should be a friendly and fruitful discussion of a broad, national question, imputations against the honesty of those who are compelled to differ with it as to the proper solutions of that question. I am constrained to believe that you will find no support, as you deserve none, in the charges you have made.

So long as existing laws remain on the statute books, they must be administered, even though those who administer them may believe that a law expressing a different policy would be better.

HAS THE WESTERN OUTPUT SUFFERED?

The only other topic under discussion, for which I request further space in your columns, is the larger ques-

tion of how the coal-land policy has affected the price of coal to the consumer. Paralysis of the industry has been freely charged ever since 1906, but whether there has been any serious checking of production perhaps can be determined best by a comparison of the statistics for the years before and after the adoption of the present coal-land policy. These statistics, which are available to anyone in the Survey's annual volumes on the mineral resources of the United States, show, I believe, that the Rocky Mountain States have kept pace with the whole United States in coal production. The actual production in those States has increased from 14 million tons in 1901 to 22 million tons in 1906 and 28 million tons in 1912.

For the sake of clearness and simplicity, a table showing the percentage of total production in each of the four principal fields for the years 1901 to 1912 inclusive is presented:

BITUMINOUS COAL PRODUCTION, IN PERCENTAGE OF TOTAL, OF FOUR PRINCIPAL REGIONS, FOR SIX YEARS PREVIOUS TO ADOPTION OF PRESENT POLICY.

	1901	1902	1903	1904	1905	1906
Appalachian	66.7	66.60	65.64	65.56	67.49	68.10
Eastern Interior	16.6	17.73	18.43	18.55	17.54	17.34
Western Interior	8.7	7.97	8.20	8.34	7.38	6.73
Rocky Mountain	6.2	6.21	6.01	5.85	6.13	6.44

SAME FOR SIX YEARS SUBSEQUENT TO ADOPTION OF PRESENT POLICY

	1907	1908	1909	1910	1911	1912
Appalachian	67.51	65.10	66.26	69.00	67.80	68.30
Eastern Interior	18.13	19.78	18.85	17.41	18.49	18.45
Western Interior	6.80	7.11	6.80	5.24	6.04	5.90
Rocky Mountain	6.06	6.51	6.63	6.92	6.42	6.32

The shifting percentages from year to year in the several fields, apparent in the table, doubtless result from a complex group of conditions, hence it is rash to attribute too much influence to a single factor, such as the growth of corporate holdings, the decreased production of oil in the East as contrasted with the enormously increased production in the West, or the present plan of public coal-land valuation. Yet I venture to suggest that there is no essential difference between the curves for the Rocky Mountains and for the whole country.

Has the Price of Coal Increased Unduly?

Next, as to whether the coal-land valuation policy has raised the price of coal and resulted in hard times in the Western States: I do not recall that my reports have made any specific reference to coal prices, though elsewhere I have expressed my opinion that both now and in the future the consumer is protected by this policy. Here, again, however, it is best to present the available figures, from which anyone may draw his own conclusions. The following table gives the price per ton for the several coal-producing public-land states and the average rate for the United States as a whole, not including Pennsylvania anthracite.

PRICES IN THE PUBLIC COAL-LAND STATES COMPARED WITH THOSE IN THE WHOLE UNITED STATES

	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912
Colorado	1.13	1.23	1.31	1.22	1.28	1.40	1.41	1.33	1.42	1.45	1.49
Idaho	2.50	3.10	3.95	3.03	3.93	4.10	4.02	4.27	3.92	2.68	3.14
Montana	1.65	1.64	1.61	1.72	1.77	1.94	1.96	1.97	1.82	1.79	1.82
New Mexico	1.43	1.37	1.31	1.33	1.34	1.46	1.37	1.29	1.39	1.44	1.42
North Dakota	1.44	1.50	1.43	1.34	1.54	1.61	1.63	1.56	1.49	1.43	1.53
Oregon	2.44	2.43	2.18	2.58	2.66	2.34	2.74	2.69	3.48	2.32	2.60
Utah	1.14	1.20	1.30	1.35	1.36	1.52	1.69	1.66	1.68	1.69	1.67
Washington	1.72	1.69	1.63	1.79	1.80	2.09	2.21	2.54	2.50	2.29	2.39
Wyoming	1.18	1.24	1.30	1.31	1.31	1.56	1.62	1.55	1.55	1.56	1.58
Average for all of U.S.	1.12	1.24	1.10	1.06	1.11	1.14	1.12	1.07	1.12	1.11	1.15

At first glance, the gain in price in 1912 over 1902, or in 1907 over 1906, might seem conclusive proof that classification had increased the sale price of coal in the West. A more careful study of the tables, and of known local conditions of markets and demand and comparison with changes in other fields, however, at once leads to the important query whether this change has been brought about by the change in the public-land policy. For example, in 1902, the price in Colorado, Utah and Wyoming, was from one to six cents above the average for the United States; in 1906, from 17 to 25c. above that average.

Classification Has Not Raised Prices

Classification certainly had nothing whatever to do with this increase in the price of coal. The same tendencies continued to 1912 would have given prices above those of that year. Further, it may be noticed that, in 1907, prices in the Western States jumped above those in 1906, in most cases nearly or quite to the price that they have held since. As 1907 was the year in which the new system was inaugurated, it might be argued that the jump in prices that year over those in 1906 was the direct result of the inauguration of the new system, even though, as a matter of fact, in the year 1907-08, a larger number of coal-land sales were recorded than in any of the previous 5 years.

On the other hand, a knowledge of the coal conditions which existed in the Western states, as well as over the country in general through the first 9 months of that year, I believe will fully account for the increased price, for during those months, as you will remember, the demand for coal ran the price up over the whole country. For example, in his 13th biennial report, the State coal mine inspector of Colorado has this to say:

> The year 1907 was the most flourishing in the history of the coal business, both in the amount of tonnage produced and also in the number of new mines opened and equipped on a scale to meet a large demand for the product; 10,965,640 tons constituted the year's output, and 18 new mines, located in the various districts, were developed by a large expenditure of capital. . . . . During the earlier 9 months of 1907, the demand for all classes and grades of coals was probably the steadiest and best the State has ever known and the prices were exceptionally good. The warning sent out from Washington and by the various railroad companies, recommending the laying in of supplies of coal while they were easily obtained, together with the tide of prosperity increasing the business of all the industries requiring fuel at that time, was responsible for the unusual activity.

I fail to find any hint in the sentences quoted or elsewhere in the report of the mine inspector of Colorado for 1907 and 1908 that the higher prices were in any way due to the inauguration of the present policy of coal-land classification and valuation, and what is true in Colorado I think will be found true in the other states.

In a letter to the Hon. Edward T. Taylor, of Colorado, on this same subject, I stated as follows:

> All the facts before me indicate that changes in coal prices in the public-land states are to be regarded as resulting not directly from any change in Government policy, but rather are controlled directly by the universal law of supply and demand. I have further made the comparison between conditions in the four Rocky Mountain States, New Mexico, Colorado, Wyoming and Montana, and their nearest neighbors on the east, where there are no coal lands in public ownership—Iowa, Kansas, Missouri and Arkansas. These latter States are fairly comparable with the Rocky Mountain States in total production, in general quality of coal, and especially in market conditions, inasmuch as particular markets are in fact served by some States in both groups.
>
> Comparing the output of 1912 with that of the boom year of 1907, I note that in the case of the Rocky Mountain States there has been a considerable increase in production, while in the case of their eastern neighbors there has been a decreased output. In the matter of change in coal prices, each state of the eastern group shows a net advance rang-

ing from 3c. in Arkansas to 18c. in Iowa, the average net advance in the group being 13c. as against 7c. in the six public land States, or even a lowering in price of 5c. if the four Rocky Mountain States are taken alone.

Or, to put it another way, while in the boom year 1907, the average price of coal in the public-land states was 8c. lower than in their nearest eastern neighbors, last year the difference in favor of the public-land states was 14c. So that, as a matter of fact, coal was sold on the average 1 cent lower last year in the public-land states than it averaged in 1907 in the five coal States next east. I am forced to the conclusion that these facts completely refute the assertion that Federal landlordship has forced up the price of coal to the consumer.

I have also approached this same question from another angle. In considering the record of the 8 sales of public coal lands recorded in Colorado in ten months of the past fiscal year, I find that these current sales, though not large in acreage (1320 acres), are in fact sufficient to meet current fuel demands. The Survey is in possession of detailed information resulting from its classification work for seven of these eight entries.

I find that these lands purchased from the Government have a total content of 40 million tons, of which nearly 15 million tons are recoverable and available for mining under present-day conditions, and some 60 per cent. more recoverable, although at considerable depth, and therefore not regarded as now available. Inasmuch as the total mine production of coal in your State last year was less than 11 million tons, these purchases were sufficient to more than offset the current exhaustion of coal lands in private ownership. Moreover, the present holding of coal lands in your State by other than the Federal Government is so large that I would not expect the demand for coal land to be lively.

Administration Has Been Intellectually Honest

In conclusion, permit me to say that the facts to which reference has been made above are simply those which have convinced my associates and myself that the classification and valuation administration of the 1873 coal-land law has proved itself such as serves the people best. In coming to this conclusion, I believe that we have been intellectually honest. Our experience, however, which leads us to defend this policy has also convinced us that this 40-year-old law is far from adequate and that the results we seek can more directly and surely be attained by a lease law.

The Bicknell Explosion

On Dec. 29, 1913, an explosion occurred at the Indian Creek mine of the Bicknell field in the southwestern part of Indiana not far from the Wabash River. It killed only three miners, injured a fourth, and five narrowly escaped death but the explosion was of such a character that had the mine been working in full force the disaster would have measured up with the largest in the past year.

The regular fireboss, it is said, was sick and in his place an old miner went into the mine to make an inspection. He had not gone far when the other men who were working round the shaft heard a small explosion which was followed by a terrific dust explosion, which carried disaster to the top of the 275-ft. shaft. Even the tipple was damaged and some of the mine buildings.

All but the miner who set fire to the gas were swept into the sump below the shaft with a lot of loose timbers and mine cars. Several pumps were put out of commission and it was feared that as a result the men would be drowned. Four men managed to get out of the sump but Alexander Cowen who was pinned down by timbers was rescued only after seven hours had passed. Meanwhile, the water rose rapidly so that his head was but a few inches above its surface when he was rescued. So badly was the stairway in the air shaft destroyed by the explosion that it had to be largely rebuilt before it could be used to remove Cowan. The cage was entirely out of commission and consequently the work of rescue was seriously hampered.

Here's Luck

The trembling hand holds up the glass,
Along the bar the catchwords pass—
"Here's luck!"
Flushed faces flush a deeper red;
The whiskey mounting to the head
Stirs phantom hopes where hope is dead;
"Here's luck!"

"Here's luck!" cry those whose luck is blank;
Luck never found the man who drank,
"Here's luck!"
He drinks, and luck has passed along;
It has no place amid the throng
With maudlin burden for their song—
"Here's luck!"



To drink—to drug the active brain,
To make all will, all reason vain—
"Here's luck!"
What fools! Their feet in folly's way,
Carousing through the busy day,
To look within the glass and say,
"Here's luck!"

'Tis pluck wins luck—'twill never come
To those who dull their wits and thrum
"Here's luck!"
Luck? Look where will and reason reign,
Where health nor time is spent in vain;
If such a thing there be 'tis plain,
Here's luck!"

—Wex Jones, in New York "Evening Journal."

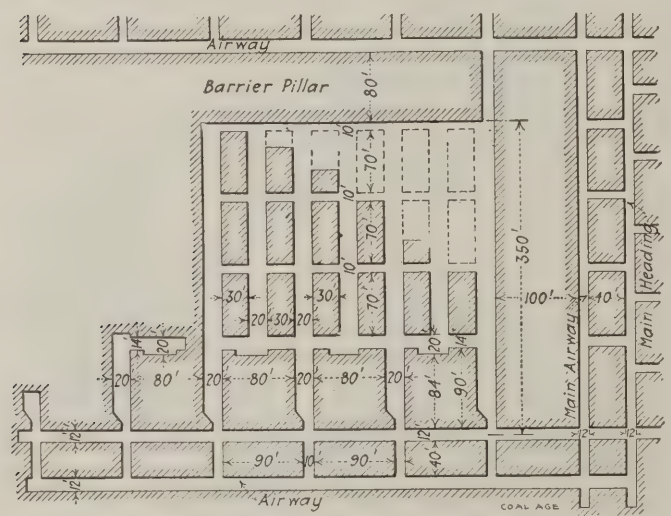
Discussion By Readers

Working Coal under Sandstone Cover

Letter No. 11—I was much interested in the recent discussion on this subject, bearing as it did on the recovery of pillar coal, and I desire to submit the following remarks:

In order to obtain the greatest amount of coal when drawing back pillars in the room-and-pillar method of working, the relative width of the rooms and pillars must be determined with reference to the thickness of cover; the nature, thickness and inclination of the seam; the character of the underlying and overlying strata; and the direction of the pillars with reference to the pitch. The length of the rooms as determining the time the pillars must stand should also be carefully considered.

Too small a ratio of width of pillar to width of opening will induce a "creep" or "squeeze." It may happen that the pillars will show no sign of weakness until the work of drawing back a range of pillars is in progress, when the strong sandstone roof will throw an excessive weight on the pillars and crush the coal unless suitable means be adopted to prevent this result.



PROPOSED METHOD UNDER SANDSTONE COVER

In case the entries have been driven to the boundary or limit and the room pillars have been left standing, in order to avoid the possible danger of a squeeze developing when the pillars are drawn, the work should be started at the inby end and proceed outward on the retreating plan. By adopting this method, less loss of coal will result and the cost of maintaining the roadways will be reduced to a minimum while the coal will be obtained in better condition. It is important to keep the line of pillar work uniformly straight and to avoid leaving any stumps of coal in the gob, because these would interfere with the uniform settlement of the overburden and cause trouble. Also, the work must proceed rapidly.

The accompanying sketch suggests a good method of providing ample protection for the main entries and cross-headings while these are being driven to the boundary. As shown in the figure, a flank pillar 100 ft. wide is left to protect the main airway, and a barrier pillar 80 ft. wide is also left between the head of the rooms and the airway above. The cross-heading from which the rooms are turned is protected by entry stumps formed by turning the rooms on 100-ft. centers. These are turned narrow for 5 or 6 yd., and then widened out to 20 ft. As illustrated, a cross-heading is started in the room, at a distance of 90 ft. from the entry. This is turned 14 ft. wide and widened out to 20 ft. on the lower side.

As further shown in the figure, the 80-ft. pillar left between consecutive rooms is then cut by driving a 20-ft. opening or room to the rise of this cross-heading. Crosscuts or breakthroughs are made at suitable distances in the remaining 30-ft. pillars.

This system has given good success in a seam having an average thickness of 4 to 5 ft., the coal being of medium hardness and overlaid with between 200 and 300 ft. of hard sandstone cover immediately above the coal. The seam was underlaid with a fireclay of medium hardness. The pitch of the seam varied from zero to 5 per cent.

BENJAMIN HARTILL.

Johnstown, Penn.

The Certificate Law

Letter No. 11—The question in reference to the interchange of certificates of competency issued in different states seems to have provoked quite a controversy. The suggestion does not appeal to me that a plan should be adopted by which a mine foreman or fireboss could be granted a certificate that would be recognized in every coal-producing state in the Union.

If a man is qualified to fill one of these positions in Tennessee, Alabama or any other state and desires to hold a similar position elsewhere, he should, in my opinion, be required to work a certain period in the new field, in order to acquaint himself with the existing conditions and the methods employed there to secure greater safety in mining. I regard this as absolutely necessary to make sure that he is not taking risks with the lives of miners that would be under his care.

I am certain that any ambitious man will keep himself posted, sufficiently at least to pass an examination in any state. As far as competency goes, if the candidate for a certificate cannot show that he is qualified by experience as well as by technical education, soberness, morality and truthfulness, he is a dangerous man to put in charge of a mine where he would be responsible for the lives and health of a large number of miners. The best and most competent mining men have accidents, but these are not as frequent as would be if our laws were less strict.

Every tub must stand on its own bottom; so every candidate must show his fitness before he can secure a certificate of competency. Our creed must be: *Safety first, last and always.* Until a man can show himself fit

and worthy to boss a mine, let him handle the pick and shovel and qualify himself by experience and study. Great mine disasters follow each other in such rapid succession, that we hardly recover from the shock of one when we are overwhelmed with the news of another. In my opinion, the solution of this great mystery and problem lies more underground than in the office.

A. H. Stansberry.

Oliver Springs, Tenn.

Letter No. 12—I have been interested in the discussion of the question of the advisability of establishing an interchange of certificates of competency for mine foremen and firebosses, between the different coal-producing states. This seems to me to be a most reasonable proposition and one that I can indorse.

It has been argued that conditions vary widely in the mines in different states, some mines generating gas in dangerous quantities, some having highly inflammable dust, and some seams pitching while others are flat. I would ask, How long would it take a competent experienced man who had his papers of qualification, to acquaint himself with these conditions as they exist? I venture the opinion that, in a short time, he would be master of the situation, because the *principles* of mining are everywhere the same.

It must be remembered that conditions vary widely even in the same state. For example, in Illinois, some mines are worked longwall and others on the room-and-pillar system; some mines generate dangerous quantities of gas while, in others, gas is almost wholly unknown, except for an occasional feeder that causes no alarm. Many of the mines in southern Illinois, particularly Franklin County, are troubled with dangerous quantities of gas and inflammable dust. In some of the mines of the state, the seam is overlaid with a rock roof where a prop is seldom stood. In the same seam, within a few miles there is 42 ft. of soapstone between the coal and the rock, requiring the use of heavy crossbars spaced from 2 to 2½ ft. apart in the entries.

Now, considering this question, with respect to the state of Illinois, the candidate for a certificate of competency is examined as to his knowledge of conditions and methods of mining applicable to the mines of Illinois. The examination may thus often relate to conditions the candidate has never experienced; but he cannot obtain his papers certifying to his competency until he has satisfied the board that he has the required knowledge. A longwall man, having passed this examination, is certified as competent to take charge of a mine worked on the room-and-pillar system. In like manner, men from districts free from gas, but who succeed in passing the examination, are certified as being fitted to hold official positions in mines generating gas. In other words, the scope of the examination is made broad enough to cover all these conditions existing in the state.

I see no reason, therefore, why the requirements in examination cannot be extended to cover the conditions in other states, so that certificates could be granted successful candidates that would be good in any of the coal-producing states in this country. I fail to see why we should be behind Great Britain, in this respect, since the conditions there are as diversified as anywhere in this country.

Compare, for example, the South-Wales coal field with that of the Forest of Dean in England, these two fields being separated by about 20 miles. In the Forest-of-Dean coal field, gas is almost wholly unknown. About 14 years ago, many of the mines in this field were ventilated by furnace. On the other hand, the mines of South Wales give off as much gas as any mines in the world and the dust is highly explosive. Even under these diverse conditions, however, a certificate granted at Bristol, England, has the same force and value as a certificate granted at Cardiff, Wales. In fact, a certificate granted a candidate at an examination anywhere in Great Britain entitles the holder to fill the same position in any coal mine in the United Kingdom. The standard of examination is the same throughout the Kingdom; the subjects are the same, and the candidate must be thoroughly versed in these subjects before he is granted a certificate.

I would argue, therefore, for a universal standard in examination, broad enough to cover all conditions common to coal mining in this country and high enough to secure the required degree of proficiency and insure the safe operation of the mine. On some accounts, the present system of examination and certification is absurd; it is needlessly burdensome and expensive to the state, all of which could be avoided and the system vastly improved by standardization and interstate agreement.

W. L. Morgan,
Ex-State Mine Inspector.

East St. Louis, Ill.

Letter No. 13—A nation-wide certificate or a national certificate law, based upon the conditions assumed in this discussion, in my opinion, would be unjust and productive of harm. Every commonwealth has its own peculiar constitutional formation based upon the physical, social, industrial and political conditions existing within the state. The object of every state constitution is or should be to secure to each individual citizen of the state the inalienable right and privileges to which he is the rightful heir; and to require of him the performance of such duties as the safety and progress of the state demand.

While not an advocate of state rights, in general, I am a strong supporter of state rights in particular. I believe it to be the right and duty of every commonwealth to enact such statutes as will protect its citizens in their vocations and social relations and afford them every facility not inimical to the public good, which they as citizens have a right to demand.

The industry of coal mining has advanced by leaps and bounds, from the class of unskilled labor to a rank among the professions requiring practical and theoretical knowledge and scientific means and methods. Each state has established its own standard of competency based upon its own peculiar conditions, which determine the qualifications required of all candidates for the positions of mine foreman (manager) or fireboss (mine examiner). We may ask, Would not any man who had qualified himself for such position consider it an act of injustice were a citizen of another state permitted to come into competition with him without having first shown his competency by passing the state examination?

I do not regard it as a logical argument to say that the general conditions of mining are so similar in the different states, that when a man is legally qualified in one state, he is like qualified in another state. It would be just as logical to say that a practical miner, who may be as competent to take charge of the mine work as his

foreman but who, lacking the technical knowledge necessary to pass the examination required by law, is not as qualified to assume the responsibilities of the position of mine foreman as a legally certificated man. The certificate granted a successful candidate is the state's seal of approval of the test of his competency.

It is well to observe that the phrase "legally qualified" does not necessarily mean "competent." A candidate is *qualified* if he measures up to the standard of the examination, but *competency* is only determined by the results produced in actual service. The difference in the meaning of these terms is illustrated by the fact that many certified foremen and firebosses, though "legally qualified," are wholly incompetent for the performance of their duties in the mine. This is the result of an unfair examination or the employment of dishonest means and methods to secure the coveted certificate. To broaden the field of operation of such certified men, by a universal certificate law, would unquestionably be productive of harm.

I question the truth of the statement that mine foremen, as a class, have their time so fully occupied as to afford no opportunity for study. Personally, I know this is not true. Too frequently, the certificate is regarded as a guarantee of no further need of study. The rightful possessor of a certificate realizes that it has required effort and sacrifice on his part to obtain the same, and it will require greater effort and sacrifice to maintain its possession. In general, the work of preparation is not as laborious as the later work made necessary by the growing responsibilities of the position. Success in any business or profession is only attained by continually striving.

My judgment is that no qualified or thoroughly competent man would consider it a hardship or an injustice to be required to submit to the standard of examination in another state in which he seeks employment as mine foreman or fireboss.

In this connection, however, I would earnestly urge that every state examination should be open to any citizen of the United States, who should be subject to no other conditions than those of experience and character.

I. C. Parfitt.

Jerome, Penn.

Working Coal under Watery Strata

Letter No. 1—Replying to the request for suggestions, in reference to working coal under watery strata, Coal Age, Jan. 3, p. 30, I want to say that the conditions described in this inquiry are peculiarly difficult to contend with in the mining of coal.

Unless a suitable method of mining is adopted at the start and the mine laid out in accordance therewith, much trouble is liable to arise from a sudden inflow of water into the mine workings. This is more liable to occur in the winter than in the summer time. It is also absolutely necessary in the development of such a mine, to drive all openings as narrow as possible and to leave ample pillars for the proper support of the overlying strata. In this case, much will depend on the thickness of the fireclay stratum interlaid with the shale and slate immediately above the coal and beneath the water-bearing sandrock.

In dealing with underground water in mining, it is necessary to study closely the character of the strata, in respect to their being pervious to water or otherwise. Under the action of gravity, surface water sinks into the soil and penetrates the underlying rocks to various depths, according to the character and inclination of the strata. Underground water may be considered in respect to two zones. The lower zone being more or less permanent, its upper surface marks what is generally known as the "water level." The saturation of the upper zone depends primarily on climatic conditions, as marked by the wet and dry seasons.

The water level, or upper limit of the permanent zone of saturation underground, in any district, is therefore an important factor in mining. While mine workings lying above this level may only be seriously troubled with water during wet seasons, workings below the water level will generally be subject to a more or less constant flow of water, for which ample provision must be made in the operation of the mine.

In considering rock strata with respect to the flow of water through them, it is observed that the clays and certain massive and igneous rocks are largely or wholly impervious to water, while other strata, such as sandstones, shales and some slates permit, in varying degree, the passage of water through them; and many of these strata absorb and hold large quantities of water.

A coal seam overlaid by a heavy bed of shale free from faults is quite likely to have a dry roof, although the shale itself may be saturated with water held in the pores of the rock. However, if the shale is much broken or traversed by faults or thins out in places and is overlaid with a water-bearing sandstone, there is every possibility of a sudden inflow of water occurring.

Another important effect of underground water that must be considered in mining, is the enormous pressure exerted by the water on the mine roof. Extra caution should be taken to avoid the breaking of the roof, which would be accompanied by an inflow of water. The pressure of the water may even be such as to cause the bottom to heave, in the workings. In all such cases, the work of drawing pillars should be delayed, until such time as the pillars can be drawn rapidly in sections of the mine where ample provisions for drainage are provided. The work of drawing the pillars should, of course, be commenced at the boundary and proceed outward on the retreating system.

I recall an instance, in my own experience, where the roof was broken in the first working, in a mine under conditions such as these. The result was that we had a very wet mine in the winter season, which increased the difficulty of driving the entries. In the summer season, however, the mine was practically dry.

Replying, then, to the questions asked by Mr. MacPhail, I would say that if proper precautions are taken in the development of the mine, there is no doubt in my mind but that 85 per cent. of the coal can be taken out. The amount of coal left in the first working of a mine varies widely under different conditions. The best practice is to leave ample pillars in the first workings in order to minimize the danger from squeeze and inflow of water through the breaking of the roof.

Many of the mines in Pennsylvania are taking out but one-third of the coal in the first workings, leaving two-thirds of the coal as pillars to be taken out later when

drawing back the work, previous to abandoning the mine. Many mines in the Connellsville region of western Pennsylvania take out but one-fifth to one-sixth of the coal in the first workings, driving only narrow stalls and drawing back the wide pillars between them.

It is, therefore, impossible to give exact rules for determining the proper size of pillars to support the overlying strata, as no rule is of universal application, in this regard. Each mine is a special problem that must be studied in the light of successful practice in the same field or in mines worked under similar conditions. Such practice, however, should not be followed blindly. Failure often results from copying the methods employed in other mines, without carefully considering the relative conditions. Because a certain system has worked successfully in one region is no indication that it will be like successful in another. It is of the greatest benefit, however, to study carefully plans that have proved successful and others that have failed.

In my opinion, the same amount of water may be expected in the hoisting shaft to be sunk 300 ft. from the airshaft. Also, the breaking of the roof in different parts of the mine may be expected to result, more or less, in the same inflow of water.

GEORGE STOCKDALE.

Percy, Penn.

Coal Production in Saskatchewan

In the issue of COAL AGE, Jan. 10, p. 67, an article entitled "Foreign Coal Production, Saskatchewan," by Frank B. Smith, states as follows:

> Up to the year 1905 all the published records of coal production in the province were included in the statistics of the Public Works of the North West Territories.

and further on:

> The returns made to the Government in 1905 showed only 60,000 tons mined, but there is no doubt that more coal was produced.

As it might be inferred from these statements that there is still no published record of the production of coal previous to 1905 in that portion of Canada now known as Saskatchewan, I would call attention to the fact that apparently Mr. Smith has overlooked the annual statistical reports of the Canadian Department of Mines. The statistical division of this department has published a record of the production of coal in the territory included within the present boundaries of the Province of Saskatchewan since 1890, these records having been obtained direct from the mine operators. The production for the year 1905 is shown in the report as 107,596 tons.

JOHN MCLEISH,
Chief of Division of Mineral Resources and Statistics.
Ottawa, Canada.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Effective Depth of Air Column—It has been shown that in all shaft ventilation the effective "head of air column" (D) is the difference in elevation of the top of the upcast and the bottom of the downcast. This applies equally to all forms of natural, furnace or fan ventilation, in shaft mines, where a positive or negative air column may exist.

Likewise, in drift or slope mines, the same law will apply, except where a long slope causes an appreciable rise in the temperature of the downcast air; and in the furnace ventilation of a slope mine. In either of these two cases, three temperatures may be concerned: (1) average upcast temperature in the shaft; (2) average downcast temperature in the slope; (3) outside temperature.

In furnace ventilation, in inclined seams, also, three temperatures must be considered: (1) average temperature of the furnace (upcast) shaft; (2) mine temperature, rise or dip of seam; (3) average downcast temperature. In a few cases, a fourth (4) outside temperature may require consideration. In all cases where more than two temperatures are concerned it is necessary to calculate the column for each separate temperature and corresponding depth and take their algebraic sum.

In practice, the arrangement of the circulation in the mine may be such that the rise or dip column is eliminated by a balance of intake and return columns of equal temperature.

PROBLEMS

Example—A shaft mine, in a level seam, is ventilated by a furnace. The furnace shaft is 900 ft. deep and has an average temperature of 300 deg. F.; the downcast shaft is 600 ft. deep. Calculate the air column producing circulation in this mine and the corresponding ventilating pressure and water gage when the temperature of the outside air is 20 deg. F.

Solution—The effective head of air, in this case, is D = 900 ft. and, assuming that the temperature of the downcast shaft is practically the same as that of the outside air, which is commonly true, the air column, expressed in terms of the downcast air, is

$$h_d = \frac{(T - t)\,D}{460 + T} = \frac{(300 - 20)\,900}{460 + 300} = \frac{280 \times 900}{760} = 331.5\ ft.$$

Expressed in terms of the upcast air the air column, in this mine, is

$$h_u = \frac{(T - t)\,D}{460 + t} = \frac{(300 - 20)\,900}{460 + 20} = \frac{280 \times 900}{480} = 525\ ft.$$

The pressure is found by multiplying either of these air columns by the corresponding weight of downcast or upcast air.

Thus (downcast), $p = \frac{1.3273 \times 30}{460 + 20} \times 331.5 = 27.5\ lb.\ per\ sq.ft.$

Or (upcast), $p = \frac{1.3273 \times 30}{460 + 300} \times 525 = 27.5\ lb.\ per\ sq.ft.$

The corresponding water gage is, then,

w. g. = 27.5 ÷ 5.2 = 5.3 in., nearly

The Coal Age Pocket Book

Example—A slope mine is ventilated by means of a blowing or force fan located at the top of an air shaft 800 ft. deep. The slope is the main return airway and the elevation at its mouth is 275 ft. below that of the top of the air shaft. What natural air column exists, assuming the temperature of the mine is 60 deg. and that of the outside air 10 deg. below zero (— 10° F.); and is this positive or negative?

Solution—The effective head of air, in this case, is D = 800 — 275 = 525 ft.; because the downcast fan shaft has the same temperature as the outside air column, which therefore balances 275 ft. of the shaft column. The downcast air in the shaft being colder and heavier than the upcast or return air in the slope, the resulting air column assists the circulation produced by the fan and is, therefore, a positive air column. It is

$$h_d = \frac{60 - (-10) \times 525}{460 + 60} = \frac{(60 + 10)\,525}{520} = \frac{70 \times 525}{520} = 70.67\ ft.$$

This air column is in terms of the downcast air, which weighs, assuming a barometric pressure B = 30 in.,

$$w_d = \frac{1.3273 \times 30}{460 + (-10)} = \frac{39.819}{450} = 0.0885\ lb.,\ nearly$$

The natural pressure due to this air column is then

$$p_n = 70.67 \times 0.0885 = 6.25\ lb.\ per\ sq.ft.$$

Ques.—If the fan, in this example, were to be reversed so as to exhaust air from the mine, thereby making the slope the intake and the fan shaft the upcast, what air column would result, if the average slope temperature is 40° F.?

Ans.—In this case, three air columns exist, two assisting and one opposing the circulation induced by the fan. They are as follows:

Outside column (*positive*), $w_o = \frac{1.3273 \times 30}{460 - 10} \times 275$

Slope column (*positive*), $w = \frac{1.3273 \times 30}{460 + 40} \times 525$

Shaft column (*negative*), $w_u = \frac{1.3273 \times 30}{460 + 60} \times 800$

The net air column, expressed in terms of say the slope air, is now found by dividing the algebraic sum of these positive (+) and negative (—) columns by the weight of 1 cu.ft. of the slope air, which gives after simplifying,

$$h_s = (460 + 40)\left(\frac{275}{460 - 10} + \frac{525}{460 + 40} - \frac{800}{460 + 60}\right)$$

$$= 500\left(\frac{275}{450} + \frac{525}{500} - \frac{800}{520}\right) = 61.3\ ft.\ (positive)$$

The weight of 1 cu.ft. of slope air is

$$w_s = \frac{1.3273 \times 30}{460 + 40} = \frac{39.819}{500} = 0.0796\ lb.$$

The natural pressure assisting the circulation is then

$$p_n = 61.3 \times 0.0796 = 4.88\ lb.\ per\ sq.ft.$$

Inquiries of General Interest

Ventilation in Airways

It is possible, in the ventilation of a mine, to have the same velocity of air current at the face of the intake entry as at the main entrance? We have been discussing this point and, while one claims that the resistance of the airway would decrease the velocity of the air current, another claims that the volume of air passing the head of the entry must be the same as that entering the mine, providing, of course, there is no leakage of air through the stoppings. It is also claimed that the velocity must remain the same under the same pressure. We are considering a single straight entry having no leakage of air and no butt headings to ventilate.

I want also to ask if it is possible to have more air on the return than on the intake entry in a mine; and how does the warmer temperature of the mine affect the velocity of the air current?

J. H. Frazier.

California, Penn.

Assuming that the sectional area of the entry is the same at the face of the heading as at the main entrance and that there is no change in the temperature of the air, there would be no change in the velocity of the air current.

The *weight of air* passing into the mine, in a given time (pounds per minute), is the same as the weight of air passing out of the mine or the weight of air passing any point in the entries, in the same time. This is true, regardless of the mine resistance.

But, the mine resistance developed in any circulation of air depends on the rubbing surface and the square of the velocity of the air current. This is the total mine resistance or the total resistance of the airway; and the pressure due to this resistance is the pressure per square foot, producing the ciculation. It is the difference of pressure at the mouth of the mine or airway, between the intake and return.

It is important to observe that this difference of pressure between the intake and return decreases regularly from the mouth to the face of the pair of headings, where the difference is zero. The difference of pressure between the intake and return is measured by a water gage placed on a brattice in the crosscut. It is evident that the water-gage reading will be greatest in the first crosscut, at the mouth of the mine, and will be practically zero in the next to the last crosscut, at the face of the heading; but, as stated, the velocity of the air current is constant at all points of the airway, for the same sectional area and temperature.

In answer to the second question: For the same sectional area of the airway, a constant velocity will produce a constant quantity of air in circulation. But any change of temperature will cause a corresponding change in the volume of the air current; and, consequently, a like change in the velocity of the current. As the temperature rises, the air expands in volume. Therefore, the volume of air in circulation varies as the absolute temperature; and, for the same sectional area of the airway, the velocity of the current varies in the same ratio.

For example, a current of 10,000 cu.ft. per min. passing into a mine, at a temperature of 32 deg. F., will be increased on the return airway where the temperature is 70 deg. F., to a volume of

$$10{,}000\,\frac{460+70}{460+32}=\frac{10{,}000\times 530}{492}=10{,}772\ cu.ft.\ per\ min.$$

If the sectional area of the airway remains constant, the velocity will be increased in the same ratio. If the sectional area of the airway is 50 sq.ft., the original velocity is 10,000 ÷ 50 = 200 ft. per min. The increased velocity due to the rise of the temperature is then

$$\frac{200\times 530}{492}=215.44\ ft.\ per\ min.$$

Fan Ventilation

I have recently been studying a difficult problem and have been unable to obtain any satisfactory information from other foremen and superintendents whom I have consulted. Their views mostly contradict my own conclusions.

The situation is as follows: Having charge of a mine that is well developed, and ventilated by a fan that is not large enough to give the required quantity of air, I propose to install another fan on the other side of the mine. Both of these fans will blow air into the mine by separate air courses, the one on the right and the other on the left side of the mine; and the plan is to bring the two currents together into a main-return airway about a mile from the mouth of the mine. In other words, both fans will ventilate separate sections of the mine but use the same return airway for a distance of about a mile, from the working face back to the mouth of the mine.

The question is, will both of these fans work successfully? If you can answer this question, or if some of the readers of Coal Age will give their experience, it will greatly assist me, and I shall appreciate the favor.

D. J. Hopkins,
Foreman, Mine No. 2.

Madera, Penn.

The plan proposed by correspondent is entirely practicable. Both fans being blowers or force fans, there will be no difficulty experienced; but each will perform its proper work. It may be necessary, however, to install a regulator at the inby end of one of these airways or sections of the mine, in order to properly balance the work of the ventilators and secure the proper distribution of the air produced in the two sections.

It is always an error to undertake to run two centrifugal fans in tandem; that is to say, to operate one fan as a blower and the second fan as an exhaust on the same circulation. In that case, one or the other of the two fans will perform the entire work, and the air current will be carried through the other fan by the pressure maintained by the first.

Examination Questions

Selected Fireboss Questions

Ques.—A mine is producing 40,000 cu.ft. of air per min. with 10 hp.; what horsepower will be required to produce 75,000 cu.ft. per min., in the same mine?

Ans.—In any mine or airway, the power producing the circulation varies as the cube of the quantity; in other words, the power ratio is equal to the cube of the quantity ratio. Calling the required power x

$$\frac{x}{10} = \left(\frac{75{,}000}{40{,}000}\right)^3 = \left(\frac{15}{8}\right)^3 = \frac{3375}{512} = 6.59$$

$$x = 10 \times 6.59 = 65.9, \textit{ say } 66 \textit{ hp.}$$

Ques.—With a water gage of 0.4 in., a ventilating fan is making 65 r.p.m. and producing 36,000 cu.ft. of air per min.; what quantity of air will be produced under a water gage of 0.6 in.?

Ans.—The rise in water gage from 0.4 to 0.6 in. may result from an increase in the mine resistance, due to a fall of roof or extension of the airways; or the same rise of water gage may be the result of increasing the power and speed of the fan. The question does not specify the cause of the rise in pressure.

Assuming, first, the power applied to the fan shaft and the efficiency of the fan remain constant, the power on the air will be constant. In this case, the quantity varies inversely as the unit pressure or water gage. In other words, the quantity ratio is equal to the inverse water-gage ratio. Thus, calling the required quantity of air x

$$\frac{x}{36{,}000} = \frac{0.4}{0.6} = \frac{2}{3}$$

$$x = 36{,}000 \times \tfrac{2}{3} = 24{,}000 \textit{ cu.ft. per min.}$$

But assuming, on the other hand, that the rise in water gage is due to an increase of power and a consequent increase in the speed of the fan, the quantity of air in circulation in a given mine or airway will then vary as the square root of the pressure or water gage. In other words, the quantity ratio is equal to the square root of the water-gage ratio. Or,

$$\frac{x}{36{,}000} = \sqrt{\frac{0.6}{0.4}} = \sqrt{1.5} = 1.2247$$

$$x = 36{,}000 \times 1.2247 = \textit{say } 44{,}000 \textit{ cu.ft. per min.}$$

Ques.—The hand on an anemometer turns around 3.25 times in one minute. The airway is 6.25x8.5 ft. What is the velocity of the air current and the quantity of air passing, allowing 3 per cent. for the resistance of the anemometer?

Ans.—The sectional area of the airway is $6.25 \times 8.5 = 53.125$ sq.ft. In the Biram anemometer, one revolution of the large hand corresponds to 100 ft. of air travel, disregarding the error of the instrument. In the given case, the air is traveling at the rate of 325 ft. per min., as indicated by the instrument. Allowing 3 per cent. for resistance, the indicated velocity is 97 per cent. of the actual, which makes the velocity of the air current, in this case, $325 \div 0.97 = 335+$ ft. per min. The volume of air in circulation is then $53.125 \times 335 =$ say 17,800 cu.ft. per min.

Ques.—Where would you expect to find firedamp in a mine?

Ans.—Firedamp may generally be expected to be found in the air current passing the face of a heading or other working place generating a considerable quantity of marsh gas, sufficient to render the passing volume of air inflammable or explosive. Again, firedamp may be expected to be found at the face of a rise heading or chamber that is poorly ventilated, or where the air current is not properly directed so as to sweep the face of the heading. Firedamp also accumulates in pockets or cavities in the roof or other void places not reached by the air current and in all rise workings.

Ques.—If the temperature of the air current passing in a mine is 60 deg. F., and its velocity 300 ft. per min., the sectional area of the airway being 50 sq.ft., what weight of air is traveling per minute?

Ans.—The volume of air passing in this airway is $q = av = 50 \times 300 = 15{,}000$ cu.ft. per min. Assuming a barometric pressure of 30 in., the weight of air passing in this case

$$W = \frac{1.3273 \times 30}{460 + 60} \times 15{,}000 = 1148+ \textit{ lb. per min.}$$

Ques.—What effect does an atmosphere containing explosive gas have on a safety lamp?

Ans.—The effect will depend on the degree of explosiveness of the firedamp mixture and the character of the mixed gases. If the firedamp consists principally of marsh gas and air mixed in such proportion that the mixture has not yet reached the lower explosive point but is merely inflammable, the effect is to cause a disturbed condition of the flame of the lamp, which may reach upward, flutter and become enlarged in volume and finally fill the entire gauze of the lamp.

As more gas is added and the mixture becomes explosive and nears the maximum explosive point, small explosions and sharp cracklings are apt to occur within the lamp when the latter is first introduced into such gas. The moment of greatest danger is when the lamp is being removed from such a mixture of gas and air. The entrance of fresh air into the combustion chamber of the lamp, under these conditions, is apt to cause an explosion within the chimney that will force the flame through the gauze. The lamp should be removed slowly but promptly from such a mixture.

Ques.—Explain, briefly, what is meant by a "dead hole" and what is a "windy shot"?

Ans.—A dead hole is a hole that is drilled more or less perpendicular to the face of the coal and has no opportunity to work so that the charge can free itself. Any shot that is thus bound is spoken of as a "dead hole."

A windy shot is one where the energy of the exploding charge is spent largely on the air, producing a heavy concussion of the atmosphere in the immediate vicinity of the blast.

Coal and Coke News

Washington, D. C.

The Interstate Commerce Commission has handed down a decision in the case of "investigation and suspension docket No. 242" which involves a so called "Chicago switching charge." In this decision a proposed increase in rates on interstate shipments of coal from Chicago, Ill., to Ravenswood, Ill., and the reduction of the amount of absorption on such shipments by line carriers were found not to be justified, and the suspended tariffs were required to be withdrawn. The case in question is another of the series of switching charge cases that have been before the Commission for some time past.

On anthracite coal absorption of the switching charges of the Chicago & Northwestern to both Rose Hill and Ravenswood was provided to the extent of $4 per car, regardless of weight, the difference in rate being the result of the spread in the locals. In an attempted compliance with the order of the Commission, in the case referred to, instead of lowering the Rose Hill rate, the respondents raised the Ravenswood local to 25 cents, and at the same time the line-haul carriers filed tariff canceling the through rate and reducing the absorption on bituminous coal from $6 to $4 per car, the effect of all of which was to put Ravenswood on a basis of 15 cents and 5 cents per net ton higher on bituminous and anthracite respectively, than points immediately south of and in competition with it, by means of wagon and motor-truck deliveries.

In this situation Zipf Brothers Coal Co., located at Ravenswood, protested against the new tariffs becoming effective, alleging that they would result in an illegal discrimination, in that their immediate competitors, of which there were many, would be upon a basis of 15 cents per net ton lower, which would practically eliminate the protestant from the business. It appears that the chief interest of this concern is with the soft-coal rates. Complaint as to the proposed rates was also made by the Chicago Coal Dealers' Association.

"The respondents," says the decision, "seek to justify the manner in which they attempt to comply with the Commission's order in the Rose Hill case by asserting that if they should reduce the Rose Hill rate to within 5 cents of the present Ravenswood rate, it would result in too great a spread between Rose Hill and Rogers Park, and other points immediately north and subject them to the same complaint they encountered in the Rose Hill and the instant case.

This argument, however, is extraneous to the issue, which is whether the proposed rates to Ravenswood are reasonable. The fact that another complaint might possibly arise out of the same general situation is not a controlling factor in the determination of that question, as cases of alleged undue preference or prejudice must be adjudged upon their respective merits.

To substantiate the reasonableness of the advanced rates respondents offer testimony tending to show that what is known as the Chicago switching district really ends at Deering, though the map filed with the Lowrey tariff, to which respondents are parties, indicates that only the inner zone of the switching district terminates at or near Deering while the outer zone extends much farther north and takes in Ravenswood and other points several miles above Ravenswood."

Arguments on Proposed Alaskan Railway

The principal subject of interest during the past week with respect to mining developments has been the discussion of the bill for constructing a government railway in Alaska intended to open up the coal region of that territory as well as to render the copper and gold mining sections of the peninsula more accessible.

Much of the discussion has been of a semi-political type designed to show that the failure to develop the territory by private capital was due to unreadiness on the part of certain capitalistic interests to run counter to the wishes of others which have obtained a strong foothold in Alaska and are in position to defend themselves.

Another large division of the discussion has dealt with purely technical railroad questions, involving the routes that could be followed in reaching the districts that are intended to be opened up. All of this part of the debate has been of purely technical significance. In addition, however, there has been some development of information with regard to the probable effect of the new road upon mining conditions and the circumstances under which freight is now carried and would be carried in the event of the enactment of the legislation.

It is alleged that under existing conditions it costs about $150 per ton to get freight to Fairbanks whereas under the new plan with a Government road it would be not over $27. This is the general drift of the argument in support of the new measure.

HARRISBURG, PENN.

The Interstate Commerce Commission on Jan. 14, resumed its inquiry into the anthracite coal industry with reference to rates and practices existing among the railroads and coal companies. The hearings were begun last November, and were suspended until now, because of the death of Commissioner Marble at Washington, and Commissioner McChord, presided at the present hearing.

The principal questions which the Commission sought to determine by its investigation were:

"Are the carriers directly engaged in the mining and sale of coal, and are these big railroad companies sufficiently separated from the producers?

"Are the rates, rules and practices governing the transportation of coal reasonable?"

According to testimony presented during the hearings, efforts were made to show that the carriers had derived earnings from freights and in return made certain concessions in interest charges, royalties, rentals and in other ways to their own companies, while competitors were forced to pay big freight rates without receiving any concessions whatever.

The interlocking directorates of the Delaware & Hudson R.R. Co., and the Delaware & Hudson Coal Co. it was brought out, were responsible for the attitude taken by the latter company and also dictated its policy toward independent coal companies.

The Reading Co., it was pointed out, owns the capital stock of both the Philadelphia & Reading Coal & Iron Co., and the Philadelphia & Reading Ry. Co., thus forming a holding company and two operating companies. It was also shown that the Reading Co. is financed by $100,000,000 or more of 4 per cent. general mortgage bonds. The holding company also owns $20,000,000 bonds of the Philadelphia & Reading Ry. Co., and the later is obliged to pay 6 per cent. to the holding company, making an additional 2 per cent. The equipment used by the railway company is owned by the Reading Co., and it must pay 8 per cent., which was paid monthly in advance instead of semi-annually in arrears.

The question of interlocking directorates was also touched on in the testimony given by G. H. Ross, vice-president of the Susquehanna Coal Co., which brought out the fact that its subsidiary companies were supposed to pay royalties of from 20 to 28 cents a ton on coal mined on land leased by the railroad to the coal company, but that these royalties had never been paid. That two subsidiary companies of the Susquehanna leased land from the Northern Central R.R. and now owed $6,000,000, but that interest was never paid before 1908, and has been paid since at the rate of from 5 to 6 per cent.

Evidence that the Delaware, Lackawanna & Western R.R. Co., had been lax in its methods of renting property to the Delaware, Lackawanna & Western Coal Co., was obtained from E. E. Loomis, vice-president of the railroad company and president of the coal company. It was brought out that the railroad company is receiving a fair rental for property leased in Buffalo. A quantity of the coal company stock is owned by some of the directors of the railroad it was stated. It was also said that the coal company might have profited to the extent of $112,000 if the coal taken over from the railroad company at the time of the reorganization in 1908 had been purchased by careful inventory of the stored material. A book inventory only was taken, and by this system the coal company lost money on the transaction.

The auditor of the Lackawanna company admitted exchange shipments of coal between his company and the Central Railroad of New Jersey, but that this arrangement was reciprocal, even though contrary to the published traiff rates of the railroad company.

Concerning the storage facilities offered to competitors of the Lackawanna company, it was brought out, that unlimited detention of coal on cars was allowed without demurrage charges to all shippers, but it later developed that the only

shipper having available facilities for free storage of coal on cars is the Delaware, Lackawanna & Western Coal Co., but by pooling their interests, the independent operators might store their product as cheaply as the Lackawanna company.

Testimony on Unpublished Rates

Witnesses were examined with regard to allowances that had been made to companies, and which had not been published in the rates filed with the Commerce Commission. This allowance of from 10 to 15 cents a ton permitted to railroad companies which hauled coal after it reached the trestles and piers to which it was assigned has been stopped recently. This special rate was known as the "Penn Haven rate." The largest allowances were those permitted to the Lehigh Coal & Navigation Co., for its service over the "laterals," which means the special short-cut tracks from the collieries to the nearest railroad center or distributing point. The Lehigh Navigation Co. it was brought out transported much of its coal over these laterals, the allowance to the coal companies on this amounted often to as much as 30 cents a gross ton.

It was brought out by the general coal agent of the Lehigh Coal & Navigation Co., that this company was prevented for many years from entering the Western coal market through hindrance by the Reading Ry. It was also shown that a daily report of all coal, either anthracite or bituminous, transferred to vessels for shipment to New England and other points, is sent to the general sales agent of the Reading Coal & Iron Co., whether the coal belonged to the Reading company or to other shippers.

R. D. Rickard, secretary and treasurer of the New York, Ontario & Western R.R., testified that the Scranton Coal Co., and the Elk Hill Coal & Iron Co., both owned by the Ontario people have been operated in the last few years at a loss and that both concerns failed to pay interest on second mortgages held by the railroad company.

The railroads will have an opportunity to present their side before any decision is handed down by the commission, which adjoined on the 17th, for six or seven weeks, so that the railroads may have an opportunity to prepare their evidence.

PENNSYLVANIA

Anthracite

Harrisburg—It is thought that the next legislature will be asked for an appropriation to establish a safety station similar to the one maintained at Pittsburgh by the United States Government. This request will be the outcome of a recent conference between James E. Roderick, chief of the State Department of Mines, and Dr. Holmes, of the U. S. Bureau of Mines.

Plymouth—The double frame building occupied by Lewis Ryzdewski, located on Vine St., began settling into the workings of the Plymouth Coal Co., on Saturday, Jan. 10, and, on the morning of Jan. 13, had practically disappeared, only the roof being visible from the street.

Wilkes-Barre—Judge Fuller in rendering an opinion for the bench on Jan. 19 established the legality of the 1913 assessment which was attacked by the coal companies. Efforts had been made to set aside this assessment on the ground that it was improperly made, and that the valuation of $250 per foot-acre was unfair and inequitable. The decision in question asserts that the assessment was legally and fairly made, upholds the $250 assessment and leaves no apparent loophole of escape to the coal companies.

Hazleton—The G. B. Markle Coal Co. which has been running a special train between Hazleton and Jeddo for its employees, since the start of the trolley strike in Hazleton, has decided that hereafter the workers must pay five cents each way. The coal company contends that the train is costing $300 a day, and that the miners should defray part of the expenses.

Pittston—One man was killed and two others injured recently by an explosion of gas in No. 17 shaft, Pennsylvania Coal Co. No. 9 Colliery, at Pittston.

Bituminous

Connellsville—The Byrne Coal & Coke Co. recently concluded negotiations for the purchase of the Whyel Coke Co.'s holdings in the Yukon field, aggregating about 100 acres. The purchase price was $70,000, to which $60,000 will be added by the Byrne concern in improvements. The construction of 60 new coke ovens, in addition to the 34 already in place, will be started soon.

Philadelphia—A committee of the Association of Bituminous Coal Operators of Central Pennsylvania is considering the question of bringing damage suits against the United Mine Workers of America as an organization and individually for alleged violations of a contract existing between the operators and the union miners of the central Pennsylvania soft-coal field. Such proceedings, if instituted, would be for the recovery of damages caused by petty strikes in violation of the contract.

Du Bois—It is alleged that the Northwestern Mining and Exchange Co. (an Erie Railroad affiliation) is so disgusted with the attempt of the union to enforce a closed shop that it is preparing to dismantle its Eriton mine near this place. Should this mine be allowed to flood it will be a serious menace to surrounding collieries.

WEST VIRGINIA

Charleston—The Main Island Creek Coal Co., which was recently reorganized at a meeting of the stockholders, will open up a new field in Logan County within the next few months. This firm expects to be shipping coal from six mines by Mar. 1, and from four others in 90 days later. Contracts have been let for the erection of 500 houses, two large storerooms and three power plants of 400 hp. each, which will be completed within the next 30 days.

Wheeling—After a thorough inspection of the mine assisted by J. W. Paull, a U. S. Bureau of Mines' man from Pittsburg, Earl Henry, on Jan. 14 decided that the recent explosion in the mine of the Mound Coal Co. at Moundsville, in which four men were injured, was the result of igniting an accumulation of gas caused by a fall which occurred after the mine fireboss had made his rounds. Aside from the injury to the four men, no damage was done to the mine, which is now in good condition.

Huntington—An important real estate deal was recently consummated at Ironton, Ohio, whereby the Hecla properties passed into the hands of F. B. Enslow, A. B. Brode and Julius L. Anderson, this property consisting of approximately 20,000 acres, a large percentage of which is underlaid with coal, will probably be developed at no remote date.

MARYLAND

Cumberland—The Consolidation Coal Co. has made an opening at mine No. 9, which will develop a new field estimated to contain about 600 acres of coal 3½ ft. thick. The company has completed the outside improvements at the mine and a new haulage system.

KENTUCKY

Whitesburg—It is reported, that since re-opening on Jan. 10, after an extended holiday lay-off, the several large plants of the Consolidation Coal Co. and the Mineral Fuel Co. in the Jenkins, Burdine, McRoberts and Fleming sections, are again operating on full time, in spite of the slow demand for coal in many markets. The shortage of fuel caused by the shutdown has resulted in a good demand from customers of the companies, and large steam contracts have to be filled, regardless of general conditions, which means that the companies will probably continue operations at an active rate, being to a large extent independent of the open market.

Madisonville—Reports indicate that considerable progress is being made by Eastern interests in securing control of undeveloped properties in this section, several deals having been closed recently. Garland Roney, of Providence, Ky., C. H. Murphey, of Madisonville, and others are reported to be interested, and to have made sales lately direct to the interests who are said to be acquiring the property. Nothing is heard, however, of the formerly rumored acquisition of a large number of operating concerns by an Eastern syndicate.

OHIO

Martins Ferry—In line with the recommendations of the State Mining Commission's report to Governor Cox, the Providence Coal Co., with mines at St. Clairsville and Fairpoint, has appointed J. J. Forbes, a mining engineer, as safety inspector. Forbes' duties include the inspection of the mines to prevent possible accidents, the care of the mine-rescue apparatus, and the instruction of the men in accident prevention.

St. Clairsville—About 1000 miners employed in the Blaine and Lansing mines of the Lorain Coal & Dock Co. near St. Clairsville struck because the company refused to haul them into the mines on its mine cars. Under the provisions of the compensation law the company is responsible for injuries to miners while being hauled in that manner and since the men refused to waive their right of action the company refused to permit them to ride on the cars.

Lisbon—Dornacher & Rider, of Akron, Ohio, have purchased 3000 acres of coal lands in Wayne and Washington Townships in Columbiana County which they will develop in the near future.

Coshocton—The Morgan Run Coal & Mining Co., of Cleveland, has closed one of its mines in the Coshocton field permanently, throwing 25 men out of employment. The mine was closed following a visit of the State Mine Inspector D. H. Sullivan who ordered many repairs to insure safety to the miners. The company immediately closed the mine.

INDIANA

Boonville—The increase of stripping operations in the vicinity of Boonville, which have threatened to supplant shaft mining entirely, will meet with opposition in the future, the Central Labor Union of Boonville having adopted resolutions condemning the new method, for presentation to the United Mine Workers of America during the meeting which began Jan. 20. The resolutions point out that the stripping plan is not only detrimental to labor, but that land mined in this manner is completely devastated, and urgently recommend some action to check its further use.

Indianapolis—The Indiana Supreme Court, in a case in which the Shirley Hill Coal Co. was defendant, decides that where a healthy man of 35 years, earning $85 a month, was killed, leaving a wife and five children, a judgment of $8000 will not be held excessive without some showing of wherein the jury was prejudiced or acted with partiality or through corruption.

Dugger—The coal chute of the Sunflower Coal Co. near here was burned, with two cars of coal, Jan. 14. The loss was $6000.

ILLINOIS

Springfield—The Springfield coal Co. has closed three mines, one at Riverton, one at Klondike and one at Taylorville. The Taylorville mine has not been idle before since it was opened up, 25 years ago. The shutdown is indefinite, and all the miners removed their tools from all of the mines. In the aggregate, over 1000 miners are out of work from the three mines. No causes are given, excepting that there is no money in operating a coal mine. It is understood that three other mines of the Springfield Coal Co. will be shut down in the course of perhaps a week.

Pana—The Illinois Midland Coal Co. has filed a mortgage for $3,000,000 in favor of the Continental and Commercial Trust and Savings Bank of Chicago. Several thousand acres of coal rights were transferred this week by the Pawnee Construction Co. to the Illinois Midland Coal Company.

Bloomington—A fire of unknown origin recently destroyed the fan house and blacksmith shop at the McLean County Coal Co.'s mines. The monetary loss will aggregate over $1500, but added to this will be the inconvenience of a forced shutdown while repairs are being made.

West Frankfort—The South mine here recently hoisted 3886 tons of coal in one day. The Zeigler mine a few days earlier hoisted 3401 tons.

Pekin—Factories and railroads are commencing to store coal in anticipation of a strike which is expected when the new scale comes up for consideration and adoption.

OKLAHOMA

McCurtain—The mines of the San Bois Coal Co. will not resume operations until after the expiration of the present contract between the United Mine Workers of America and the Southwestern Interstate Coal Mine Operators' Association.

Poteau—The Claco Mining Co., recently incorporated with $50,000 capital, will shortly develop 260 acres of coal and clay properties, It has advertised for machinery to the value of about $15,000.

TEXAS

Brownwood—A thorough examination of the newly discovered coal field in the eastern part of Brown County has been made, and it is declared that a thick vein of lignite coal of a good quality exists there. The land on which this coal has been found lies along a ridge about 12 miles from Brownwood, and between the towns of Blanket and Zephyr. Leases have been secured on about 1000 acres of this land, and it is planed to start development as soon as possible.

KANSAS

Radley—Two shot firers were killed in Mine No. 48 of the Central Coal & Coke Co. near Radley, Kan., recently. A windy shot caused an explosion, resulting in the death of the men. The bodies were recovered about 12 hours after the exposion.

Mulberry—On Jan. 14 the cable at Mine No. 7 of the Spencer-Newlins Coal Co. broke, dropping the cage, which carried six men about 100 ft. to the bottom of the shaft. Three of the miners upon the cage at the time were killed, and the remainder seriously, if not fatally, injured.

COLORADO

Trinidad—It has been announced from the headquarters of the Colorado Fuel & Iron Co. that the coke ovens at Tercio and Tabasco resumed operations on Jan. 6. The resumption of operations at the coke ovens would signify that a full quota of men is employed at these places, and that the output will be materially increased.

Denver—Nine hundred union miners on Jan. 17 demanded the release within 24 hours of Mother Jones by the military authorities. This demand came from a meeting of strikers at Rockvale, about 900 men being in attendance. The miners affirmed that unless Mother Jones was freed within 24 hours, they would free her by force of arms.

FOREIGN NEWS

Vancouver, B. C.—Interest was recently aroused in Vancouver over the alleged discovery of large coal areas on Smoky River in Alberta, near the British Columbia border along the line of the Grand Trunk Pacific Ry. The coal is said to be a good grade of anthracite similar to that produced in Pennsylvania. The area of the property is 32,000 acres, and is leased at $1 per acre. The leasing company expects to sell the coal in the Prairie Provinces and on the Pacific coast.

PERSONALS

F. J. Harry, M. E. Markell, J. R. Davidson, Charles Detwiler and F. A. Parsons, of Uniontown, were recently elected directors of the Southern Connellsville Coke Co.

J. R. Watkins, Supt. of the Issaquah & Superior Coal Mining Co., after a hard year's work is taking a trip back to Wales. Mr. Watkins expected to sail from New York on the Lusitania on Jan. 14.

Malcolm Macfarlane was recently appointed inspector of mines for the New York Central & Hudson River R.R. Co., with headquarters at Phillisburg, Penn. H. B. Douglas, who formerly held this position, has been assigned to other duties.

R. B. Drum, general superintendent of the Vesta Coal Co., a subsidiary of the Jones & Laughlin Steel Co., with mines at California, Penn., retired Jan. 16 after more than a quarter of a century of service with the company. He was succeeded by H. B. N. Louttit, previously manager of the Monongahela River mine of the Pittsburgh Coal Co.

Charles F. Ice, formerly manager of the Millers' Creek division of the Consolidated Coal Co. in Kentucky, was recently made chief coal inspector for the same firm with duties embracing all divisions. G. M. Gillette, formerly assistant general superintendent of the Elkhorn division, was promoted to be manager of the Millers' Creek division succeeding Mr. Ice.

OBITUARY

L. E. Monser, president of the Wenona Coal Co., and a pioneer operator in the Illinois coal fields, died at his home at Wenona, Ill., recently, after a long illness.

The body of Edward Joyce, who mysteriously disappeared from his home in Carnegie, Penn., in April, 1909, was discovered in some abandoned workings of the Camp Hill mine of the Carnegie Coal Co., on Jan. 14. The portion of the workings where the body was found had been bratticed off from the rest of the mine for several years on account of firedamp. How Joyce, who was boss of the pit at the time of his death came to enter these abandoned workings is unknown, but it is now believed that for some reason he did so and was overcome by the firedamp.

CONSTRUCTION NEWS

Scranton, Penn.—The Pennsylvania Coal Co. is rapidly pushing the erection of its new breaker at Underwood.

Myersdale, Penn.—Men and teams are at work transporting machinery and putting it in place for starting a new coal mine a short distance below the sanitorium power house near this place.

Chillicothe, Ohio—The Norfolk & Western R.R. intends to build a short line about 17 miles in length to penetrate the coal fields of Pike Co., Ky. This branch has been incorporated at Frankfort, Ky., as the Tug River & Kentucky R.R. Co.

Cumbo, W. Va.—In addition to other improvements recently made at the Cumbo yards of the Baltimore & Ohio work has recently been started upon a coal tipple. This structure will be of concrete and its erection is being somewhat impeded at the present time by cold weather.

Pittsburgh, Penn.—The William B. Scaife & Sons Co., of Pittsburgh, Penn., recently received a contract from the Pittsburgh Coal Co. for three steel tipples, each requiring a large amount of structural steel. These tipples are for the Montour mines Nos. 1, 2 and 4.

Lancaster, Penn.—The Philadelphia & Reading R.R. Co. recently awarded to Witmer & Warsel the contract for the erection of concrete and steel coal pockets, office and stable at Lancaster. The work is to be started in the near future and rushed to completion.

Galveston, Tex.—The Atlantic States Coal & Coke Co., a subsidiary of the Clinchfield Fuel Co., has selected Galveston as its headquarters. It is the ultimate intention of the company to locate large storage yards, loading apparatus and a coke-manufacturing plant at Port Bolivar, on Galveston Bay directly across the harbor channel from the Galveston dock.

Bluefield, W. Va.—Large forces of men are engaged along the line of the Norfolk & Western R.R., between Bluefield and Vivian, and work is being pushed rapidly upon the electrification of this section. At the present time construction work is being concentrated to a large extent on the Elkhorn and Maybeury grades. It is now estimated that one year will be required to complete the electrification of the division.

Uniontown, Penn.—Reagan, Lynch & Co., contractors, of Uniontown, have recently completed arrangements for the installation of five Covington coke-drawing machines for the H. C. Frick Coke Co. Three of these machines were erected at the Mammouth works and two at Calumet. The installation of these coke drawers required a large amount of grading, laying of tracks and the reconstruction of the fronts of many ovens. The work was started last September.

Martinsburg, W. Va.—Announcement was recently made that all the rights of way for the new railroad in the Back Creek Valley have been secured and that work will be begun early in the spring. It is not definitely known what route will be followed, two having been surveyed and both being declared to be excellent. The New York syndicate owning the territory has acquired about 30,000 acres of coal land. An analysis of the fuel shows it to be of the best quality.

NEW INCORPORATIONS

Maryland, Tenn.—The Maryland Coal & Coke Co. has been incorporated with a capital stock of $50,000.

Pekin, Ill.—The Champion Coal Co. has been organized with a capital stock of $20,000, to mine and deal in coal. The incorporators are A. L., C. L. and A. P. Champion.

Connellsville, Mo.—The Connellsville Coal & Mining Co. has been incorporated with a capital stock of $15,000. The incorporators are C. W. Evans, Marion C. Miller and S. F. Shoop.

Murray City, Ohio—The Globe Coal Co. has been organized for the purpose of mining and dealing in coal. The capitalization is $10,000, and the incorporators are Vance Webb, Louis Green, E. W. Davis, L. P. Mooney and Arthur Green.

Wellston, Ohio—The Blue Jay Coal Co. has been organized for the purpose of mining and marketing coal. The capital is $10,000, and the incorporators are W. F. McCloud, H. A. Goddars, Grant McGhee, John K. Yeager and G. E. Littler.

Lewiston, W. Va.—The Lewiston Block Coal Co. has been incorporated with a capital stock of $25,000, for the mining of coal. The incorporators are A. A. Starbeury, W. E. Chandler, L. J. Schwartz, Homer Wiseman, and C. W. Morton, all of Charleston, W. Va.

Charleston, W. Va.—The Mill Creek Cannel Mining Co. has been organized to mine coal with a capital stock of $10,000. The incorporators are W. M. Watles, F. G. Campbell and C. Riggs, of Charleston, W. Va., and J. F. Hindson and Fred Watles, of Villa, W. Va.

Carlinville, Ill.—The Elly Coal Co. has filed papers of incorporation. The capital stock is $2,800,000, and the incorporators are Henry C. Hamilton, C. C. Terry, of Girard, and Albert Salzenstein, of Springfield. The company has several thousand acres of coal land in east Macoupin and west Montgomery Counties.

INDUSTRIAL NEWS

Sullivan, Ind.—The mines of the Carlisle Coal & Clay Co. have been sold to the Chicago-Carlisle Coal Co. and will be reopened.

Memphis, Tenn.—The Memphis Coal Briquette Co. is arranging to build a plant with a daily capacity of 200 tons for the manufacture of briquettes. These will be made of West Kentucky slack with a binder of asphaltic material.

Winchester, Ky.—The H. S. Davis Co. on Jan. 15 sold to the Woolf Valley Coal Co. 1270 acres of coal land in Breathitt County near the Perry County line at a private price. Immediate possession will be given and development on a large scale will soon start.

Chicago, Ill.—The O'Gara Coal Co. has given notice that all interest coupons on the bonds of the company due Sept. 1, 1913, will be paid at the office of the company in the Marquette Building, Chicago, on presentation. A few such coupons are still outstanding.

Indianapolis, Ind.—The National Executive Board of the United Mine Workers of America convened here Jan. 16 at the international headquarters to take up the consideration of appeals from the various districts. The business of the board is said to be merely routine.

Henderson, Ky.—The highest price for coal rights said to have been paid in Henderson County up to the present time was $46 per acre recently paid by the People's Mining Co. to W. T. Lambert. J. W. Todd sold about 45 acres of coal rights to the same company for $25 per acre.

Charleroi, Penn.—The H. C. Frick Coke Co. has bought two tracts of coal in Fallowfield Township from W. J. Emery and wife, of Washington. One contained 105½ acres approximately, and the other about 29¾ acres. The price paid was $75,000. This coal adjoins a large tract now held by the Frick Co.

Terre Haute, Ind.—The Illinois Midland Coal Co. has transferred to the Midland Counties Coal Co. 56,500 acres of land and mineral rights, valued at $6,000,000. At the same time record was filed of a sinking-fund mortgage of $3,000,000 upon this property. The land lies in Sangamon and Christian Counties in Illinois and in Otter Creek Township of Vigo County, Indiana.

Springfield, Ill.—The report of Master in Channcery, J. M. Ffeifer on the foreclosure sale of the properties of the Illinois Collieries Co. showed a deficit of $2,983,012.50. The properties were sold Nov. 15 to the Pittsburgh Coal Co. for $126,000. The deficit represents the amount of outstanding bonds, together with interest, and renders certain a total loss of investment to the bondholders.

Drifton, Penn.—Umpire of the Conciliation Board Charles P. Neill recently decided that the action of the Lehigh Valley Coal Co. in cutting the yard price for laying roads from 61 cents to 24 cents in August 1912, and also similarly for moving gob per car, was contrary to the wage agreement. By this decision several thousand dollars back pay will be turned over to contract miners.

Washington, D. C.—According to the testimony before the House Committee on naval affairs of Rear-Admiral R. S. Griffin, the coal taken from the Bering River field in Alaska and tried experimentally by the American navy to determine its fitness for naval uses was a complete failure. Chemically this fuel appeared to be better than the famous Pocahontas coal, but when tested it failed utterly to give the anticipated results. This was extremely disappointing to the officers of the navy.

Mobile, Ala.—The Alabama Fuel & Iron Co., of Birmingham, with mines at Acmar and Margaret on the Central of Georgia, and at Acton on the Louisville & Nashville has opened a Mobile office and appointed Messrs. W. M. and J. F. Johnston, of Mobile as its agents with the idea of entering into the bunkerage business. Contracts have already been signed with the Seeberk Steamship Line, Orr & Laubenheimer Co., fruit importers, and Hubbard-Zemurray Steamship Co., amounting to over 50,000 tons. The coal to be supplied is the Acton, Acmar and Margaret washed nut and slack, all of which is especially suitable for steamship use.

Coal Trade Reviews

General Review

Anthracite much improved by the more seasonable weather, but still lacking the customary snap. Curtailment in mining and further recessions in the bituminous situation. Sharp competition for any spot business that developes. Considerable demurrage coal appearing.

There has been a generally consistent improvement in anthracite all along the line since the recent severe cold snaps. Increased activity is noted in both retail and wholesale business but more particularly in the former. Operations in the mining regions continue on full time, and the fact that the output is being absorbed and some additional picked up from storage piles is indicative of a substantial movement. But all sizes are in free supply, and the customary snap of a mid-winter market is entirely absent.

Curtailment in mining is the salient feature in the bituminous situation. As in anthracite the more seasonable weather has tended to divert attention from the weak spots in the trade; but this has not been sufficiently persistent to hold the market steady, and further recessions are still noted, some spot business being negotiated at lower figures than prevailed at any time in 1913. Demurrage has become a prominent feature in the market, the selling price of occasional tonnages of off quality soft coal often being fixed by the amount of car service against them. Inquiries at the moment are only scattering, and the future market will be greatly influenced by the coming wage conference.

Operations in the Pittsburgh district are still heavily curtailed in spite of an increased domestic demand as a result of the lower temperatures. There is sharp competition for what little spot business developes, and the circular is freely cut. In spite of the determined effort to maintain prices in Ohio the customary winter schedule has finally been reduced to about the usual summer level; business in the spot market is confined entirely to small domestic orders which have developed as a result of the recent change in weather conditions. Contracts for the new year are being negotiated on the same basis as last year with provisions for any change in the mining scale, and method of paying the miners. The circular at Hampton Roads is being well maintained, but the movement is light. The steam demand in the Southern market is somewhat improved, while the colder weather has resulted in an increased movement of the domestic grades, and a general improvement all along the line.

Although the Middlewestern trade is well supplied with coal, the lower temperature has created such an active situation in retail circles that the affects are being felt at the mines. The domestics are notably stronger, while the steam fuels are also showing some improvement. Anticipation of possible labor troubles is already creating a rather tense feeling in some quarters, and a few large steam users have adopted a regular buying program that will provide for an accumulation of surplus stock.

EASTERN MARKET

BOSTON, MASS.

"Opening prices" rumored on Pocahontas and New River as $2.85 plus the possible advance in tolls; but little interest among buyers. Low prices on "market coal" for inland distribution. Anthracite a weather market, with stove the only short size. Disastrous gale on the coast.

Bituminous—Seasonable weather has drawn attention away from the weak spots at Hampton Roads for the time being, and there is beginning to be talk of "opening prices" on Pocahontas and New River. The consensus of opinion seems to be that the f.o.b. basis will be the same as last year, $2.85, unless the much discussed advance in tolls is made, and in that case the advance will be added. There are already rumors of certain pro forma contracts being closed on such an understanding, but it will probably be several weeks at least before there is any significant movement. A good deal will depend on the labor negotiations in the Pennsylvania districts, and it is now rather early to make forecasts.

The question of tolls is a subject of great interest to the New England trade. If coal rates are advanced all over on a percentage basis it is readily seen that it will operate rather against the all-rail shippers into New England and in favor of those who handle Southern coals at tide-water. The general impression is that such a horizontal ruling will probably be the outcome of the present hearings before the Interstate Commerce Commission.

At Providence and Boston cargoes shipped on the market have lately sold down to figures lower than at almost any time in 1913. The demand for coal inland is practically nil.

In Georges Creek and the Pennsylvania grades there is practically no market news. Operations in all the districts are under more or less curtailment and there is only a scattering inquiry. On the quality coals prices are held on a firm basis but that is a matter of policy and not in any way an indication of a better market. The lower priced varieties are heavy and the selling price depends largely on the amount of demurrage that may have accrued and how large a loss the individual shipper cares to sand. All-rail trade is more than listless.

Anthracite—We have now had nearly two weeks of strong coal burning weather and orders are beginning to filter in. Stocks are generally so large however that low temperatures will have to continue for a longer period to develop any considerable demand on the shippers. The companies are still limiting the proportion of stove size in any one cargo but every other size is in easy supply. Dock screenings are scarce on account of the light shipments of domestic coals over the piers.

The Arctic gale early last week worked havoc to shipping along the coast. The property loss is estimated at nearly $1,000,000, six schooners and a barge having been lost.

Current wholesale quotations are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$1.00@1.50	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.25@2.75	2.50@2.85	2.92@3.02	
New York*	2.55@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.90
Boston†				3.53@3.72
Providence†				3.58@3.72

*F.o.b. †On cars.

NEW YORK

Market continues dull, even the better grades showing the effects of the heavy pressure. Outlook in bituminous indeterminate. Anthracite more active as a result of the colder weather. Mines still working full time.

Bituminous—The soft-coal market has suffered a still further decline during the week, and the pressure is even being felt on the better grades. The good qualities have been in uniformly good demand in the past but occasional reports of weakness are now heard. Considerable coal is on demurrage, and, as usual, the market must be forced in order to find a disposal. As a rule, this is being confined mostly to the off qualities, but, as noted, occasional tonnages of the better grades are heard. It is particularly notable that the market at tidewater continues to lead in the decline; all-rail business is holding up in fair shape, particularly up in the New England district.

But, in spite of the generally depressed conditions, the larger companies maintain an optimistic attitude toward the future market. This may possibly be due to the fact that they are the least sufferers from prevailing conditions as their tonnage is well covered, while many of the smaller concerns are being forced to restrict operations. The outlook is rather indeterminate and dependent on future developments in other lines. Already, a more cheerful feeling is noted in the Western trade as a result of the increased operations in steel.

We quote the New York market weaker but with the price base unchanged as follows: West Virginia steam, $2.60@2.75 good grades of Pennsylvania, $2.75@2.85; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.

Anthracite—The colder weather of a week ago has had a notably stimulating effect on hard coal. In addition to this, production was more generally curtailed over the holiday period than was anticipated, and there has been a mild rush for certain grades in short supply. All the high-grade buck-

wheats are in good demand as are also pea and egg coal in the domestic sizes. The other prepared grades are inclined to be heavy, particularly stove coal, which is notably long; No. 2 buckwheat in the low grades is rather short, while No. 3 is normal and No. 1 long.

Generally speaking, the domestic grades are all easier, while the steam sizes are strong. The movement out of storage, while improving during the past two weeks, has nevertheless been below normal for the season. All companies report stocks on hand to be larger than normally the case at this season. Some even fear that certain grades will be carried over after the Apr. 1 discount goes into effect.

We quote the New York market on anthracite as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	$5.10	$5.05	$5.05
Egg	5.25	5.35	5.30	5.30
Stove	5.25	5.25@5.35	5.30	5.20@5.30
Chestnut	5.50	5.60	5.55	5.45@5.05
Pea	3.50	3.55@3.60	3.50	3.50@3.55
Buckwheat	2.75	2.75	2.70@3.45	2.25@2.70
Rice	2.25	2.25@2.35	1.95@2.20	1.75@2.20
Barley	1.75	1.75@1.80	1.70	1.50@1.70

PHILADELPHIA

Mining continues full but there is a lack of snap. All grades easy and trade needs a sharp rush of orders to clear up stocks. Prompt shipments made to New England.

Trade conditions in this vicinity are at least on a parity with last week. The wholesalers have not found it necessary to curtail mining, which is an indication of improvement, as the market must be absorbing the entire output; but the lack of snap that should characterize the market at this season is still apparent. All the dealers state that the call is not as active as last week, but that considerable coal is moving. As a matter of fact, all sizes seem to be in fairly easy supply. Broken, egg, stove and chestnut, and the smaller sizes are all on a parity, as far as demand is concerned.

The fact that all sizes are moving off would indicate a fairly healthy condition, but what the operators want is a rush that will deplete the stocks, which are reported to be fairly heavy. In spite of the fact that there has been fairly seasonable weather, it will take more than one or two weeks of this to help much. All through the winter there has been no disposition on the part of the trade to place orders ahead for coal. This is doubtless due to the fact that no difficulty has been experienced in securing almost any size required. If the operating companies cannot supply it, the individuals can, and quite frequently at lower prices, either by an absorption of the state tax, or a straight cut from the circular. It is understood that even stove coal, which has held its own pretty well throughout the winter, is being sold at reduction of 25 to 30c. by some of the individuals.

Retail prices continue as follows: Egg, $7; stove, $7.25; chestnut, $7.50; pea, $5.50. Prices at wholesale tidewater still continue as follows: Broken, $4.50@4.75; egg, $4.75@5; stove, $4.75@5; chestnut, $5@5.25. The differentials mark possible concessions on the part of individuals.

It is understood that the anthracite companies shipping coal from tidewater to the New England market are still able to furnish loading for the large fleet of barges engaged in handling this business, but there is no marked activity. It is almost a case of shipping the order as fast as entered, in marked contrast to normal years, when three weeks was considered ample time in which to even expect that an order would be forwarded.

The bituminous situation is characterized as poor, by some operators, but others seem to discern an improvement, as manifested by a better demand, although prices are unchanged. Taking this trade as a whole, however, there is still large room for improvement.

BALTIMORE, MD.

A feeling of confidence in the future of the coal trade. A little more inquiry developing for soft coals, and the anthracite demand is about up to seasonable average now. A number of charters announced.

In spite of all the flat conditions in the present market there is a growing feeling of confidence in the near future of the coal business. Mine interests are going ahead with development plans on the belief that things will soon take a turn for the better in the general industrial situation. The head of one of the largest coal concerns here expressed himself as entirely satisfied that the next two months would see a change for the better.

Prices at present remain at a standstill. West Virginia gas coals run from about 80 to 90c. at the mines, with steam fuels at from 90c. to $1. Pennsylvania fuels of ordinary grade command from 95c. to $1.10, with best grades worth about $1.30.

Hard coal call here is pretty well up to the seasonal average, that is for immediate sales, although the warm winter has made the business as a whole unsatisfactory. Encouragement is found in the announcement of a number of vessel charters for loadings at local piers. Especial activity was shown in foreign charters.

CENTRAL STATES

PITTSBURGH, PENN.

Demand light and production continues at about 50% of capacity. Prices are being freely cut on prompt lots. Connellsville coke demand light, with prices unchanged.

Bituminous—Demand for domestic coal has been somewhat better, as the weather has been seasonably cold, but there has been no increase in demand for railroad or manufacturing purposes, and production continues to average about 50% of capacity in the Pittsburgh district. Outside of the requirements of retail dealers there is hardly any call for prompt coal, shipments being almost exclusively against contracts, and at much less than the normal tonnages involved in such contracts. A few operators are competing rather sharply for the limited orders offered, and regular circular prices are being freely cut in most cases, sometimes to the extent of 10c. or 20c. a ton, except in the case of slack, which is bringing 15c. to 25c. above the circular price. We repeat circular prices as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The market has been quiet, no contracts having been made in the past week, while demand for prompt coke has been quite limited. There are two inquiries in the market respecting contracts, one for delivery beginning February and the other for delivery beginning March, but these are not taken seriously since the buyers had bought for the short period and are rather expected to continue buying from month to month rather than make contracts. Prices are about as well held as formerly, and we quote: Prompt furnace, $1.90; contract furnace, $1.90@2; prompt foundry, $2.40@2.65; contract foundry, $2.40@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending Jan. 10 at 260,670 tons, an increase of 8519 tons, and shipment at 258,459 tons, an increase of 6308 tons.

BUFFALO, N. Y.

Coal too plentiful for much firmness. More interest now in labor matters than in trade. All reports indicate that a sharp clash is certain. Loading water coal suspended.

Bituminous—The sharp spurts of cold meather are more numerous than formerly, but are of too short duration to give tone to the coal trade, although some dealers find business steadily improving. As a rule, the improvement in demand is slowly increasing, but prices do not advance. There is not now much coal on track here unsold. Dealers have united to some extent and cleaned it up, with the understanding that it should be kept so; as long as there is a car unsold the buyer is in control of the price. There are many reports of shutdowns on account of inability to sell the full output.

The miners are becoming more difficult to manage, and strikes are numerous. Even where mine superintendents strictly observe union rules there are strikes on all sorts of minor differences. The statement made by one of the leading miners' officials that the operators will readily yield to a demand for higher wages, even before the mining year is up, is repudiated by the producers who say they have a surplus of coal, both here and on the upper lakes and do not care if they are idle till June. If the winter is not very severe from now on a long suspension will be welcome.

Some fair prices are still to be obtained for bituminous, in spite of the reports of much cheap coal offering. The highest prices are based on $2.80 for Pittsburgh lump, $2.65 for three-quarter, $2.55 for mine-run and $2.15 for slack. The market for slack is growing steadily firmer. Allegheny Valley coal is about 25c. lower than Pittsburgh.

Coke—There is a little better feeling in the coke market, but it will take some time for prices to advance or even stiffen up to any great extent. The activity of the steel mills is not yet sufficient to create the proper demand for coke. The feeling in iron is better, however, and an improvement is looked for before long. Best Connellsville foundry is quotable at $4.50.

Anthracite—The demand is still light, both locally and for rail-line shipment. The mines are running at a slow rate.

There was at one time a large amount on cars here, but that has been cleaned up. About 50,000 tons was loaded into vessels, and it is now stated that no more will be brought here for water shipment. It is customary to begin loading at least as soon as March if the coal is to be had. Reports from the upper lakes indicate that there will be quite a large surplus on the docks there on May 1, unless the winter is severe. The handlers of independent anthracite are doing very little business.

TORONTO, CANADA

Cold wave has stimulated the market. Steam demand fair but not up to normal.

Coal dealers have been busy as a result of the extremely cold weather. The cold wave was attended by a rush of orders calling for immediate delivery and dealers in many cases were obliged to take on extra help in order to fill them. The demand for soft coal for factory purposes is fair, but not equal to that of last season as manufacturing is quiet. The yards are well supplied, but freight traffic has been congested by the cold snap causing some delay in deliveries. Quotations remain unchanged.

COLUMBUS, OHIO

A new lower circular stimulated buying in steam and domestic sizes. Weather conditions improved and there is a generally better tone to the trade. Wage scale and legislation the main features of interest.

After determined effort to uphold prices for the past two months against adverse conditions, operators and jobbers last week announced a reduction in the circular, placing quotations at the lowest level for several months. This was done in order to steady prices, as cutting was prevelent in all fields. The new level, which is about the same as usually prevail in the summer months, is expected to have a good influence upon trade.

Domestic demand took a brace recently because of the short spell of wintry weather. Dealers put in small orders to replace stocks which were sold at that time. But generally speaking supplies in the hands of retailers are large. It will require considerable cold weather to have any great effect on the trade. Retailers have had a good run of small orders and their teams have been busy.

The steam business showed a little spurt also but is still at a low ebb. A number of manufacturing plants which suspended during the holidays have resumed operations and this means an increased demand for certain grades. Railroads are also taking a large tonnage. As yet manufacturers are doing little toward stocking up to guard against a suspension after Apr. 1. Certain railroads have started their stocking movement. Contracts for steam tonnage are being made at the same figures as last year with provisions for changes in the mining scales and the method of paying miners.

The output during the week averaged about 50 per cent. of normal, due to the slack demand. In the Hocking Valley district the production was about 50 per cent. of the average and the same is true of Pomeroy Bend district. In eastern Ohio and the strictly domestic fields the production was about 40 per cent.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50 @ 1.45	.....	$1.50 @ 1.45	$1.50 @ 1.40
3-4 inch	1.35 @ 1.30	$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.25
Nut	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.80 @ 0.75	.....	0.85 @ 0.80	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	1.00 @ 0.95	0.75 @ 0.70	0.70 @ 0.65

DETROIT, MICH.

Considerable coal on demurrage. Market somewhat improved by changed weather conditions but business still slow. Some stocking against a possible suspension in April.

Bituminous—The colder weather over the past week has helped the situation somewhat, but it will have to be of considerable duration before any material benefit will be derived. Prices remain at about the same level, but the movement was somewhat improved, and a generally better tone noticeable. There is said to be approximately 700 cars of consignment coal on track at Detroit, the majority of which is under demurrage anywhere from $1 to $15 per car. Conservatism in mining seems to be the rule, and this will no doubt continue until the surpluses are reduced.

There is an increased demand for the steam grades, also Pocahontas and splint coal. The railroads seem to be in the market for more coal and greater activity is noticeable in general manufacturing. Some stocking against a possible suspension Apr. 1 is also being done.

Mine-run, which ordinarily sells at $1.10@1.20 f.o.b. mines is now readily obtainable at $1; slack is the strong feature at the moment being quoted as high as $1 per ton on occasions.

The market is now quotable on the following basis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump	$1.65	....	$1.50	....	....	$2.50	$2.50
Egg	1.65	....	1.50	....	....	2.50	2.50
Nut	1.25	....	1.30	....	....	....	....
Steam lump	.25	....	....	....	....	....	....
¾-in. lump	1.10	$1.10	....	$1.00	$1.00	....	....
Mine-run	1.00	1.00	....	1.00	1.00	....	1.25
Slack	1.00	1.05	.80	0.85	0.85	....	....

Anthracite—Indications point to a favorable business this month particularly on domestic sizes.

Coke—Connellsville coke is fairly steady on both contract and spot business. There is little inquiry and scarcely any new business being closed. Local jobbers have accepted as low as $1.90 for contract coke, but the market is more nearly quotable on the basis of $2.

HAMPTON ROADS, VA.

Loadings of coal from Hampton Roads somewhat light both on cargo and bunker vessels. Little demand during week for spot coal. Domestic business improved by colder weather.

Shipments from Hampton Roads during the past week have been somewhat light. This applies to bunker as well as cargo vessels. The greater portion of the coal moving during the week has been on contract business although, of course, there have been some small spot sales. Even with the light demand suppliers are not cutting prices below the circular which has been in effect for some time.

Several cold days during the week has caused a better demand for domestic coals and retailers have had perhaps one of the best week's sales of the winter although they still complain of poor business.

Foreign shipments from Hampton Roads for the week have gone to Montevideo, Kingston, St. Thomas, Port Antonio, Canal Zone, St. Lucia, Para and Manos. Shipments coastwise went to Boston, New Bedford, Providence, Portland, Fall River, Allens Point, and Jacksonville.

The schooner "Grace A. Martin," which sailed from Norfolk, Jan. 4, with a cargo of over 5000 tons of coal for Portland is reported to have foundered Jan. 14 near Martinous Rock. Two of the Palmer schooners which loaded here recently are past due at their destinations and considerable anxiety is felt as to their safety.

LOUISVILLE, KY.

Adverse conditions further intensified by continued mild weather. Heavy stocks on hand. Operations much restricted and prices soft.

Market conditions are practically unchanged although perhaps further intensified by another week of mild weather. Domestic coal is almost unsalable, and the steam market is rapidly reaching the same state. There was promise of some cold weather but the flurry did not last, and was succeeded by the mildest temperatures experienced within the past month or so. In consequence, the demand has since been negligible.

The efforts of the operators to effect sales have been almost wholly without results as the retailers are heavily stocked with coal purchased at bargain prices during the past month; and as the season advances with little demand from domestic consumers, the retailers are naturally disinclined to take on any further supplies. Half-time operations, or less, are in effect at many of the mines, but notwithstanding this, the supply of screenings is inexplicably large.

Prices on all grades have been affected by the conditions indicated, although it is generally recognized that it is futile to make radical cuts. However, orders are eagerly sought, and the few purchasers who are in the market have the trade at their mercy. The better grades of eastern Kentucky block can be had at $1.65 or thereabouts, which sufficiently indicates the state of the market. Nut and slack has held up much better, in comparison with this figure, but is difficult to dispose of, and 65 to 75 cents may fairly be said to represent the range of the market on first-class coal, while the lower grades are freely offered at much less.

KNOXVILLE, TENN.

Colder weather this week has caused a recovery in the market. Notable lack of consignment coal.

The market in this field was completely demoralized by the warm weather which prevailed from Nov. 10 until Christmas day. The New Year opened with coal selling at almost any price that could be secured on domestic, while steam quotations have been sagging since Jan. 1.

During January mines have averaged about four days per week, some less. Operators, however, seem to have gotten over the unprofitable habit of loading and shipping coal for which they had no orders, and little fuel has been reported on consignment this season. This fact has saved the market from a worse condition than prevailed. The cold weather of January has reduced stocks materially, but at present is having strengthening effect on prices.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM, ALA.

Market on domestic coal slightly improved and steam grades also in better demand. No change in blacksmith coal and furnace and foundry coke still quiet. Pig iron shows heavy sales but at slightly lower prices. Car situation fairly satisfactory.

Cool weather for several days has caused a slightly larger demand for domestic lump, though shipments are not what they should be for this time of the year. Steam coal has improved, the demand being much larger from the small users, and shipments on regular contracts increased. The outlook is better on both grades than last week. There is no change in the blacksmith market, prices and demand being about normal.

Furnace and foundry coke show little, if any, improvement, and the prospects are not as encouraging as on coal. Heavy sales of pig iron, amounting to about 125,000 tons, were booked during the week for delivery during the first half of 1914, but the prices were slightly below the $11 per ton basis 2 Foundry f.o.b. Birmingham. The car situation has improved materially, and little trouble is being felt from this source.

NEW ORLEANS

Demand increases due to high price of oil. Better coaling facilities in harbor will cause more steamships to coal at this port. Prospects for year are excellent.

Increasing prices for fuel oil is causing many steam plants in this territory to return to coal. The change of the Kansas City Southern R.R. from oil to coal is certain to have much influence on smaller consumers still using oil. It is stated that a few cents more added to the present price of fuel oil will cause the Southern Pacific to take the same step. This tendency is broadening the market for coal.

Prospects for the year's business are better than has been the case for a decade. The decrease in the use of fuel oil will be the cause of the greatest increase in coal consumption, but the improvement of the coaling facilities in the harbor will mean that many of the lines, not coaling here at present, will do so later. The facilities for loading of coal cargoes here are also likely to be improved, according to the plans of the dock board.

Despite the heavy stocks, orders awaiting the rise in the Ohio are large, while there has been no reduction in the standing orders at the mines in Alabama. With southern Louisiana and Mississippi experiencing the mildest winter in years, the demand for fuel is far below normal.

CHICAGO

Cold weather has a beneficial effect upon market conditions although they are not yet satisfactory. The domestic trade is somewhat stronger and dealers in steam coal are more hopeful. A large amount of steam fuel is being stored in anticipation of a suspension.

Lower temperatures have resulted in an appreciable upturn in general conditions in the Chicago coal market although the situation cannot be characterized as satisfactory. The tone of the domestic trade is stronger with prices remaining firm.

Dealers in steam coal are more optimistic as a result of a slow but steady improvement in manufacturing. Employees of mills and factories laid off before the holiday season are returning to work in large numbers and the consumption of steam fuel has correspondingly increased. Another important factor in the situation is the fear of labor difficulties. This has caused many of the larger consumers of steam coal to adopt a fixed plan of purchasing for storage purposes and the trade has been quick to feel the effect. Market observers express the opinion that there will be serious difficulties and that the present is an opportune time to provide safeguards against a future shortage.

Retail dealers report increased sales of anthracite coal. All-rail shipments are being absorbed more readily although there has been little influence brought to bear on movements from the lake docks. The operators in Franklin County announce that the colder weather has had no appreciable effect upon prices except to check a downward tendency. The better grades of this fuel are commanding $1.75 while other coals sell at prices ranging between $1.50 and $1.65. Prices for Carterville coal remain at about the same level.

There has been some increase in the demand for smokeless coal. A surplus accumulated several days ago because of a curtailment in production and this has been disposed of at prices quoted a week ago. The Hocking market is firmer and dealers believe it will continue to gain strength. The new circular price of $1.75 for 1¼-in. lump, the mines, holds firm. The situation so far as splint coal is concerned shows little change. A large amount of Indiana coal is being stored by steam users and the effect on the market is noticeable in a firmer tone generally.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.32	$2.55@2.80	$2.27	
Steam lump	1.97		1.97	
Egg		2.55@2.80		$4.30
Mine-run	1.87	2.30	1.87	3.45
Screenings	1.47	1.75@1.85	1.47@1.57	

Harrisburg coal is: Domestic lump and egg, $2.25@2.85; steam lump, $2.25; mine-run, $2.25; screenings, $1.75@1.85; No. 1 nut, $2.55@2.85; No. 2 nut, $2.55.

Carterville quotations are: Lump, egg and No. 1 washed, $2.55@2.85; No. 2 washed, $2.55.

Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; by-product, egg, stove and nut, $4.90@5; gas house, $4.65@4.75.

INDIANAPOLIS

A touch of cold weather created activity in the retail trade. But it was short-lived and market is back in the rut. Some storing against a shut-down in case operators and miners fail to agree on next wage scale. No transportation troubles. Prices generally fair.

With the temperature around 15° above for a few days the domestic coal trade was benefited, at the yards, but the effect was not felt at the mines. Retailers are well supplied, generally. They seem to have contracted for normal amounts last summer and fall and the winter so far has been mild. They have had no chance therefore to get low in their supplies, for there was always plenty of contract coal ready to fill any holes. The change of weather again dashed the hopes of dealers who anticipated a stretch of real winter.

Mine operations show little change. What little activity there is, comes from large consumers who do not care to risk a shut-down of the mines on Apr. 1 and in consequence are increasing their stores of coal. There is little if any complaint of handling of the coal by the railroads. Conditions have improved greatly in this respect over those prevailing in October and November.

Prevailing prices at the mines are $1.10 for No. 4 mine run, $1.25 for steam lump and nut; $1.45 for egg; $1.70 for domestic lump and 80c. for screenings. Contract business is slightly higher and coal in the open market can be had slightly lower than these figures. Screenings continue scarce and prices stiff while some bargains are reported in mine-run and domestic lump. There is no demoralization, however, and prices are well maintained, taking the Indiana field as a whole.

ST. LOUIS, MO.

Demand for domestic grades poor, due to mild weather. Situation now hinges on the coming labor conference.

Continued warm weather has broken down the market, and there is absolutely no demand at all for domestic sizes and the steam sizes weakening. There is something radically wrong with local conditions, but the trade seem unable to solve the problem; with no demand for lump and egg there seems to be a tonnage of the small sizes, sufficiently large to take care of the demand, and for the past week the screenings market has been gradually dropping.

It is the same thing with everything else; anthracite, coke and smokeless are slower now than in the month of March, which is usually the dullest in the year. There seems to be no relief in sight, unless it is cold weather, and the trade has about given up hope of seeing any real winter.

If the conferences between the miners and operators bring about any indication of a suspension or a strike in April, it will materially improve conditions, but if a settlement seems probable the situation will likely become worse.

The prevailing market is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.90@1.00
3-in. lump	.....	.....	$1.40	.....
6-in. lump	$1.25 @ 1.50	$2.25	1.50	1.15@1.25
Lump and egg	1.85 @ 2.15	.....	.....	.....
No. 1 nut	1.15 @ 1.40	.....	.....	.....
Screenings	0.75 @ 0.80	.....	.....	.....
Mine-run	1.10 @ 1.20	.....	.....	.....
No. 1 washed nut	1.60 @ 1.75	2.25	1.60	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....
No. 3 washed nut	1.15	.....	.....	.....
No. 4 washed nut	1.05	.....	.....	.....
No. 5 washed nut	0.50	.....	.....	.....

KANSAS CITY, MO.

Demand light due to unseasonable weather. Mining much curtailed. Market steady but weak.

Lack of a continuous stretch of cold weather has prevented operators of Kansas and Missouri from getting much beyond half time in the mines. The weather has been variable, and has not provided any great amount of business for the mines. The latter have depended chiefly on contracts from railroads and other big consumers to keep them busy, and have worked about half time without difficulty. The Pittsburg district could not have turned out more than half its capacity even if demand were strong because of an accident. Demand for domestic purposes has been light. The market has been steady and rather weak, though no pronounced change was noted in this respect.

PORTLAND, ORE.

Portland investigating the cost of fuel for bunkering purposes. Market unusually quiet as a result of the warm weather.

At its regular monthly meeting here last week the Port of Portland Commission instructed its manager, M. Talbot, to communicate with the various coal-producing districts and ascertain the cost of laying down coal in Portland. It is expected there will be a much heavier demand here upon the completion of the Panama Canal and the establishment of many new steamship lines and it is desired to be in position to furnish them with coal here as well as at other Pacific Coast ports.

So far the winter has been unusually mild here and in the entire Pacific Northwest and there has been no occasion for advanced prices. While some cold weather may be experienced, it is not likely that it will be of long duration.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN R.R.

The following is a statement of tonnages shipped over this road from mines in West Virginia and the commercial and company coal, for the month of December, in short tons:

Field	Shipped	Tipple	Total	Commercial	Company
Pocahontas	930,212	18,276	948,488	934,600	107,910
Tug River	220,746	3,050	223,796	162,666	61,130
Thacker	234,752	8,885	243,637	156,834	86,803
Kenova	78,518	9,199	87,717	70,043	17,674
Clinch Valley	.....	.....	.....	125,324	14,135
Other N. & W.	.....	.....	.....	36,848	.....
Total N. & W. Fields				1,486,315	287,652
Williamson and Pond Crk. RR.	.....	.....	.....	50,926	10,930
All Othe Railroads	.....	.....	.....	74,128	.....
Grand Total	1,464,228	39,410	1,503,638	1,611,369	298,582

Total shipments of coke, entirely from the Pocahontas field amounted to 85,846 tons.

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for November and the five months ending Nov. 30, 1912 and 13, in short tons:

	November		5 Months			
Destination	1913	1912	1913	%	1912	%
Tidewater	255,344	252,447	1,313,390	17	1,466,758	22
East	248,297	311,684	1,029,925	13	963,386	14
West	289,521	731,129	4,831,363	63	4,222,603	61
Total	1,395,162	1,195,216	7,174,678		6,652,747	
From connections						
Bituminous	133,599	69,230	561,420	7	175,687	2
Anthracite	1,225	1,198	7,689		5,430	1
Total	1,529,986	1,265,688	7,743,787	100	6,833,864	100
Coke	28,535	24,216	147,818		131,392	

FOREIGN MARKETS

GREAT BRITAIN

Jan. 9—Business in large coals shows more activity, but the demand is principally confined to prompt positions. Buyers continue to hold back inquiries for ahead shipments in the hope of being able to secure easier terms. Small coals are plentiful and the tendency is irregular. Quotations are approximately as follows:

Best Welsh steam	$4.62@4.74	Best Monmouthshires	$4.26@4.32
Best seconds	4.44@4.56	Seconds	4.02@4.14
Seconds	4.32@4.44	Best Cardiff smalls	2.64@2.70
Best dry coals	4.56@4.68	Seconds	2.40@2.52

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, exclusive of wharfage, and for cash in 30 days.

British Exports—The following is a comparative statement of British exports for December and the 12 months of the last three years, in long tons:

	December		12 Months		
	1912	1913	1911	1912	1913
Anthracite	230,803	249,496	2,454,523	2,547,712	2,976,389
Steam	4,210,920	4,4,88444	47,119,017	46,539,374	53,619,022
Gas	829,435	980,548	10,504,172	10,559,845	11,527,586
Household	141,763	134,348	1,540,710	1,639,571	1,769,571
Other sorts	284,447	276,581	2,980,844	3,157,893	3,507,402
Total	5,,697,368	6,229,453	64,599,226	64,444,395	73,400,118
Coke	97,409	118,619	1,059,876	1,059,650	1,223,936
Manufactured fuel	171,400	178,235	1,612,741	1,580,803	2,053,187
Grand total	5,966,177	6,526,307	67,271,883	67,035,848	76,687,241
Bunker coal	1,556,784	1,842,006	.....	18,291,370	21,031,507

GERMANY

The German coal production for November and the 11 months and imports and exports for November were as follows:

	Imports		Exports	
	1912	1913	1912	1913
Coal	1,002,271	910,433	2,551,839	2,879,752
Lignite	676,065	508,817	5,629	5,550
Coke	50,130	35,203	505,844	402,090
Coal briquettes	5,167	1,759	168,123	116,041
Lignite briquettes	16,276	9,483	73,885	61,140

	Production			
	November		11 Months	
	1912	1913	1912	1913
Coal	14,805,443	15,329,610	162,209,627	175,945,462
Lignite	7,558,561	7,417,859	75,218,408	79,741,825
Coke	2,598,768	2,608,370	26,435,461	29,470,168
Coal briquettes	448,329	463,573	4,870,954	5,382,167
Lignite briquettes	1,671,265	1,729,283	17,420,149	19,648,359

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Jan. 17.

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	....	....	80	84†	82†
American Coal Products Pref	106	106	106	106	106
Colorado Fuel & Iron	31¾	31	32	32¾	28½
Colorado Fuel & Iron Pref	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102½	....	....
Island Creek Coal Com	48	47	48	48½	47
Island Creek Coal Pref	85	84	85	85	83½
Pittsburgh Coal	19¾	19	19⅛	19¾	17⅞
Pittsburgh Coal Pref	88½	87	88	88½	86
Pond Creek	20¾	19	19⅝	19⅝	18⅜
Reading	171⅛	168¾	169⅜	171⅛	166½
Reading 1st Pref	....	....	87½	88	87½
Reading 2nd Pref	91	90½	90½	91½	90¼
Virginia Iron, Coal & Coke	40	40	40	40	40

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's* Range	
Colo. F. & I. gen. s.f.g. 5s	92½	Sale	91½	92	90	99½
Colo. F. & I. gen. 6s	104	106½	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	78½	Sale	79½	79½	75	85
Cons. Ind. Coal Me. 1st 5s	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s	..	92	87⅞	Dec. '13	87	87½
Gr. Riv. Coal & C. 1st g 6s	..	..	102¾	April '06	..	..
K. & H. C. & C. 1st s f g 5s	92¼	95½	92¼	Dec. '13	91	98
Pocah. Con. Coll. 1st s f 5s	..	85½	86	Oct. '13	85	87½
St. L. Rky. Mt. & Pac. 1st 5s	78	79	77	77⅜	73	80½
Tenn. Coal gen. 5s	99¾	Sale	98⅛	99¾	96	103
Birm. Div. 1st consol. 6s	101⅛	102½	101½	Jan '14	100⅝	103
Tenn. Div. 1st g 6s	101	102½	101	Jan '14	100¼	102
Cah. C. M. Co. 1st g 6s	101	..	103	July '13	103	103
Utah Fuel 1st g 5s	..	..	..	....	..	..
Victor Fuel 1st s f 5s	..	84	80	May '13	79¾	80
Va. I. Coal & Coke 1st g 5s	93½	96	94	94	92	98

*For the full year 1913. †Sale involving less than 100 shares.

DIVIDENDS

Consolidation Coal Co.—Regular quarterly dividend of 1½% payable Jan. 31 to holders of record Jan. 24.

Dominion Coal Co. Ltd.—Dividend No. 42 on the preferred of 3½% payable Feb. 2 to holders of record Jan. 17.

Pacific Coast Co.—Regular quarterly dividend of 1½% on the common and second preferred and 1¼% on the first preferred, all payable Feb. 2 to holders of record Jan. 24 to Feb. 1.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 5
Issued Every Saturday
Hill Publishing Company

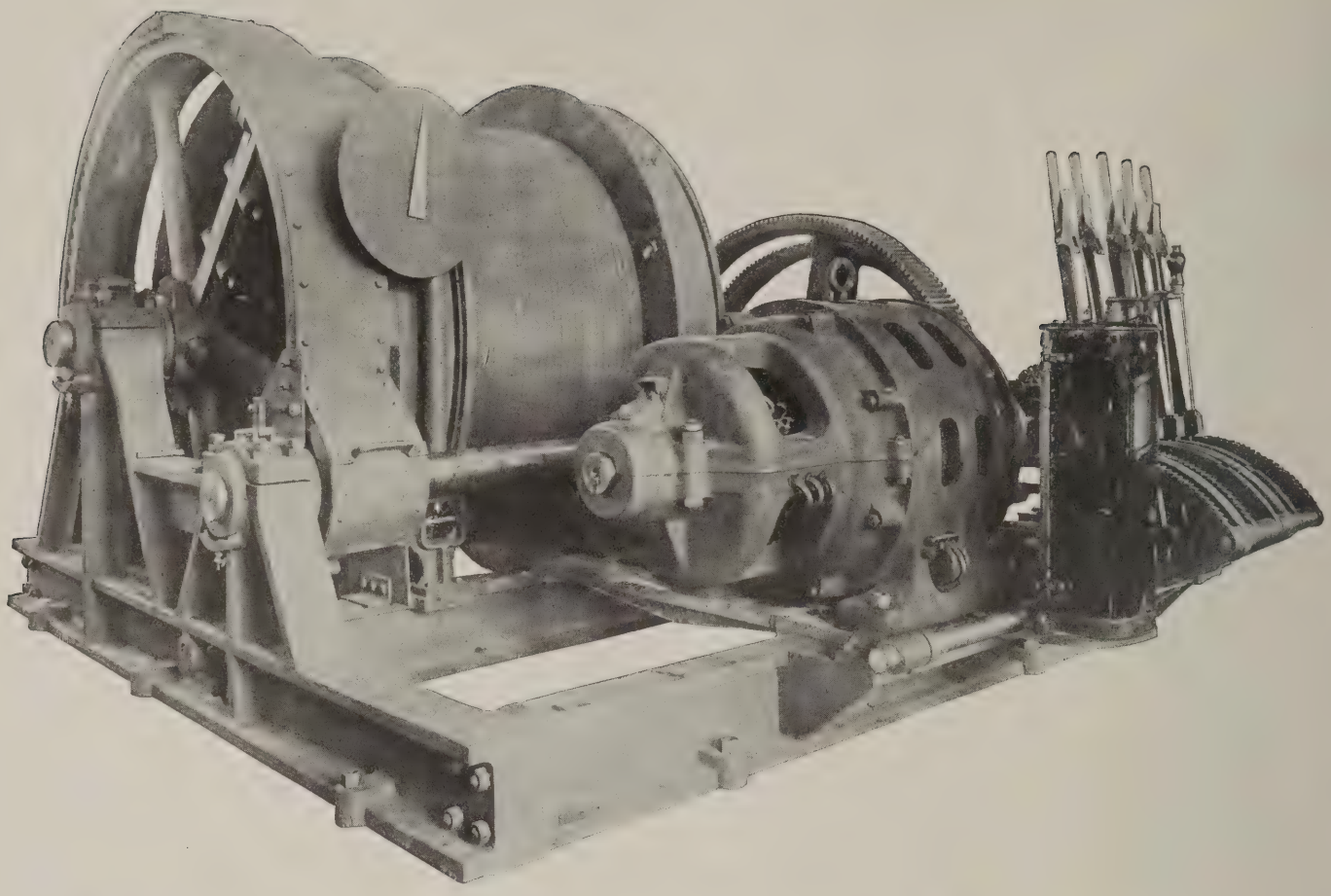
NEW YORK, JANUARY 31, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Miners Leaving Cage After Day's Work in Clifton Colliery, Nottinghamshire, England

COAL AGE



Westinghouse Motors For Moderate Sized Hoists

While manufacturing the electrical apparatus for the largest mine hoist installation ever undertaken in the United States, the Westinghouse Electric and Manufacturing Company has devoted very careful attention to the design of motors for moderate sized hoists.

No attempt is made to take motors designed for some other purpose and adapt them to mine conditions. **They are hoist motors and are especially designed in every respect for this service.**

These motors have unusually heavy pulling power for their horsepower rating. The revolving part is small in diameter to permit quick stops and reversals. Low power consumption insures economical operation.

They are particularly designed to allow ease of inspection and dismantling, if necessary. All coils are form wound and placed in open slots, making repairs, in case of accident, as simple as possible.

Our nearest office will be pleased to furnish full information about Westinghouse Mine Hoist Motors upon request.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

ATLANTA, GA.
BALTIMORE, MD.
BIRMINGHAM, ALA.
BLUEFIELD, W. VA.
BOSTON, MASS.
BUFFALO, N. Y.
BUTTE, MONT.
CHARLESTON, W. VA.
CHARLOTTE, N. C.
CHICAGO, ILL.
CINCINNATI, O.
CLEVELAND, O.
COLUMBUS, O.
*DALLAS, TEX.
DAYTON, O.
DENVER, COLO.
DETROIT, MICH.
*EL PASO, TEX.
*HOUSTON, TEX.
INDIANAPOLIS, IND.
JOPLIN, MO.
KANSAS CITY, MO.
LOUISVILLE, KY.
LOS ANGELES, CALIF.
MEMPHIS, TENN.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
NEW ORLEANS, LA.
NEW YORK, N. Y.
OMAHA, NEB.
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ORE.
ROCHESTER, N. Y.
ST. LOUIS, MO.
SALT LAKE CITY, UTAH
SAN FRANCISCO, CALIF.
SEATTLE, WASH.
SPOKANE, WASH.
SYRACUSE, N. Y.
TACOMA, WASH.
TOLEDO, O.
WASHINGTON, D. C.

*Westinghouse Electric & Mfg. Co., of Texas.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JANUARY 31, 1914 NUMBER 5

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 191

The Question. Some verses dealing with the important subject of decently and properly providing for the older employees who have spent the best part of their lives serving in minor positions. Berton Braley. COAL AGE, Vol. 5.

IT IS BETTER TO ELIMINATE A WRONG THAN TO ALLEVIATE THE EVIL CONSEQUENCES: *Page* 192

*SAFETY LADDER FEET FOR CONCRETE AND IRON FLOORS: *Page* 192

*MINE FIRES ON AN EXPERIMENTAL SCALE: *Page* 193

*A WIRELESS SYSTEM OF TELEPHONY FOR COAL MINES: *Pages* 194-195

Reineke's wireless telephone system dispenses with all connecting wires and has been used successfully for two years in a Westphalian colliery. It can be readily moved from one place to another and is not affected by other electric currents. No sparks can be produced. COAL AGE, Vol. 5.

AN ANALYSIS OF THE OHIO MINING COMMISSION'S REPORT: *Pages* 196-200

The second and concluding article on the Ohio Mining Commission's Report. The arguments of both the miners and operators for and against the proposed new legislation are discussed in detail. The main contention of the miners appears to be founded on an intangible psychological condition. A. T. Shurick. COAL AGE, Vol. 5.

*A FLOAT-AND-SINK TEST DIAGRAM: *Page* 201

THE GASES IN COAL: *Pages* 202-203

WHO'S WHO IN COAL MINING: *Pages* 204-205

A brief sketch of the life of H. M. Wilson, chief engineer, Bureau of Mines, Pittsburgh, Penn.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 220

COAL AND COKE NEWS: *Pages* 221-224

A SAFETY BANQUET IN WEST VIRGINIA: *Pages* 205-206

The United States Coal & Coke Co. gives its fourth annual safety-boosting banquet to its employees. This banquet is one of the many plans this firm employs to foster the safety morale of its working force. COAL AGE, Vol. 5.

*THE TRANSITION FROM INFLAMMATION TO EXPLOSION OF COAL DUST: *Pages* 207-210

An explosion is not merely a culmination of progressive combustion, but a suddenly developed phenomenon when the coal as a whole enters into chemical reaction and would so act, even if it did not contain any hydrocarbons. This develops such a center of force that a wave of pressure backs on the zone of inflammation, producing those effects previously ascribed by most writers to suction. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 211-212

What Your Coal Is Worth—Nystagmus—The Mining Industry and the Public—The Ethics of the Mine-Cave Problem.

THE POLICY OF HUSH: *Page* 213

KINGSTON COAL CO.'S IMPROVEMENTS: *Page* 213

*THE UNDERWOOD COLLIERY: *Page* 214

MORE RESCUE MANEUVERS: *Page* 214

DISCUSSION BY READERS: *Pages* 215-218

*Working Coal under Watery Strata. Letters Nos. 2, 3 and 4—The Certificate Law. Letters Nos. 14 and 15—The McAllister Experience.

STUDY COURSE IN COAL MINING: *Page* 218

INQUIRIES OF GENERAL INTEREST: *Page* 219

Reversible Coal-Cutting Machine—Longwall Mining—Ventilation.

COAL TRADE REVIEWS: *Pages* 225-230

ADVERTISING INDEX: *Page* 24

CIRCULATION OF THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers

One Way To Save Time

The Weekly Ad-Talk Page

"In this terrific, ceaseless, relentless strife, methods—ideas—are the arms and equipment, as sword and breastplate were the weapons of ancient Greek and Roman, as battle-axe and plate armor were the equipment of the Crusader. And as no nation today would think of going to war with obsolete equipment, so no business man can succeed unless new, advanced ideas are shield and buckler. One modern battleship would blow all the navies of antiquity out of the water. Similarly, there are methods for doing business, born of yesterday's ideas, which make the methods of a few years ago seem ludicrous."

The above is from an able editorial in "System"—the progressive magazine for business men.

We quote it here because the sentiment of the writer applies equally to you in the field of coal mining.

There are methods for accomplishing things in the coal mine that enable the up-to-the-minute engineer, the engineer who takes advantage of the new ways of doing things, to make the results from old-time equipment look sick.

And how are you going to keep constant track of the new things coming out and being developed in your field unless you keep in constant touch with the manufacturers in your field?

And what better way to keep in constant touch than by reading the business messages of these manufacturers in the Selling Section in issue after issue of your technical paper?

In the Selling Section of COAL AGE you find the manufacturer's explanations of why you can use his goods to advantage.

You can find the pump manufacturers quickly—the hoist builders, the drill manufacturers, the manufacturers of all kinds of mining equipment and supplies.

You do not have to weed through a mass of advertising material that is not in your field.

The advertising pages contain only advertisements of coal mining equipment and material—the kind of advertising that gives you the ideas that help you produce salary-raising results.

The Selling Section, in other words, is a business education for the mining man—the finest kind of a guide when he needs anything for his plant.

Advertising is today's method of bringing the best of manufactured goods to the doors of the men who can be materially benefited by the use of those goods.

And the man who takes advantage of the ideas the advertising pages hold out is naturally the man who is able to show the best results, the most improvement in the year's efficiency figures.

Make the Selling Section help you week after week.

* * * * *

Only good goods can be continuously advertised.

COAL AGE

Vol. 5 NEW YORK, JANUARY 31, 1914 No. 5

The Question

By Berton Braley

Written expressly for Coal Age.

What have you done with the old men
  Who're broken by toil and time?
Once they were brave and bold men,
  Now they are past their prime,
Now they are aged and juiceless,
  Now that their race is run,
Now that they're weak and useless,
  Tell us: What have you done?

Have you made their hard lives rougher
  By turning them out, in truth,
To shiver and starve and suffer
  In the world that was meant for Youth?
Now that they cannot aid you
  Nor earn their miner's wage,
For all that their work has paid you,
  How have you dealt with Age?

Once they were young and gay men
  Toiling to make you wealth,
Now they are bent and gray men
  Broken in strength and health,
Have you pensioned these one-time bold men
  Or starved them as some men do?
As you have dealt with the Old Men
  May Destiny deal with you!

It Is Better to Eliminate a Wrong Than to Alleviate the Evil Consequences

Yes, Mr. Superintendent, the Christmas and New Year season is past and you have again settled down to your ordinary way of doing things. Probably by now that feeling of benevolence stirred up in you by the sound of Christmas bells has passed away, or is rapidly disappearing. You have probably helped charities both worthy and unworthy during the past month.

Maybe you gave John Brown's orphans a dollar apiece and provided them with a few toys; also, if the feeling was strong upon you, you saw that they had their Christmas dinner.

Perhaps you also assisted Bill Thompson's children whose sufferings were caused by Bill's foolish desire for drink. What a time you had at the Christmas tree! and how glad you were to see parents and children all happy.

You did feel sorry for Henry Williams and his wife who were there, but all alone, the sweet little boy and girl they were blessed with having been snatched away from them by the "Grim Reaper," during the epidemic of fever which swept the camp last spring. But while you in your benevolence attempted to alleviate some of the misery around you, did you pause to think of what had actually caused some of it ?

Maybe if you sit down now and consider, you will discover that your mite just expended in the cause of charity did not compensate for your being responsible for much of the misery which aroused your sympathy.

Had you paid more attention to the various "Safety Movements" and not displayed such criminal indifference to the social conditions of your workmen, perhaps some of the misery which touched your pity would not have existed.

Perhaps You Are Responsible for Much Misery

You are probably indirectly responsible for the conditions of some of those poor sufferers.

Why did you not have some of your men trained in first-aid work? Then John Brown would not have died from arterial bleeding, for his wounds would have been instantly attended to. And maybe William Thomas, whom we omitted to mention before, would have had two legs instead of only one, if he had not been roughly and unskillfully handled by untrained men.

In both cases the children depending on these men would have been able to enjoy more luxuries than they did, even without your paltry dollar or two.

You also maintain a very nice (?) saloon in your camp, and while the houses you provided for your workmen were as plainly and poorly built as possible, this same liquor emporium is fitted up with all the modern attractions of such abodes of corruption. The human desire for things better than we ourselves possess probably attracted Bill Thomson first to such a place, hence his downfall.

Your camp is in a bad sanitary condition and has been so for some considerable time. You know this is true, and you also know the reason for the outbreak of fever which took away Mr. and Mrs. Henry Williams' children. However, you excuse yourself on the plea of "saving expenses."

Why Do You Not Take an Interest?

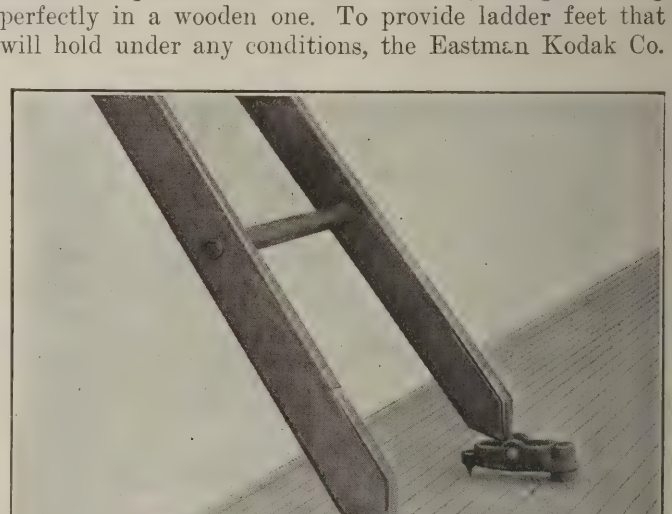
Why do you not take an interest in the safety-first movements and maintain efficiently trained corps with all the necessary appliances? Why do you not take an interest in the social welfare of your workmen and keep your camp in good shape? Also, why do you not assist the promotion of such societies as the Y. M. C. A. in your camp? Surely it cannot be that you have no time to consider anything other than the making of a few paltry dollars to improve your reputation for cheapness of production, regardless of the fact that you are gambling away human lives.

If low cost of production is your only thought, it is time you were eliminated. Get down to business and remember there are more days than Christmas Day and New Year's Day to do good.

Pay a little more attention to the human element and then you will be fit to hand out a dollar along with a Christmas blessing to a worthy cause. If you are responsible for so many miseries, due entirely to your indifference and negligence, you are as guilty of murder as if you had deliberately shot your victims.

Safety Ladder Feet for Concrete and Iron Floors

Often a ladder equipped with sharp-pointed or spiked feet will slip on a concrete or iron floor, though holding perfectly in a wooden one. To provide ladder feet that will hold under any conditions, the Eastman Kodak Co.



Safety Feet for Ladder

has designed the style shown in the illustration, taken from the *American Machinist*. This consists of castings hinged to the ladder legs as shown. Each casting carries a spike at one end and a rubber pad at the other. The spike will hold on wood or dirt surfaces, and the rubber on surfaces where the spikes would slip; the two make an ideal combination that needs no adjusting when setting the ladder. The spikes used are threaded horseshoe calks of a type easily purchased in the open market, and the rubber pads are standard large-size crutch tips.

The number of ladder accidents have caused much ingenuity to be displayed in their reduction. The American

Mason Safety Tread Co., of Lowell, Mass., is using carborundum grains set in delta metal casings for ladder footings. The carborundum retains its edges and even when the false ladder foot becomes coated with oil or grease, it still retains reliable nonslipping qualities.

Mine Fires on an Experimental Scale

The Bureau of Mines has recently installed at its Pittsburgh experiment station an underground chamber or furnace in which to carry on experiments relating to mine fires and spontaneous combustion as occurring in mines.

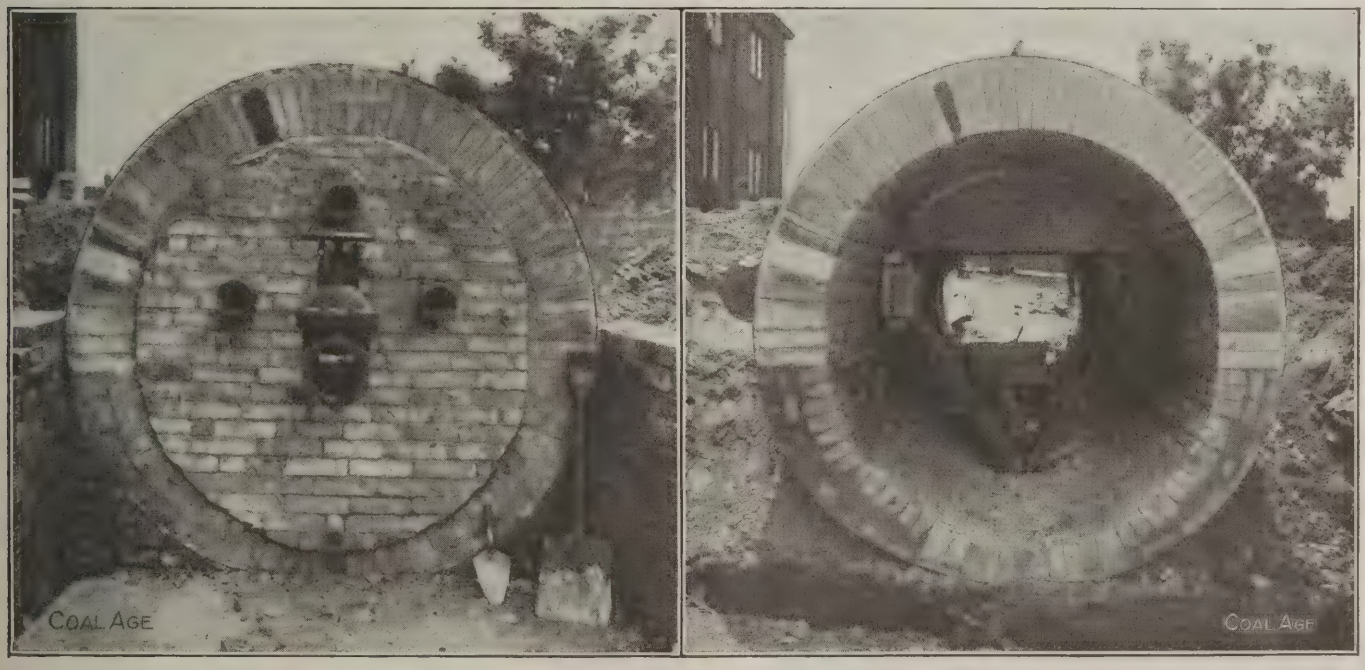
A section of steel tube, cylindrical in shape, 6½ ft. in diameter and 27 ft. long, was laid on its side in a trench. After lining with firebrick and mineral wool and stopping the ends with 13-in. brick walls, this shell was covered with two feet of earth. The chamber was constructed so as to be as nearly airtight as possible, and in such manner as to retain to the greatest degree practical any heat generated within its walls.



General View of Plant

The progressive changes in composition of the fire gases or of the air surrounding the coal will be followed and temperature measurements made, in an endeavor to apply the data thus obtained to solving practical problems in the treatment of mine fires.

Investigations have been made in other countries and to some extent also here, on the gases produced in actual cases of mine fires both before and after sealing off a burning area. The bureau is now making, however, probably the first attempt to investigate such problems in an experimental apparatus which permits careful control of conditions and yet is on a scale nearly commensurate with mining operations. These experiments are being carried on by Horace C. Porter, chemist, of the Bureau of Mines.



The Steel Cylinder Lined with Firebrick and with End Bricked in

At one end a motor-driven fan will blow in air at a rate which can be accurately measured, and at the other a stack is provided which can be opened or closed as desired. Through the top of the chamber, at frequent intervals, pass small pipes for withdrawing samples of air or gases and for inserting pyrometers for temperature measurement in the interior.

Coal and Waste Material Will Be Scientifically Tested

The chamber will hold 6 to 8 tons of coal when one-third full. It is expected that different kinds of coal or of the gob or waste material from mines will be placed in the chamber and a study made of the spontaneous development of heat in them under various conditions. After an active fire has been started either by this means or artificially, experiments will be made on controlling it by reducing the air supply or by sealing it off entirely.

Messrs. Fletcher, Burrows & Co., colliery proprietors, of Atherton, England, have just completed the erection of a lofty and spacious building containing 40 spray baths for the use of the 700 colliers employed at their Gibfield pit. The water for the baths is supplied from a large tank inside the building capable of holding 500 gal. of water. The collier, after taking off his pit clothes, goes into one of the small recesses, and pressing on a piece of wood with his foot causes the water to come over him in the form of a spray at a temperature of 96 deg. Seven minutes are allowed for the bath, and the collier has to bring his own soap and towel. After rubbing himself down, he can put on his clean walking clothes, which have been slung up to the ceiling, and if they have been in the rain, will be quite dry by the time he needs them. There are 396 of these slings, each numbered and provided with a separate lock and key.

A Wireless System of Telephony for Coal Mines

Special Correspondence

SYNOPSIS—Reineke's wireless-telephone system dispenses with all connecting wires and has been used successfully for two years in a Westphalian colliery. It can be readily moved from one place to another and is not affected by other electric currents. No sparks can be produced.

The liability of the connecting wires in ordinary mine-telephone systems to become damaged and broken by the work going on in the colliery has always been a source of trouble, and, from time to time, attempts have been made to provide a satisfactory substitute to the ordinary telephone service, or to so improve such service as to make it absolutely beyond suspicion in the above respect. With the advent of wireless or spark telegraphy for ordinary above-ground work, it was confidently hoped that developments would shortly occur in connection with the application of the same means of transmitting electrical impulses and telephony in mines, but there are certain disadvantages with regard to spark telephony which make it difficult of application to this purpose.

Means, however, of dispensing with connecting wires have been developed by Reineke's Wireless Telephones, Ltd., of London, and Herr Reineke's system has been in regular use for two years in the Carolinengluck mine, at Bochum, in Westphalia, Germany. No other system of signaling is now used. Since then it has been applied in Great Britain at the Dinnington Main colliery, and Fig. 1 shows the manager of this colliery at the receiving and transmitting station in his office underground. The second illustration shows the engineer of the colliery in the pit cage receiving a message from the pit bottom.

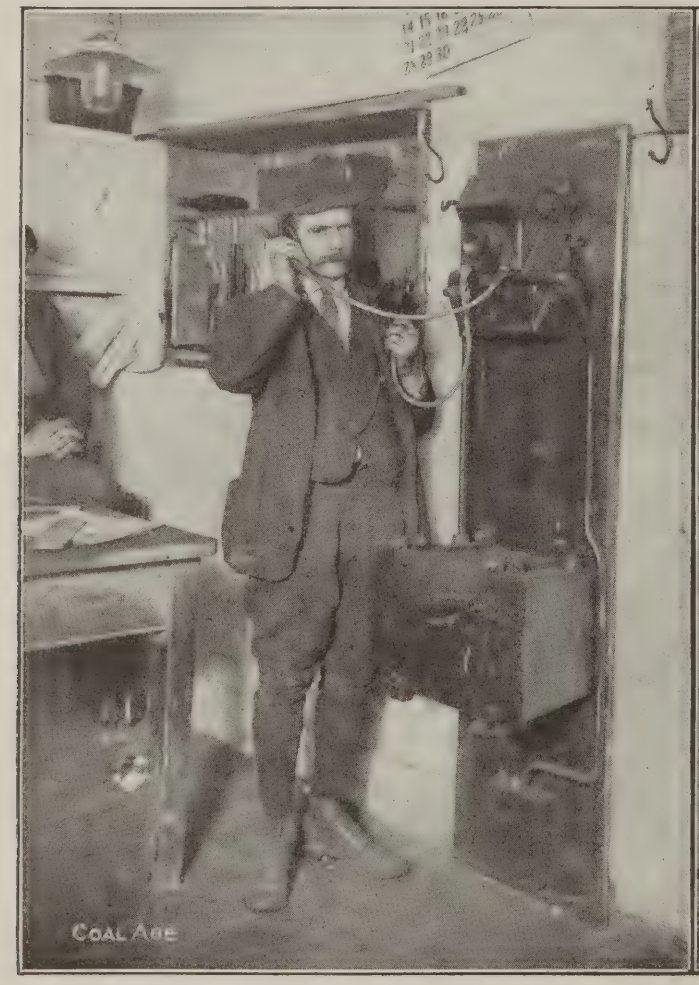


Fig. 1. Colliery Manager at Wireless Phone in Underground Office



Fig. 2. Engineer in Pit Cage Receiving Message from Shaft Bottom .

Rails and Pipes Act as Conductors

In the Reineke telephone, transmission and reception of the speech in the telephone occur exactly as in an ordinary telephone; that is to say, the current strength is varied by the sound waves causing the diaphragm in the transmitter to vibrate, and so vary the resistance offered to the current by the carbon particles in the telephone. This varying current operates the diaphragm of the receiver through the agency of the magnet excited

by the currents. Instead, however, of the current from the transmitter being conducted along wires to the receiver, it is converted to a high pressure by a transformer contained in the telephone case and the high pressure or secondary winding of the transformer is connected to the ordinary rails or pipes in the pit.

In this way, the charge of electricity is communicated in and spreads over the whole system of rails throughout the pit, the charge varying with the fluctuations of the primary current in the transmitter circuit of the telephone. In this system no attempt whatever is made to insulate the rails or pipes or to connect the adjacent lengths electrically. The conditions of distribution of electric charges underground are entirely distinct from the conditions on the surface of the earth and the working of the system largely depends on this fact which was for the first time demonstrated by Herr Reineke.

The reception of speech is accomplished by connecting telephones to the rails or pipes at any point of the system, by bridging a sufficient length to obtain a suitable potential difference, or by connecting between the rails and pipes if these exist, while in some cases it is found convenient, as in portable instruments, to connect to an antenna consisting of a loose coil of wire which may be laid on the floor or hung on the timbers.

A Bell Rings Just as in an Ordinary Telephone

To call attention, a bell similar to that of the ordinary telephone is operated by a specially designed relay. When the button is pressed at the transmitting station, all the bells belonging to the receivers will ring and all the telephones will receive the message by taking the receiver off the hook, which cuts off the bell and connects up in the usual manner.

By tuning the relays, it is possible to make each respond to its own particular signal so as to call any one station, but in mining work this does not appear to be either necessary or desirable, and the different stations are called up by giving one, two or three rings, a special signal calling all the stations to speak simultaneously. The current is given by an ordinary battery, and in outward appearance the telephones are similar to the ordinary mine telephone.

One form of the instrument is exceedingly portable, weighing with its case about 20 lb., enabling it to be carried about and used in any part of the pit to which the rails extend. It can either ring up other stations or be rung up by them. A smaller or pocket instrument can also be made which can ring up other stations, but cannot be called by them, but messages can be exchanged from any of the fixed telephones. This is useful for an overseer, who thus can give notice of any accident and ask for assistance from any point whatever in the pit.

A telephone can be fixed at any position on the surface and connected to the head gear if desired, or to the winding rope or pipes which go down the shaft. This telephone can speak to any of the telephones underground if necessary, but it is usually found convenient to enable it to speak to the station at the pit bottom only and for this station in turn to deal with the underground telephones. In metalliferous mines which have a number of different levels running from one shaft, communication from one level to the other is established without the presence of ore affecting the speech in any way.

Can Speak from a Moving Cage

A special application is the speaking from the moving cage to the winding-engine house. For this purpose the telephone is mounted on a standard which brings it close to the engineman's ear. On receiving a call he has only to put his ear to the receiver, the slightest pressure being sufficient to switch in the telephone and allow him to communicate with the cage without lifting his hands from the levers.

For the telephone in the cage, one of the best methods of connection is the connection into a loop formed by the winding ropes and by the balance rope, or if this is not used, by a wire suspended below the cage in the same way. It is then possible to speak from the cage either to the surface or pit bottom without any alteration to the ordinary winding arrangements. The surface telephone is preferably connected in circuit with a loop of wire, which is fixed to the headstocks or in the shaft in any convenient place.

System Is Absolutely Safe

We are indebted for this information to the Reineke Wireless Telephones, Ltd., and also to a paper before the Institute of Mining Engineers, by T. W. Wallis, at a visit to the Astley Green colliery, Manchester, England. The system appears to provide numerous advantages. It is claimed to be absolutely safe because there is no possibility of producing a spark under any conditions. It provides complete certainty of communication as there are no connecting wires to be interrupted. It can easily be moved from one place to another if required and it cannot be affected by, or affect other electric circuits in its neighborhood, whether these are direct or alternating currents conveying power, or used for signaling. Moreover, it is not interfered with by ordinary wireless telegraphic signals. The system therefore appears to have a great future and opens up quite a new phase in the problem of underground telephony.

Consular Market Notes

The U. S. Consular service makes the following comments on the foreign markets:

Silesia—There was a lively and continuous demand during the year for Silesian coal, especially for industrial purposes, in Germany, Russia and Austria-Hungary. The mining strike in England made German, Danish, Swedish and Russian customers buy from Silesia, and the strike in the Ruhr district in Germany increased the demand. As the river conditions were unusually good, the only complaint heard was of the car shortage, which was worse than ever, especially in this district. This shortage begins every year in the middle of September and ends in November with the close of the sugar-beet harvest.

The production of stone coal in the province for the past three years in metric tons (metric ton = 2204.6 lb.), was 39,993,239 in 1910, 42,300,412 tons in 1911 and 47,445,170 tons in 1912.

Australia—Export statistics of Newcastle for the first nine months of 1913 show gratifying trade increases over the similar period last year. Coal shipments totaled 3,786,432 tons, valued at $9,645,727, increases of 166,756 tons and $490,625, respectively. It is announced that a contract for supplying 100,000 tons to Java has been obtained for Newcastle.

Gibraltar—Coal trade of this port has increased during the last few years, and further development is looked for in 1913. In 1912 the total number of steamers calling for coal was 2010, and 239,051 tons were sold, an increase of 180 steamers and 7916 tons over the previous year. The current price for Welsh coal is $7.17 and North Country $6.32 per ton f.o.b. No American coal has yet reached this market.

Belgium—In 1912, 5,784,850 tons of coal were sold in the Liege consular district. As compared with 1911, the amount of coal sold increased 455,950 tons, or 8.6 per cent. The total increase in value of the coal output was $3,218,305, the increase in price per ton being 36c. for semihard, 28c. for hard, and 19c. for soft coal. The net profits of the coal mines amounted to $1,682,168, or an increase of $751,994 over 1911.

The coal market showed great strength in 1912, especially in coal for industrial use. Coal for household use was not in great demand, on account of the exceptionally mild winter. One result of the firmness of the market was an increase in the price of coal.

An Analysis of the Ohio Mining Commission's Report

By A. T. Shurick

SYNOPSIS—The second and concluding article on the Ohio Mining Commission's report. The arguments of both the miners and operators, for and against the proposed new legislation, are discussed in detail. The main contention of the miners appears to be founded on an intangible psychological condition. The commission finds that the impurities in the finer sizes will be so increased under the screened-coal system that they will be practically worthless unless washed. Although the operators' arguments are sustained by the commission itself, in nearly every instance, the recommendations are made in favor of the miners. The report makes the incongruous blunder of condemning without attempting to prescribe a remedy.

The report next enters into a detailed analysis of the arguments of both parties to the controversy.

The First Objection of the miners is that on the present basis of payment they are "not paid for the whole product of their labor." The commission is of the opinion that while this "will not bear analysis, it is probably true that this assumed grievance is the most serious defect in the present system of wage payment." Obviously it is a psychological effect, a condition of the mind, rather than a real, tangible grievance. Even the old, original report of 1883 pointed out: "The stubbornness of this misconception is hard to overstate." But it is none the less based upon such absurd contentions, that it would hardly seem to justify the consideration of serious men of affairs. For these rather illogical reasons, the commission shows a tendency to agree with the miners in their position.

A more tangible reason for sustaining this objection would seem to lie in the loss of fine coal, as is pointed out in the report. Under the present system of payment the miners do not benefit by loading out the smaller sizes, so that a certain proportion of these must be lost to posterity. But even this loss is so small that it cannot be considered important when compared with the average mining practice throughout the country.

It is generally true, however, as the report ultimately sums up, that since "the miners believe that they are not being paid for a portion of the product of their labors, and that this results in grievances, causes of disputes and bitter feeling between miners and operators," it is obviously desirable to effect an agreement providing it can be conclusively shown that no material injury will result to either party.

Inaccuracies of the Screen-Coal Basis

The Second Objection of the miners is that the percentage of lump coal is fixed in a more or less arbitrary manner. If, as the commission states, the amount of screenings made at the different mines varies between such extremes as 5 to 45 per cent., this certainly is one of the "strongest arguments against the present system." Not only do the operators generally benefit over the miners, but companies in different districts have a certain economic advantage over those in others. The commission is uncertain as to how much weight should be given to this objection, becauses, "under any system of collective bargaining, inequalities are bound to exist," but surely there is little excuse for a discrepancy of such proportions as this. It is not by any means an unusual practice to fix the wage scale according to the varying conditions in the different districts, and it seems that a satisfactory solution to this difficulty might be effected in this manner.

The Third Objection of the miners to the screen-coal basis of payment is that: "It is to the interest of the operators at some mines to produce a large amount of fine coal," and a number of methods of roughly handling the coal in order to obtain this end are cited. It is true that a mine may occasionally (though very rarely) find it necessary to crush a portion of its output in order to meet a temporary heavy demand for slack coal. On the other hand, this might have been readily purchased in the open market, and the differential in value between the two saved. Indeed conditions where the operator could profit by increasing his proportion of slack, so seldom occur in the commercial end of the industry that to all practical purposes this contention of the miners can be ignored.

Discrepancies in the Proportion of Screenings

The Fourth Objection of the miners charges either deliberate negligence or a studied unfairness on the part of the operators in screening the coal. It is claimed that while the companies usually comply with that part of the agreement providing for screen bars spaced 1¼ in. apart, these wear away rapidly, permitting a greater amount of coal to pass through than should. If the findings of the commission are to be given full credence, the operators have been excedingly lax in this respect and should be taken sharply to task. The commission states that it took measurements of the screens at all the mines visited and that it was *seldom* that one was found fulfilling the prescribed conditions.

Of course, there are extenuating circumstances in this connection, since it might be said that after the first day's use the screens may be sufficiently worn to make an infinitesimal discrepancy. Obviously the operators should not be required to replace such a screen, and in fact it becomes a question as to just what variations from the 1¼-in. spacing should be permissible. It is clearly a strain upon the integrity of any operator to require him to purchase new screen bars when such expenditure works to his disadvantage. It is, therefore, not to be wondered that the miners have experienced exasperating delays in prevailing upon the companies to replace worn screens.

But when the commission refers to this as "a system which knows no remedy but a strike," one feels obliged to immediately take issue with such a statement. Certainly some practical method might be evolved for solving this difficulty as, for instance, the operators could be required to make the original spacing of their bars 1⅛ in., and to replace them when the opening exceeds 1⅜ inches.

Different Coals Produce Varying Percentages of Slack

The Fifth Objection of the miners is, that owing to the varying hardness or softness of the coal in different mines, and even in different parts of the same mine, a corresponding higher or lower percentage of lump coal is obtained. Naturally a great variation of this kind would affect the earnings of a miner appreciably, although the commission is of the opinion that it is not a weighty consideration. In any event it is a difficult matter to ascertain, and could only be arrived at by careful experimentation with each mine and even different parts of the same mine. Generally speaking, it might be said that differentials in the working places at all mines is an ineradicable evil. Even under the present mine-run system all know that each mine has its "good" and its "bad" places, it being the customary practice to bestow the more favorable upon the best workers or the oldest employees.

Sixth Objection.—Coming finally to the concluding argument of the miners we find this to be founded on the contention that since the operators benefit by obtaining a large proportion of slack there is no premium placed upon skilled labor. As the report rightly points out, the validity of this claim hinges on the commercial value of the finer grades. In the opinion of the commission the large proportion of unskilled labor in the mines today is due to the introduction of mechanical devices, which has eliminated the necessity for trained labor. It might further have been mentioned, in this connection, that there is usually a great scarcity of labor and that it is becoming increasingly difficult to attract any but the lower class of workmen to the mines.

The Operator's Objection to the Mine-Run System

The crux of the argument is finally arrived at in "the operators' objections to the mine-run system," and a more or less successful effort is made to prove the uneconomic principles upon which the miners' demands have been conceived.

First Argument—As an opening gun on the subject the operators endeavor to undermine the fundamental principles upon which the miners' demands are based, by seeking to have the claim for legislative interference set aside. Accordingly they point out the fact that the miners' organization is one of the most powerful in the country and well able to adequately protect its own interests. Labor has indeed learned its lesson from syndicated capital with its interlocking directorates, alliances, etc., and has, in fact, become syndicated labor, with a latent brute power of passivity no longer to be denied.

The producers also show that legislative action in this connection materially weakens their position in future wage contentions with the miners. This position of the operators is well taken. As all know, the periodical fixing of wage scales invariably winds up in a compromise, each side giving and taking until an agreement is finally reached. This ruthless seizure of what might properly be considered one of the most valuable assets of the operators is clearly unjust. Or, as the operators point out, if this condition must be met it is only logical that a fair and equitable wage scale should be fixed upon under the same arrangements. They have also shown a commendable fairmindedness in this connection by repeatedly offering the miners the same wage scale as now in effect in Illinois and the fact that the latter have consistently evaded a definite reply to this condition, must inevitably lay them open to suspicion.

Although the commission concedes that to take away from the Ohio operators the right to grant the mine-run basis of payment will seriously handicap them at the pending wage conference, it nevertheless feels that it "cannot push this objection very far." This it does on the premises that its instructions were to find an equitable basis of payment if the present mode should be considered unfair. Apparently the commission assumes its instructions to take precedent over all considerations of an economic character—an obviously unsound principle.

An Increased Percentage of Fine Coal

Second Argument—This objection of the operators is based upon the contention that the adoption of a mine-run system of payment must inevitably bring about a large increase in the production of slack coal. The controversy focuses on this phase of the problem and the powerful arguments which the operators advanced, are ample evidence of the almost panicky fear in which they hold the adoption of any such measure.

It is, of course, clear, as the operators point out, that heavy shooting of the coal would, no doubt, be a result of the mine-run system of payment, since the miner would have nothing to lose by an excessive breaking up of the coal, whereas his labor would be materially lessened. If, as the operators claim, a great deal of trouble is already experienced in finding a profitable market for finer grades, an increase in the proportion of these must naturally be viewed with apprehension.

The commission clinches this argument by citing the testimony of a coal inspector, with broad experience, whose company uses three-quarters of a million tons of Ohio coal annually. This witness states that at the second screening of the Ohio coal, at the head of the Lakes, from 35 to 40 per cent. of slack is taken out. In answer to a direct question as to what effect a further increase of slack would have, he stated that "it would certainly work to the disadvantage of Ohio coal and would have a tendency to cause us to seek coal elsewhere," and, further, in reply to a question along similar lines: "From my standpoint as an inspector, I would certainly advise our people to dispense with the use of that coal."

This issue is more or less generally conceded by all parties to the controversy, and as the commission directly points out, the situation hinges upon just what the increase in the percentage of slack would be under a mine-run system of working. While confessing its inability to reach a decision on this matter, the commission states that all are agreed that where shooting off the solid is practised, the increase in the percentage of slack would be large. But since only between 5 and 10 per cent. of Ohio coal is mined in this manner, this does not become an important consideration. The operators rightly contend that the miner is compelled to use precaution in shooting his coal under the present system and even goes to extra labor in breaking up large lumps, while under a mine-run basis of payment he would be relieved from any restraint whatever in this connection, with the result that indiscriminate blasting of the coal would be practised which must inevitably result in a large increase in the production of slack.

Harry N. Taylor on the Slack Question

The arguments of the operators certainly lack nothing in plausibility, but the commission finds that the miners advance equally sound arguments in rebuttal. They claim that such heavy shooting as described by the operators would blow down the props and scatter the coal so that it could not be recovered. It is clearly a delicate question to decide and one that may vary greatly in different mines, kinds of coal and even with the personal equation of the miner himself. Because of the contradictory nature of the testimony, the commission freely conceded that it has been unable to arrive at a definite conclusion on this subject and that it has been obliged to rely upon testimony of witnesses residing outside of the state.

For this reason, then, it has rested its case almost entirely upon the opinion expressed before it by Harry M. (N. ?) Taylor. Mr. Taylor states that "in the solid-shooting mines there is an enormous increase in the percentage of screenings and the quality of the coal has been deteriorated by the mine-run system, but where the coal is undercut by machines this condition does not exist." In view of the great importance attached to this testimony, one is rather inclined to investigate the record of the witness in order to determine his credibility. In reviewing the history of Mr. Taylor*, it is noted that he has had an almost spectacularly successful career. He has advanced rapidly and apparently upon his own initiative from one position of responsibility to another and has been repeatedly honored by appointment to the highest office which it was in the power of his coworkers to bestow upon him. He is a man of unblemished character, vigorous personality, quick and accurate decision and occupies a preeminent position in the coal industry.

Credibility of Taylor as a Witness

But some question may arise as to the competency of Mr. Taylor's testimony on conditions in Ohio, when it is noted that his experience in that field was confined to a period of six years, between the ages of 16 and 22 years, and that he left there 27 years ago. It would seem that testimony based upon the impressions formed by a mere stripling over a quarter of a century ago should be carefully balanced before being so freely accepted as the commission apparently does.

But Mr. Taylor's testimony, in the opinion of the commission, adequately refutes the contention of the operators, regarding their fear of an excessive increase in the proportion of slack coal, and the commission believes that the chief danger will be due to the probable increase in the percentage of impurities. The commission states that in their opinion the operators should be protected to the extent that they should not be required to pay as much for the smaller grades as the larger sizes.

But when it says, "the contracts between operators and miners to have the men paid on a mine-run basis might be made conditional upon keeping the amount of fine coal within the limits established by this fixed percentage," one rather gathers the impression that the commission retains the privilege of readjusting its conclusions to suit its convenience. On pages 37 and 38 of the report, the commission points out the large discrepancies in the amount of screenings made, finding on occasions variations ranging from 5 to 45 per cent. In the minds of the commission, this was considered "the strongest argument against the present system." If such difficulties arise where exact methods have been specified for accurately determining the amount of slack made, what might the discrepancy be when less effective measures are used?

Before finally closing the discussion on this subject, the commission comments on the broader general usage into which these finer grades are coming, and their consequent enhanced value. The report states that the demand for these grades is increasing to such an extent that it is occasionally necessary to even crush the larger sizes. While it is true that appliances have been devised for burning fine coal, and there has been considerable development in this direction in the past decade, it is equally true that special and rather elaborate equipment is necessary, and that where the consumers go to this extra expense they must naturally expect to profit in their fuel bills. Indeed it would appear that the general assumption that an important market for the finer grades has already developed, would show a tendency to anticipate industrial advancement that is yet to be realized in actual practice.

Increased Impurities under the Mine-Run System

Third Objection—The third objection of the operators is that the mine-run system would result in a great increase in the amount of impurities which, in the words of the commission, "is the strongest objection to the adoption of the mine-run system." The report enters into a detailed discussion on the technique of cleaning coal underground and the difficulties attendant upon obtaining satisfactory results. The necessity for a thorough cleaning of the coal is also dwelt upon at some length. Strenuous competition with coal from other states compels the local producers to insist upon as thorough cleaning as practicable, and even where considerable expense is gone to in this direction, it is shown that consumers still continue to complain.

The report then takes up a number of methods of treating coal to remove the impurities, laying considerable emphasis upon the washing process. The fact is brought out that mines operated on the mine-run system in Illinois are generally equipped with washers as well as other devices for thoroughly sizing the coal. It is also shown that the few washers which have been installed in Ohio have not "proved very successful from a commercial standpoint," in spite of which fact, however, "the commission feels compelled to say that Ohio operators might well go farther to get clean coal." This rather ambiguous conclusion is difficult to reconcile.

On the other side of the question, however, the miners claim that they would clean their coal as well under a mine-run basis of payment as under a screen-coal arrangement. It is stated that these arguments "did not greatly impress the former commission" before whom they were also placed and "neither do they greatly impress the members of this commission." It is generally agreed by all that most of the miners make an honest endeavor and go to a reasonable amount of trouble on their own initiative to load clean coal; but since only a small percentage loading poor coal may have a serious, if not disastrous, effect upon the average product of the mine, the promulgation of any recommendation affording opportunities for increasing the impurities should be given serious consideration.

*See "Coal Age," Vol. 2, page 292.

The commission agrees that if the mine-run system opened fresh opportunities for the miner to load impurities that some at least would do so, and "would not other men employed in the mine be tempted to do the same thing?" It is conceded that such a temptation would exist, and "that even 10 per cent. of dirty loaders at a mine would make it difficult for operators to get their coal in marketable shape." But the operators must be rather startled at this point to note that the commission states: "miners say that they do not demand pay for dirt." In view of the fact that it is customary to "dock" or fine miners found guilty of loading impurities, it is gratifying to note that the men are at least prepared to temper their demands to the extent of not demanding pay for loading such impurities. Indeed the commission quite appropriately asks: "How is it possible to clean the coal before it is weighed?" Obviously this is impossible.

Testimony on Impurities Question

Testimony was taken from both operators and miners as to what effects the adoption of the mine-run system would have upon the percentage of impurities in the coal, and as was to be expected the evidence was of an exceedingly contradictory nature. The miners testified to a man that equally clean coal would be produced under the mine-run basis of payment, as is now obtained with the screen coal. The operators are equally positive that there would be a large difference and cite the effects of the mine-run system according to the report of the state geologist of Arkansas, while the commission itself agrees that the testimony of operators in other states tended to substantiate this belief.

In attempting a solution of this intricate problem the commission again relies almost exclusively upon the opinions of Harry N. Taylor, and in doing so it calls attention to the fact that since the testimony of this gentleman was adverse to the operating interests in the first instance that it is only fair that the miners should accept his conclusions in the present case. As already pointed out, there were grave reasons for taking exception to Mr. Taylor's previous testimony, although the general competency of the witness was agreed to. This exception does not apply in the present instance for the reason that Mr. Taylor has been in intimate touch with the conditions of which he speaks throughout his career.

In response to a query as to what difference exists where a miner is loading coal on a screen-coal basis as compared with a mine-run basis, Mr. Taylor said: "If a man was cleaning up his place, he cleaned it up just as clean as this floor, because he gets paid for it, if it is being weighed and paid for as mine-run." As to cleaning coal, when loading mine-run, Mr. Taylor said: "They don't clean the coal any better; in fact, they shovel in the refuse of the room; that is, they load everything out that weighs anything."

Washers a Necessary Adjunct of the Mine-Run System

Mr. Taylor states further that where the mine-run system has been adopted in northern Illinois, the proportion of impurities in the screenings amounts to between 20 and 30 per cent.—obviously an unmarketable product. This has made it necessary to construct washers in order to remove these impurities and it was shown that this added from 10 to 20c. per ton to the cost of the washed coal.

Mr. Taylor also gives some particularly valuable testimony regarding the impurities in coal, and the various subterfuges which the miners resort to in loading these out. He segregates the impurities into two general classes, the bone coal, which customarily occurs in a relatively thin stratum, "frozen" in an otherwise perfectly clean seam, and the clay minings found in the bug dust.

Speaking of the bone coal, Mr. Taylor said that he has known of repeated instances where miners would take the grease from a car wheel and cover up all evidence of this impurity in a large lump, rather than take the trouble of breaking same up and removing the impurities. As to the bug dust in the coal, Mr. Taylor calls attention to the fact that the addition of this not only forces the operator to pay for something he cannot sell, but that it materially effects the value of his product. In fact where this occurs the finer sizes cannot be sold except by giving them a thorough cleaning in the washer, a condition that was conclusively proved in Illinois, when the mine-run basis of payment became operative there. Mr. Taylor says, finally, that, "the entire method of handling coal in Illinois has been changed."

The question was put up to Mr. Taylor as to whether the miner would load out the fine clay made in working the machine in a clay seam, to which he replied: "The men will load everything that is loose in that room, where under the lump-coal system they formerly left that in because it didn't do them any good," and he went on to state further that it was impossible to apprehend those guilty of doing this.

The commission concludes this phase of the discussion with the statement "that the adoption of the mine-run system would cause a considerable increase in impurities unless some way was found to protect the operators." In view of the subsequent recommendations of the commission that the mine-run system be adopted, it would seem only reasonable that the commission should be called upon to first offer a solution of these obstacles, which even it concedes.

Fourth Objection—The concluding argument of the operators is that they would be forced to "considerable expense in rebuilding and rearranging their tipples." This objection, as is pointed out, is more or less incidental, and there is no doubt but that the operators as a whole would be willing to meet this expenditure under favorable conditions. It would seem, however, that the commission is inclined to under-rate this item, and it will doubtless be found that the statement, "All that would be necessary to do would be to cover the screens and to continue to dump the coal," will not apply to a great many mines. Should the operators be compelled to install washing plants in order to clean their finer sizes, this heavy expenditure will assuredly close up all the small operations in the state and possibly many of the larger.

"Conclusions and Recommendations"

First—The commission finds that the "present mode of payment is not an equitable one," justifying its position in this matter mainly on the grounds of the inaccuracies in screening the coal. As already pointed out, a simple remedy for this evil might easily be devised. In fact, indications point to the conclusion that the commission has recommended according to "instructions" rather than on the true merits of the controversy.

The report also comments upon the inborn prejudice of the miners against the present system of payment, which even the commission itself confesses its inability to substantiate with tangible facts. The commission asserts: "There would be carload after carload of fine coal sold, which has been produced by their labor, and for which they imagine they have received no pay whatever." One feels inclined to ask if the commission has given equal consideration to the feelings of the operator who will probably see "carload after carload of fine coal" going onto the rock dump after the new measure has been enacted?

Second—The second conclusion of the commission refers to the question of the increased amount of screenings and the greater amount of impurities in same. As already noted, the commission agrees that a very material increase in the amount of impurities in the finer grades will result, but it fails utterly to suggest a remedy for this evil.

As to the question of an increase in the percentage of screenings, the commission does not believe this will be of sufficient proportion to be of economic importance except in solid-shooting mines, and since it embodies a recommendation that all solid shooting be prohibited for the reason that this is a prolific cause of accidents, this objection of the operators seems to be adequately disposed of from their point of view. But it should be remembered that this question is still open as the commission failed to prove it as conclusively as some will expect.

Under the proposed mine-run basis the report points out that there would be an incentive for the miner to load out all the fine coal, and that this condition would, therefore, prove advantageous from a conservation standpoint. The correctness of this theory is in much question. The report has quite conclusively proved that the finer grades will carry such a high percentage of impurities under the mine-run system, that it will be impossible to market them unless they are first washed. It may be safely assumed that none of the smaller operators are financially able to undertake the installation of washer plants while it is also reasonable to believe that many of the larger operators will not feel inclined to materially increase their mining investments in Ohio. This brings one to the inevitable conclusion that instead of conserving the coal, as this measure is intended to, it is highly probable that a greater percentage will be lost and the interests of conservation even more effectively defeated than is now the case.

The commission concludes its report by conceding that it is unable to state whether the adoption of the mine-run system will result in the miners shooting their coal harder and states that "it would be the part of wisdom to provide safeguards for the mine owners."

In Conclusion

It would be well for the Ohio operators to prepare for a defeat in this measure. The trend of public opinion is too unmistakably adverse to capitalistic interests to anticipate a decision favorable to them. The best that can be expected is the customary compromise which, however small, spells victory to the miners since they have nothing to lose and everything to gain.

Whether one be for or against the political innovations of the present day, all must agree as to their radical nature. Driven on by an insistent popular clamor, the movement is evident on every hand from the insignificant city council to the national assembly at Washington. Time alone will prove the wisdom of these new departures, but it is a significant fact that serious physical conditions are already arising that throw grave doubts over the future. The attacks on corporate interests are by no means at an end and we are even now facing the problem of restoring the confidence so essential to the aggressive expansion which has characterized American enterprise in the past.

Class legislation is becoming so common that it is no longer thought necessary to attempt concealment. A notable example of this is the "rider" attached to the Sundry Civil bill enacted last year, providing that no part of the $300,000 fund set aside for prosecutions under the Sherman act should be used in cases against labor unions or farmers. A direct law exempting labor and the farmers from action under the Sherman act would have been promtly declared unconstitutional.

A Transitional Period

Our best students of economics are agreed that a transitional period is at hand. The representative form of government was an institution developed by oppressive political conditions that have long ceased to exist and it has not been found effective in dealing with the intricate problems relating to competition, insurance and credit. In fact it is the consensus of opinion among the best thinkers of the day that our entire social system is strikingly unfair.

The trouble is largely a psychological one, a protest against fundamental conditions, rather than the mere question of hours and wages. The proletariat is becoming more sensitive and critical with the wider diffusion of education while the modern changes in the character of labor are tending toward a loss of individuality and hence creating a lack of interest and a subsequent dissatisfaction. The evils of the fiduciary system, wherein the owner is replaced by a manager or agent, is also a prolific cause for disturbance.

As to remedies for these new conditions one finds a great diversity of opinion. Some think there must be a radical readjustment in the conditions of labor, with provisions for old-age pensions, etc. The socialists, of course, demand their "disciplined democracy" and make a strong plea for a closer understanding and more intimate relationship between the laborer and his employer.

But whatever the corrective, the conservative thinker will agree that it must be one of gradual evolution. Society is too complex, too strongly established to make feasible an abrupt and arbitrary revolution without precipitating an untenable economic situation. Radical innovations tending to effect abrupt changes in established lines of industrial endeavor are to be viewed with suspicion. The world's commerce is gaged upon delicately balanced fundamental conditions, the ruthless disruption of which must inevitably be accompanied by dire results.

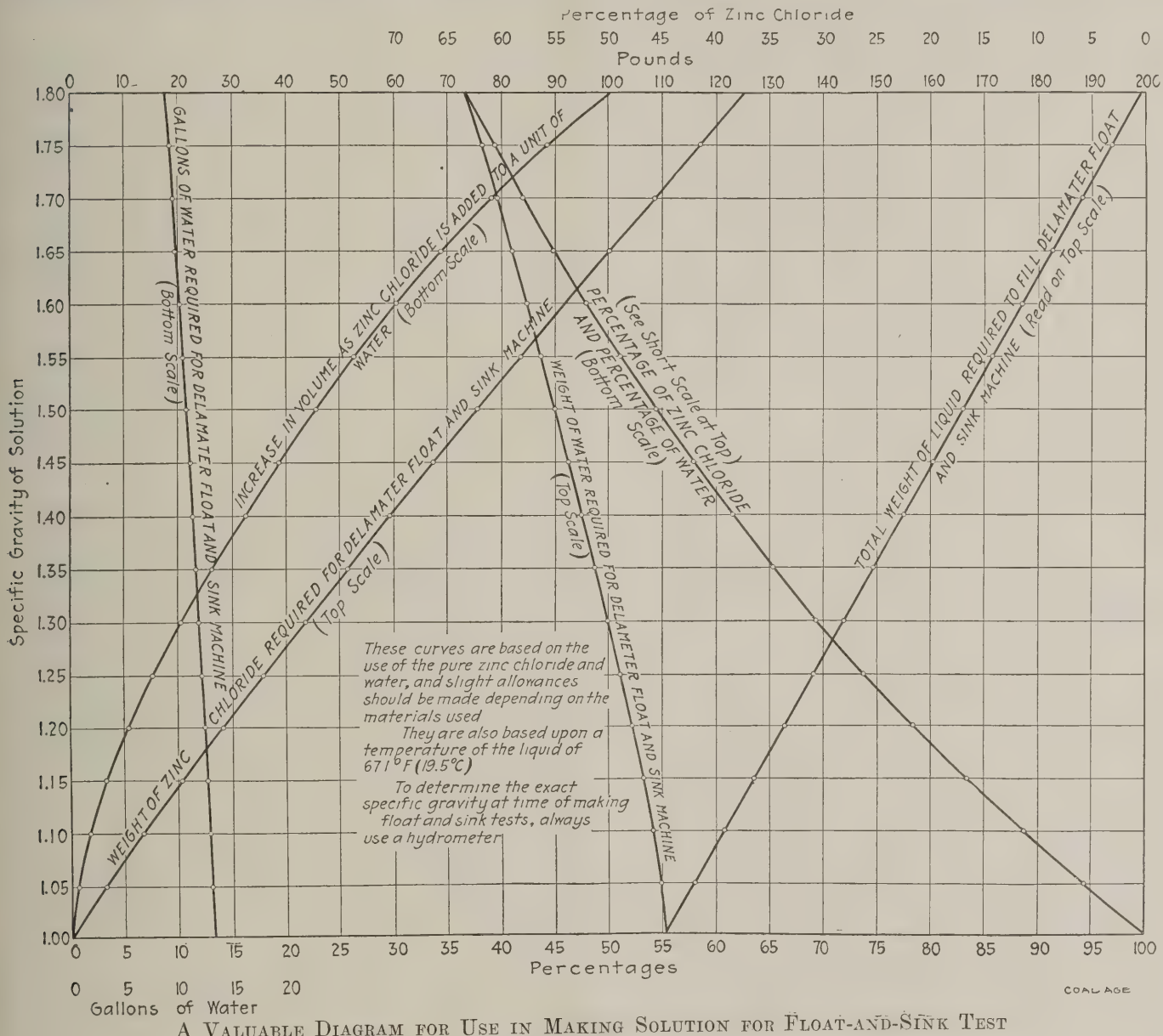
Postscript—Since the publication of the first article on this subject, later advices from Ohio have been received which indicate an even more tense situation there than was thought. While we are not at liberty to use the additional information at the moment, it is probable that Coal Age will have some interesting disclosures to make in this connection in the near future.

A Float-and-Sink Test Diagram

In the washing of coal, it is often desirable or absolutely necessary to determine whether or not the washer is doing the work expected, or whether the separation of the coal from the slate and other impurities is as complete as required. Attention was drawn to this matter in an article by G. R. Delamater entitled Washery Plant Control, COAL AGE, July 20, 1912, p. 82. In that article, Mr. Delamater described what is known as the "float-and-sink test."

The test consists in preparing a solution of zinc chloride of such density that the purer quality of the washed coal will float therein, while other portions of the coal that contain too much impurity will sink to the bottom of the tank. In making this test, the float is skimmed from the surface of the liquid, dried and examined. In the same manner, the sediment at the bottom of the tank is removed, later, dried and examined. Without going further into the details of the test, which was fully described in the article mentioned, the accompanying diagram is sufficiently self-explanatory to be of interest.

The vertical scale at the left shows the specific gravity of the solution, while the curved lines of the diagram show, respectively, the gallons of water required in the use of the Delamater machine; the weight of zinc chloride, weight of water and total weight of liquid solution, corresponding to any given specific gravity from 1 to 1.8, which is a sufficient range for any ordinary coal test. The diagram also shows the corresponding percentage of zinc chloride and percentage of water, together with the percentage of increase in volume caused by the addition of the salt to the water.



A VALUABLE DIAGRAM FOR USE IN MAKING SOLUTION FOR FLOAT-AND-SINK TEST

While the diagram is an ingenious combination of curves giving the data that are of particular interest in testing the results obtained in the washing of coal, it is recommended that use should always be made of a suitable hydrometer to check the specific gravity of the solution when making a test; as the temperature and any differences in the materials employed will vary the density of the solution to a slight degree. The diagram is particularly useful in making up solutions for a given test.

The Gases in Coal

N. H. Darton, geologist in the U. S. Geological Survey, addressed the New York Section of the American Institute of Mining Engineers on Friday, Jan. 16, in the Engineering Societies' Building, 29 West Thirty-ninth St., New York. The address entitled, "Mine Gases" covered some researches and inquiries into the problem of gas emanation conducted under the auspices of the U. S. Bureau of Mines, with which Mr. Darton was for some time connected. Mr. Darton, while perhaps not a forcible speaker, has a remarkable facility of expression and a clear comprehension of his subject.

Stratigraphy and Gas Emission

The Bureau of Mines experts made their experiments in southern Illinois and in the northern anthracite field, the object being largely to connect if possible the stratigraphic conditions—cover, flexure, depth and faulting—with the volume of gas emanation.

It seems to have been in a degree a blind lead for on the whole the methane content and the emission of the gas, according to Mr. Darton, depend rather more on the actual coal substance than upon the conditions of occurrence mentioned. Yet as will be seen there are exceptions which will be later stated. The origin of the coal, its proximate composition and porosity, none of which were investigated, Mr. Darton declares, are the determinants of its gas-giving qualities. These facts are, of course, shrouded in much mystery and there seems no way of assuring oneself as to the volume and character of gas given off by any seam or part of a seam except by actual test. However, Mr. Darton's facts as collected are of great value and no little interest.

Volume of Gas in Coal Samples

The volume of gas given out by coal subject to laboratory examinations varies over a wide range. English bituminous coal gives a volume of gas 75 to 82 per cent. of its own volume; cannel coal from the same country 40 to 70 per cent.; semibituminous 99 per cent., steam coal 500 to 811 per cent. and the Ryhope coal 1000 per cent. The coal at Nanticoke, Penn., gives a volume of gas 3.1 times its own volume (310 per cent.) that at Benton, Ill., after 75 weeks 1.82 times, that at Harrisburg, Ill., after 40 weeks 1.05 times, that at Pocahontas, Va., 0.047 times in 45 weeks and that at Connellsville 0.16 times in 60 weeks. It will be seen that anthracite contains the most gas.

The Impermeability of Coal

An attempt was made at the Bellevue mine in Belgium to show to what extent the gas was bled by workings advancing toward coal and it was shown that coal is extremely resistant to the transpiration of gas through its pores. At Beaulieusart mine in Belgium it was proved that violent outbursts breaking down large quantities of coal lowered pressures in the coal bed and might at a near-by point prevent them from reaching their former values and even deter them from exhibiting any subsequent recovery. But at a point only slightly remote, the drop following an outburst was only temporary and the pressure continued to rise after the decline in pressure was compensated. The difficulty in bleeding gas from coal was most forcibly illustrated by these experiments.

Gas Pressures in English Coal Rise to 425 Lb.

L. Wood gives the following pressures of gas obtained in English coal mines. A hole was drilled in the coal, a pipe was inserted and the space between the pipe and the sides of the hole tightly tamped, the pressure developed being measured by a gage.

GAS PRESSURES IN ENGLISH COAL MINES

Mine	Depth of Hole, in Ft.	Pressure in Lb. per Sq.In.	Time Pressure Takes to Reach Maximum in Hr.
Bolden	19	425	190
	23½	381	25
	28	176	60
	32	461	60
Eppleton	3½	54	1
	7½	104½	34
	24½	204	106
	25	221	51
	37	223	174
	47	235	294
Harton	16	197	135
	27½	231	126
	37¼	296	84

Some attempt has been made to represent by a formula the relation of pressure to depth from coal face but the exceptions are almost as important as the agreements with the formula propounded.

Gas and Depth of Cover Have Little Relation

Apparently Mr. Darton's experiments showed that gas does not collect on anticlines unless they contain a large amount of crushed material. Sandstone in an arch will break and leave crevices, and gas may be found under such conditions but when the roof is shale which will flow readily, the breaches of folding are soon healed and the roof becomes so unbroken and impervious that gas cannot collect. So drillers may look for natural gas in anticlines but mine gas is not usually to be found in any greater quantity there than in synclines.

It was thought that deep coal would perhaps be excessively gassy because the opportunity for the release of gas is not provided where beds are protected by heavy cover, but while the gas content increases with depth up to 200 ft., greater depths do not seem to make any change in gaseous emanations. It was thought that the coals south of Nanticoke which are 2500 ft. below sea level might be rendered unworkable from this cause but the facts established hardly favor this idea.

Yet the nature of the cover is believed to have some effect. A chalk cap in Europe is supposed to have caused an increase in methane content and an igneous rock formation in Natal is also credited with making coal gassy.

Relation of Gas Emitted to Area Exposed

Most of the measurements made were to discover the relation of the volume of gas emitted to the coal area exposed in districts of mines making gas. And this was found to vary not only from seam to seam but freakishly in the same seam. Of course, this variation is somewhat generally known and it seems to have some connection with the paleobotany of the formation and the porosity of the coal. In the Lance Colliery, Penn., the emitted gas was as follows:

GAS IN LANCE COLLIERIES

Bed		Cu.Ft. per 1000 Sq.Ft. of Coal Exposed
Red ash		0.73
Ross		1.00
Five foot	—East Side	1.67
	—West Side	0.23
Hillman	—East Side	2.30
	—West Side	1.00

The gas in the South Wilkes-Barre colliery ran 0.22 to 5 cu.ft. per 1000 sq.ft. The Dorrance mine near Wilkes-Barre is probably the most gaseous shaft in the world. It produces 3390 cu.ft. of gas per min. The Red Ash at that colliery emits 1 cu.ft. per 1000 sq.ft., the Five-foot 2.5 cu.ft. and the Hillman 1.8 cu.ft.

Effect of Idleness on Gas Emission

A strike occurred during the course of the investigations and an opportunity was afforded to gage the effect of the idleness of the workings on the emission of gas. The results were contradictory but they did establish the fact that working or idle the mines appear to be about equally gaseous and sometimes emit even more gas after the stoppage than before. Thus for the Lance mine the following figures were obtained:

GAS FROM LANCE MINE OPERATING AND IDLE

Current	Volume Under Working Conditions	After a 2-week Strike
Total upcast	2690	3120
Hillman	555	706
Cooper	508	678

But some other anthracite mines show a decrease and in Illinois there was usually a decline in emission as a result of the suspension but not always.

The pressures in the Illinois mines were quite variant. The mines showing the highest pressures of those measured were Ziegler mine 25 to 33 lb. per sq.in. and Dering No. 18 24½ to 24¾ lb. The United mine, strange to say, showed no pressure whatever.

The gas may be estimated in cubic feet per ton mined and the table below shows this relation.

GAS LIBERATED IN TERMS OF TONS MINED

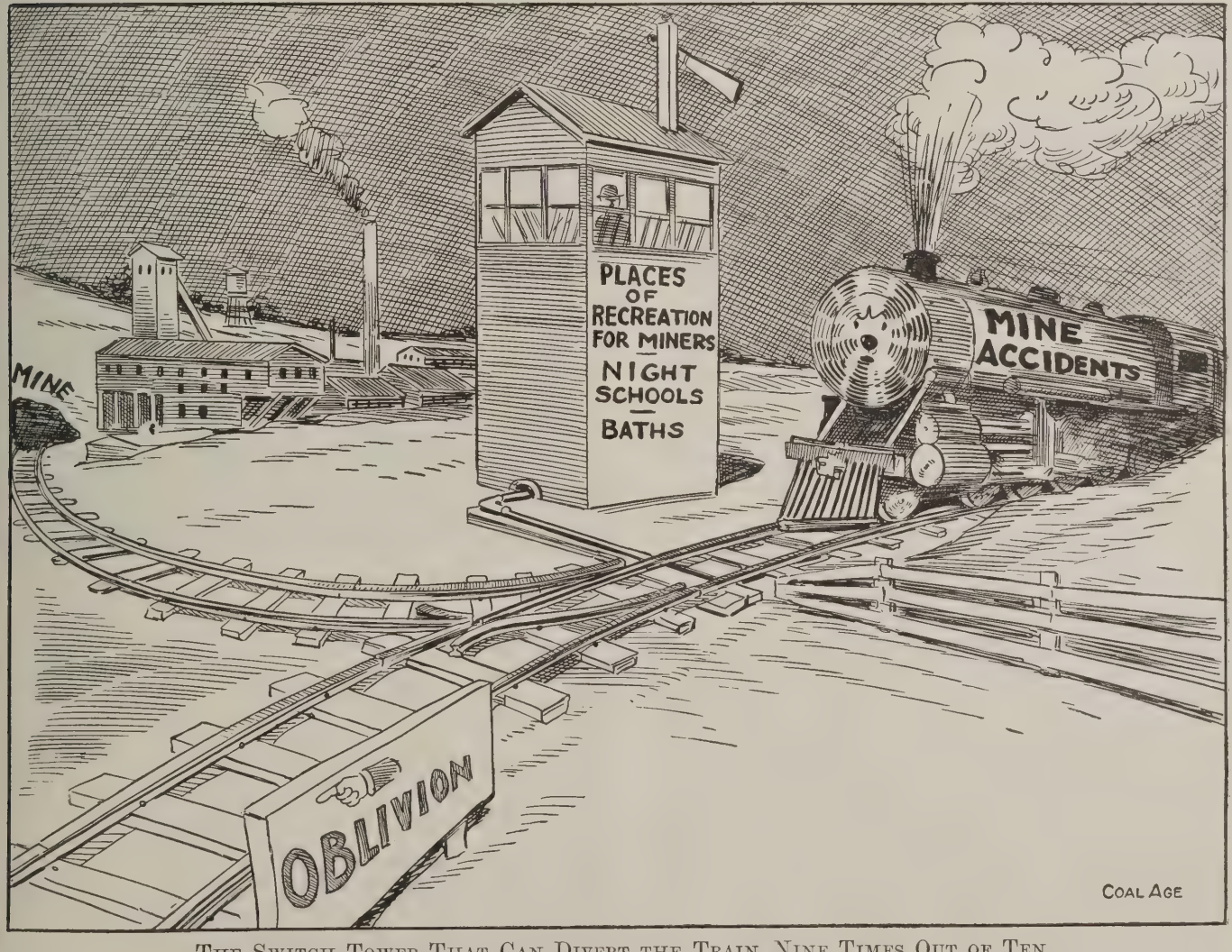
Locality	Cu.Ft. per Ton Mined	Relative Volume of Gas to Coal
Germany	16 to 1060	½ to 30
Austria	7469	300
Wilkes Barre	1500	60
Anzin, France	1377	55

[These figures are much larger than those of laboratory tests, which, perhaps, is natural.—Ed.]

Mr. Darton said that though a low barometer caused an increase in gas escaping into the airways it did not cause sufficient to endanger a well ventilated mine.

Gas and Seisms

The discussion largely turned on the effect of earthquakes in causing explosions, and of volcanic release in making them less likely. When an earthquake takes place, the gas in the measures is possibly liberated by the shaking. If care is not taken this gas is ignited and explosions result. No one asserted that the alleged coincidences in the occurrence of earthquakes and explosions proved that a connection existed between them and as someone pointed out many explosions probably resulted from dry coal dust only and such disasters could not be charged to seismic action.



The Switch Tower That Can Divert the Train Nine Times Out of Ten

Who's Who--In Coal Mining

After Director Joseph A. Holmes, the one man who has been most closely identified with the inception and development of the United States Bureau of Mines, is Herbert M. Wilson, the engineer in charge of the experiment station of that bureau in Pittsburgh, Pennsylvania.

Though educated in mining, as well as civil engineering, Mr. Wilson, whose practice has been largely along other engineering lines, owes his active association with the mining industry to his capacity in managing engineering work.

When in early 1907 Secretary James A. Garfield added a technologic branch to the United States Geological Survey, Director Charles D. Walcott, of the latter institution, selected Doctor Holmes as the chief of the new division, and as his principal assistant, H. M. Wilson was appointed because of his proven capacity in the organization and management of some of the most important of the engineering works of the Geological Survey. Mr. Wilson entered upon his duties as chief engineer when the technologic branch consisted only of divisions of fuel-testing and structural materials testing and investigations.

In the next two years the foundation was laid and the work fully organized for the testing of the fuels of the United States, much as it is now conducted in the Bureau of Mines, and testing and investigations of the structural materials for the United States as now carried on in the Bureau of Standards were also developed to practically their present status.

At this time also began the investigation of mine accidents. The result of this work was such as to attract the attention of the nation and of Congress to the need of a Bureau of Mines to carry on such work, and this was authorized by Congress in 1910. The headquarters for the field and technical work of that bureau were established in Pittsburgh, where Mr. Wilson has since been stationed as an engineer in administrative charge.

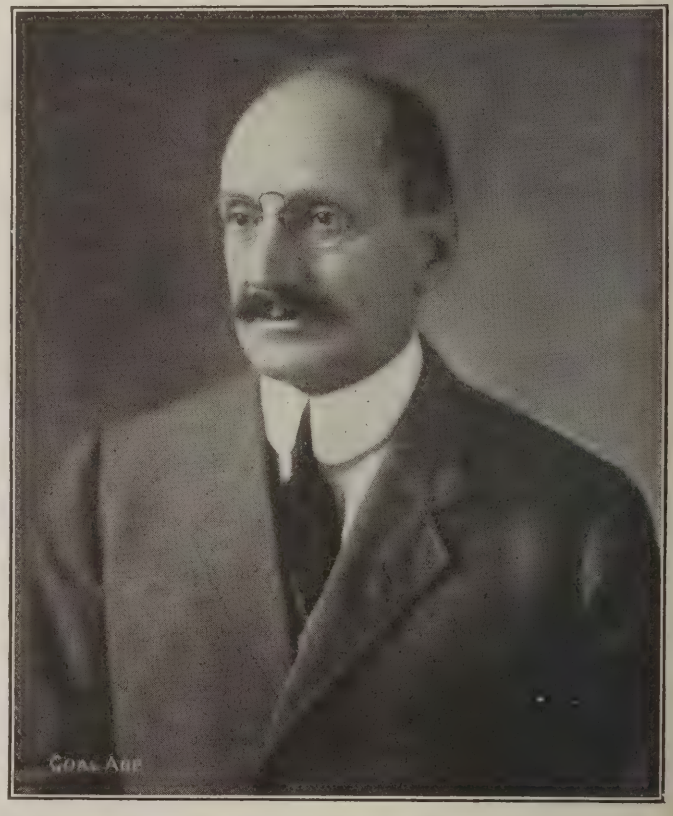
During the formative work of the Bureau of Mines, the subject of this sketch had opportunity to familiarize himself in detail with the various lines of work conducted by that bureau, serving successively as active technical head of the fuel and mechanical investigations, and of the chemical and physical investigations pending their organization into divisions under separate chiefs.

In the beginning of the mine-accident investigations Mr. Wilson was closely associated with the design and installation of the equipment for testing of explosives, and the building of the various rescue cars and stations, and with other branches of that portion of the mining work of the bureau associated with safety work. In addition to all this, he still continues the active direction of the field force concerned in safety demonstrations and training, and the management of the rescue cars and stations, and their personnel.

The humanitarian side and the educational methods of that portion of the work of the bureau necessary to the extension of safety, education and training could not have fallen into more sympathetic hands. Herbert Wilson's active interest in the welfare of the workman and his well-being was promptly recognized and he was soon drafted as one of the organizers and as a member of the executive committee of the National Council for Industrial Safety. He has been actively identified with the work of the National Fire Protection Association in its efforts to bring about safety from fires in cities and in mines, being chairman of the Committee on Mine Fires.

Helped to Create the American Mine-Safety Association

He was actively identified with the organization of and was first president, and is now secretary, of the American Mine-Safety Association. This was the first step toward



Herbert M. Wilson

bringing together the operators and mining engineers for the standardization of safety apparatus and first-aid-to-the-injured methods. With a zeal born of the inspiration of a great humanitarian task to be performed, Mr. Wilson carried the association through its first struggling year and passed the period of doubt until today it is one of the potent factors in the reduction of deaths in the mines.

Not until the first gathering of the operators and engineers from different localities throughout the country had any of the members of this new association realized the great importance of the movement. It is difficult to measure in terms of lives saved the work accomplished

by this association through the efforts of its pioneer, Mr. Wilson. We can only take the evidence adduced from the members who declare that as a result of their getting together and their discussions, many of the mines throughout the country have taken a new and much more intelligent interest in both rescue and first-aid work, and that the movement is extending in a more rational way throughout the country.

It does not require much imagination to realize that in the coming years many miners may be spared to their families through the good accomplished by this association, which started with the idea of Herbert Wilson. If as someone has said, the mine rescuers are "soldiers of humanity," Herbert M. Wilson is one of the great leaders in this humanitarian army. Mr. Wilson is a member of the American Society of Civil Engineers and of several other technical societies.

In connection with these activities and especially with the Bureau of Mines, he is already well known by those in the mining industry who are concerned in safety and rescue work in mines.

Herbert M. Wilson was born of English parents in Glasgow, Scotland, Aug. 23, 1860, and came to the United States when but a few months old. He was educated in the public schools in Plainfield, N. J., where he lived until he left college. He took a year's preparatory course in Cooper Union, New York, before entering the School of Mines, Columbia University, from which he graduated in 1881.

His initial professional work was on the designing and construction of the first United States Electric Lighting plant, built in New York City; subsequently he spent a few years on railway construction in Mexico. The next 15 years were spent in topographic surveying and in irrigation engineering in nearly every state in the Union. The larger portion of this period was passed in the far West.

This early experience in the organization and management of engineering work and surveying, thrown on his own resources in remote portions of this country and Mexico, were splendid training for his subsequent work in the management and organization of similar enterprises in the technologic branch of the Geological Survey, and in the Bureau of Mines.

A Safety Banquet in West Virginia

SYNOPSIS—The United States Coal & Coke Co. gives its fourth annual Safety-Boosting Banquet to its employees. This banquet is one of the many devices this firm employs to foster the safety morale of its working force.

It has now been several years since the various companies constituent and subsidiary to the United States Steel Corporation began an aggressive campaign for the reduction of accidents to employees. The motto, "Safety First," then launched, has since spread to the four corners of the continent and become the slogan of innumerable commercial, industrial and transportational enterprises.

The fourth annual Safety-Boosting Banquet of the United States Coal & Coke Co., a subsidiary of the steel corporation, was held at Gary, McDowell County, W. Va., Saturday evening, Jan. 10, 1914, with about 175 persons present, of whom approximately 150 were foremen and subforemen of the company, while the balance was composed of state officers, professional men and ex-officials of the company.

A simple but extremely palatable menu was first served, after which the real business of the evening began. Papers were read upon the subjects of Efficiency and the Elimination of Accidents in (a) The Cutting of Coal by Mining Machinery, by J. M. Tulley; (b) The Loading of Coal by the Miner, by W. W. Harding; (c) The Setting of Mine Timbers, by W. P. Kearns; (d) The Transportation of Coal by Motors, by A. N. Harris; (e) The Handling of Supplies, by C. G. Seaton. Papers were also read upon the following subjects: The Prevention of Gas or Dust Explosions, by J. R. Booth; The Feeding of Live Stock, by H. T. Graham; The Care of Live Stock, by G. A. Wilson; Efficient Ventilation of Mines with a View to Eliminating Accidents, by A. G. Hahn; The Inspection of Mines with a View to Eliminating Accidents, by J. L. Mullen; Efficiency in Mining Engineering with a View to Eliminating Accidents, by H. W. Saunders; Efficiency in Mechanical Engineering with a View to Eliminating Accidents, by R. H. Davis; Efficiency in Electrical Engineering with a View to Eliminating Accidents, by Eli Clemens; Statistics on Results Accomplished in Accident Prevention, by H. N. Eavenson.

The hall in which the banquet was held was simply yet tastefully decorated with boughs of evergreen and rhododendron, also the national colors, while safety mottoes were conspicuous. In the front of the hall, facing the audience, was the representation of a mine heading, illustrating the system of timbering adopted by the company. As a special feature of the banquet the foremen's Honor Table was provided, at which were seated 17 foremen and assistants who had a record clear of fatal or even serious accidents for at least six months. Some had a clear record for as long as 26 months.

In order to give these officials an incentive to be constantly on the alert for dangers which may cause accidents, the company gives a premium to each of its foremen and assistants, each month, for a clear accident record. Of this premium system, as well as other means employed by this company to eliminate accidents, COAL AGE will have more to say in an early issue.

Among the guests present were Messrs. Earle A. Henry, Chief of the State Department of Mines, Lawson Blenkinsopp, district mine inspector, also attorneys at law, coal operators, representatives of the public and technical press, etc.

Unfortunately, Gov. H. D. Hatfield was unable to attend the festivities, being detained by other important business. He, however, telegraphed his regrets, and forwarded a letter reading in part as follows:

To the officials of the United States Coal & Coke Co., in banquet assembled:

I feel that I would be deeply lacking in the sense of appreciation of services well done did I not take advantage of this opportunity to extend to you my heartiest felicitations upon the unprecedented strides made by the United States Coal & Coke Co.'s officials for the protection of human life.

I trust that your activities in the precautions taken against the hazards of the mining industry will continue to the extent of maintaining you in the position you now occupy in the fore rank of those great companies which hold as their guiding motto "Safety First," and which have demonstrated the practicability of that ideal.

The day has passed when it can longer be contended that precaution in the mining industry is impractical—that it is too expensive to look after the welfare of humanity—and to General O'Toole and the other officials of the United States Coal & Coke Co., recognized pioneers in the movement for the prevention of accidents in coal mines, the people of our state owe an everlasting debt.

A persual of reports shows me that you have an average tonnage of 476,454 for each fatality in the mines at Gary, your record standing out in sharp contrast to the general average in McDowell County, which shows the fatality tonnage to be 141,582. I know that some real work has been done to make such a remarkable record as this, and I trust that you will continue to strive to reduce the mining danger to an actual minimum.

I am endeavoring in connection with my daily duties to keep in touch with the conditions of every mine in the state, through reports submitted by the various inspectors of the state mining department. One of the greatest achievements that I would like to bring about during my administration as governor is a material reduction in the death toll as well as the lessening of the number of accidents in the mines of West Virginia.

I recognize the magnitude of your coöperation to this end and the movement for the protection of life as promulgated at Gary is being reflected over all mining sections of the state. It has served to put the protection of human life in the mine within the vale of possibility.

On the whole, our state does not at this time show up creditably with other coal-producing regions when we analyze the fatalities that occur each year. Many causes are given for the terrific death toll. One of the most salient of these is the fact that West Virginia is a new mining state and the development of its coal resources is being carried on extensively at present and in the opening of new mines, new dangers are always lurking. I believe that through a system of education and instruction, whereby the miners may learn to protect themselves, that we will be able to lessen accidents to a marked degree. This you have succeeded in doing at Gary.

Miners and operators alike in West Virginia, I believe, are awakening to the fearful death toll in the mines. This awakening is necessary to reform and this I believe we will soon experience. Such affairs as this in which the means of accident prevention are discussed is one of the best ways to spread the propaganda of safety to every mining community of the state.

I want to assure you of my hearty interest in the continued success of the model mining operations at Gary, and nothing will be a greater pleasure to me than to give my coöperation to your plans for accident prevention.

I reiterate my regret at being unable to be with you on the occasion of your annual banquet. I bespeak for the officials of the company the greatest degree of success, and for that success the thanks of a grateful people.

(Signed) H. D. Hatfield.

Charleston, W. V., Jan. 9, 1914.

While the progress in accident prevention for the year 1913 was not as great as was hoped in its beginning, yet a steady progress since the campaign for safety was begun was revealed by the statistics presented. The figures for the year show an increase in tons of coal produced per fatal accident underground over those of 1909 of 250 per cent.; over those of 1910, 130 per cent.; over 1911, 68 per cent., and over 1912, 12 per cent. The number of tons of coal produced per fatal accident, both under and above ground, during the year 1913 showed an increase of over 25 per cent. over those of the preceding year.

During the first months of 1913 no fatal accident occurred, and 1,034,000 tons of coal were shipped. No. 6 works of this company has run 18 months without a fatality. During that time only one serious accident has occurred. This shows that 750,000 tons of coal have been produced and shipped with only one serious accident—a broken leg.

We have long been accustomed to hearing the mines of England and Belgium spoken of as being the safest in the world. The actual records show that the workings of the United States Coal & Coke Co. have a lower death rate than the mines of either of these foreign countries. It will doubtless be a surprise to many people to learn that the death rate in these mines is, per thousand men employed, approximately one-fourth that prevalent among the Gloucester fishermen, and closely approximates the average among the farmers of the country.

Great as have been the strides made in accident prevention in these mines, the end is not yet. No one knows or can guess the actual minimum in the death rate among coal miners from accidental causes. It is the fondest desire and the firm determination of the management of this company to render its mines not only the safest in the United States, or the world, but the safest which human intelligence and persistence can secure.

COLLIERY NOTES

Rivets are not a trustworthy method for securing the gauzes of safety lamps.

There are now five central rescue stations in working order in South Wales and two others in course of formation.

It is satisfactory to find that, notwithstanding the great strides which electricity has made as the hand-servant of the mining engineer, very few accidents are traceable to its use.

In legislating for industrial safety, it is a sound principle to forbid dangerous practices when such a restriction does not thereby entail undue hardship to the community, or, in other words, when the remedy would not prove worse than the disease.

The total coal reserves of the world, compiled from all the reports received, amount to 7,397,533,000,000 tons, of which amount nearly 4,000,000,000,000 are bituminous coals, nearly 3,000,000,000,000 are brown coals of various grades, and about 500,000,000,000 are anthracite.

In selecting a coal-cutting machine, the question of the weight of the machine is one deserving careful consideration. Where the holing is easy and a deep undercut is not required, a light machine will do the work without undue vibration, and it has the advantage of being easily and expeditiously handled, but where deep, heavy work is required, 70 cwt. is not too great a weight for the machine.

The Transition from Inflammation to Explosion of Coal Dust

SYNOPSIS—An explosion is not merely a culmination of progressive combustion but a suddenly developed phenomenon, when the coal as a whole enters into chemical reaction and would so act, even if it did not contain any hydrocarbons. This develops such a center of force that a wave of pressure backs on the zone of inflammation, producing those effects previously ascribed by most writers to suction.

The Altofts gallery, in which the experiments about to be described were conducted, and the instruments employed for determining the necessary data, have been fully described in the "Record" of the Mining Association. It will, therefore, only be necessary here to give a brief account of the manner in which the experiments were made.

The explosion-tube or gallery, as previously stated, was 600 ft. in length and 7½ ft. in diameter. One end was open, and at the other a second tube, 6 ft. in diameter and 158 ft. long, formed a right-angle bend. Then followed short lengths of tube of 6 ft. in diameter, forming a zigzag connection to a chamber in which a ventilating fan was installed. At each angle formed by the zigzag relief valves were hung, and two swing doors were attached on either side of the fan chamber. The general arrangement is shown diagrammatically at the foot of Fig. 1.

The coal dust, obtained by pulverizing nut coal, was spread evenly by hand in the quantity required on the floor of the explosion tube and along wooden shelves, 5 in. wide, five of which, fixed longitudinally above each other on each side of the gallery, extended the whole distance required for the experiment.

Ignition was effected by the firing of a charge of 24 oz. of blasting powder, with 8 in. of clay stemming, from a cannon, pointing toward the open end of the gallery and inclined upward at an angle of about 35 deg.

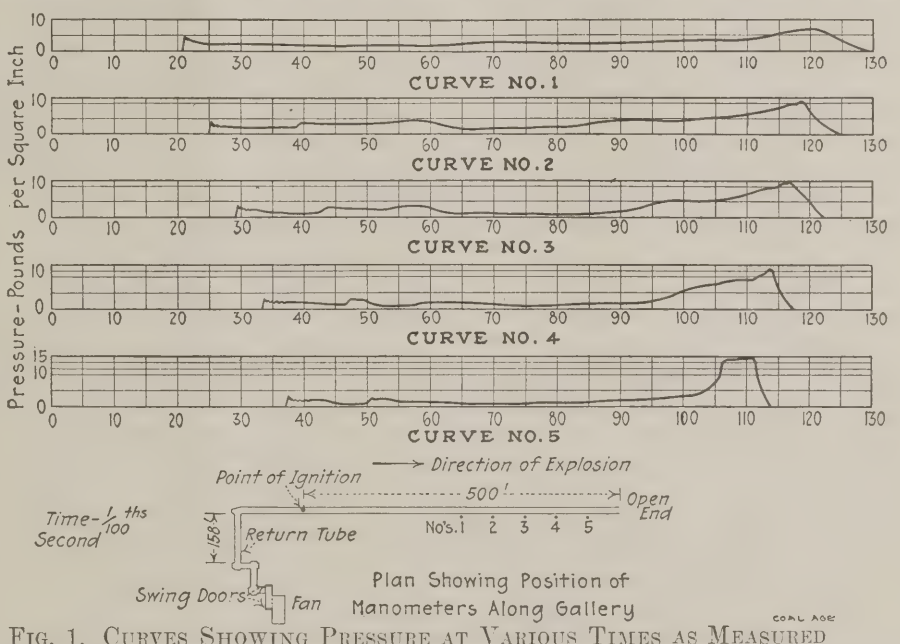


FIG. 1. CURVES SHOWING PRESSURE AT VARIOUS TIMES AS MEASURED BY FIVE MANOMETERS. THE PRESSURES PRIOR TO THE 81ST HUNDREDTH OF A SECOND SHOW THE EFFECT OF CONCUSSION ONLY

THE DUST-RAISING CANNON

A rapid air current was drawn through the gallery at the time of the experiment for the purpose of raising the coal dust into suspension. This suspension of the dust cloud was also partly effected by the concussion produced on firing a small cannon charged with 4 oz. of blasting powder and stemmed with 3 in. of dry clay. This "cloud-raiser" was placed 100 ft. toward the open end of the gallery from the point of ignition; it pointed against the side of the gallery and no coal dust was strewn near it.

DRAFT CONDITIONS

The experiments were carried out in the following manner. The coal dust having been strewn in the gallery and the cannons charged, the ventilating fan was started, both the doors in the fan chamber being wide open so that no air current was drawn through the explosion tube. As soon as the speed of the fan had attained that required for the experiment, these doors were closed by a cord controlled from the firing station, and the air current was thus drawn through the open end of the gallery. The doors when closed completed an electric circuit, which rang a bell in the firing station, and started a seconds clock. Six seconds after the closing of the fan doors the "cloud-raiser" was fired, and the "igniter" was fired two seconds later, the charges in both being ignited electrically.

The explosions as thus produced can be regarded as taking place in a tube open at one end and closed at the other, for the right-angle bends at the fan end of the gallery greatly retarded the release of pressure and had the general effect of a closed end.

THE AIR CURRENT WEAK AND ITS DIRECTION UNCERTAIN

The fact that the explosive mixture of dust and air had an initial direction of movement contrary to that of the explosion under investigation can be disregarded, for the disturbance accompanying ignition by the cannon reversed the direction of the air-current, which was moving at a speed of about 17 ft. per sec. only. The effect of the air current was, chiefly, to create a more or less homogeneous mixture of dust and air at the moment of ignition.

Note—Second abstract from the fourth report by the British Explosions in Mines Committee on coal-dust explosions. The first abstract was printed in our issue of Jan. 3, Vol. 5, pp. 19-21, under the title, "Concussion as a Cause of Explosions."

Explosion Doubtless Traveled Both Ways

In describing the experiments made under these conditions, attention will mainly be directed toward what took place between the point of ignition, the position of which along the gallery varied, and the *open* end of the gallery. The fact that inflammation could also travel toward the fan for a certain distance, dependent upon the position of the igniter, must not, however, be overlooked, for there is no doubt but that the pressure thereby produced would affect, to a certain extent, the records obtained of the explosion developed in the opposite direction.

In the experiment now to be described (No. 119, June 9, 1910), which is typical of many similar ones, the point of ignition was 500 ft. from the open end of the gallery, and, therefore, 100 ft. from the junction with the return to the fan. The coal dust was spread on the shelves and floor at the rate of 1 lb. per linear foot, equivalent to 0.4 oz. per cubic foot of air space of the gallery.

This quantity of coal dust, 0.4 oz., is about four times as much as is required for the complete combustion, to form carbon dioxide and steam, of the oxygen in one cubic foot of air. It was the quantity used throughout the experiments recorded in this report.

Pressures Measured Continuously by Five Manometers

At a distance of 250 ft. from the point of ignition a manometer, or time-pressure recorder (No. 1), was fixed. Four other manometers were also set along the gallery at distances of 300, 350, 400 and 450 ft., respectively, from the point of ignition, No. 5 thus being 50 ft. from the open end of the gallery, as shown in the diagram at the foot of Fig. 1.

Each manometer was provided with a drum revolving at a uniformly rapid speed, so that each gave a continuous record, during the whole time the experiment lasted, of the pressure existing at the particular point along the gallery at which it was placed. Each time-pressure chart was thus a curve in which the abscissae represented times and the ordinates pressures. The principle was, in fact, similar to that of an ordinary barograph.

The series of curves in Fig. 1 are reproductions of the charts thus obtained, the charts being synchronized from the records of pairs of electro-magnetic styli marking on each, one of the pair on each instrument recording the time of ignition and the other showing the speed of revolution of the drum of the manometer.*

The unit of time used in reproducing these curves is $^1/_{100}$ of a second, $t = o$, being the time of ignition, that is, the time when flame issued from the mouth of the igniting cannon. The unit of pressure used is 1 lb. per square inch.

The Concussion Wave

The first indication of pressure shown on each curve is that due to the concussion wave caused by the firing of the 24 oz. of blasting powder used to effect ignition. This concussion wave travels, as might be expected, with a velocity approximately that of sound in air at ordinary temperature and pressure. The pressure due to the concussion wave, therefore, appears on each manometer record in succession after an interval of time, dependent upon the distance of each manometer from the point of ignition.

For example, in curve No. 1 (Fig. 1) the period that elapsed between the time of ignition ($t = o$) and the first indication of pressure was 20.8 hundredths of a second. The distance from the point of ignition of the manometer that traced this curve (manometer No. 1) was, as stated above, 250 ft. The speed of travel of the concussion wave from the igniting cannon was, therefore, about 1200 ft. per second.

Similarly, the manometer fixed at a point 300 ft. from the point of ignition (manometer No. 2) began to indicate pressure 25 hundredths of a second after the cannon was fired; and so on, each manometer in succession beginning to function 4.2 hundredths of a second after the preceding one, their distance apart being 50 ft.

The Pressures Directly Due to the Firing of the Cannon

Separate experiments were made with the gallery free from coal dust to determine the magnitude and duration of this "igniter pressure" alone. They showed that when the igniter was placed 500 ft. from the open end (the same position that it occupied in the coal-dust experiment, of which the curves in Fig. 1 are records); curve No. 1 recorded a maximum pressure of 4 lb. per square inch, which appeared 21 hundredths of a second after the cannon was fired and fell gradually to zero after 81 hundredths of a second.

The pressure due to the igniter alone, as registered at manometer No. 1, lasted, therefore, 60 hundredths of a second. Curve No. 5 recorded a maximum pressure of 3 lb. per sq.in., which appeared 37 hundredths of a second after the cannon was fired and fell to zero after 60.5 hundredths of a second. The intermediate curves, Nos. 2, 3 and 4, gave intermediate values.

When considering the curves obtained during the coal-dust experiment No. 119, therefore, it is possible to divide each into two portions. The portions representing conditions prior to the 81st hundredth of a second show the effects of the concussion wave from the igniting cannon; it will be seen that they are all much of the same type. The portions exhibiting the pressures after that time represent the effects of the inflammation of the coal dust.

It is interesting to note that the curves Nos. 2, 3, 4 and 5 record the effect of the concussion wave (from the cannon) which traveled to the "closed end" of the gallery and was reflected back toward the open end. This is shown at time interval 38.5 in curve No. 2, and at time intervals 42.5, 46.5 and 50 in curves Nos. 3, 4 and 5, respectively. This "reflected wave" was traveling at a speed rather faster than that of sound in air at ordinary temperature and pressure.

In curve No. 1 the "igniter pressure" had just died away at the end of 81 hundredths of a second, and from that time onward the pressure developed was due solely to the combustion of the coal dust. The maximum pressure attained is not very great, nor is there any sign of a sudden increase. The same can be said of curves Nos. 2, 3 and 4.

Where the Explosion Occurs

Curve No. 5, however, which recorded the pressure existing at a point 450 ft. from the point of ignition, presents a different case. A rapid increase of pressure oc-

*Full details of the construction of the manometers and of the manner of obtaining the records are given in the "Record" of the Mining Association (Chapter V).

curs 106 hundredths of a second after the time of ignition, the pressure rising from 8 to 14 lb. per square inch in 6 thousandths of a second. The pressure then gradually increases to a maximum of 16 lb. per square inch, which is maintained during a short time and then falls fairly rapidly to zero as release is obtained at the open end of the gallery.

The Pressure Travels Inward

This sudden rise of pressure about 50 ft. from the open end of the gallery sends an impulse traveling back toward the closed end, where the pressure was previously comparatively low. For it will be seen that each of the curves Nos. 4, 3, 2 and 1 shows signs of a similar rise of pressure toward its end, the order in point of time in which these "peaks" make their appearance showing that the impulse is traveling along the gallery from the open end toward the closed end; that is to say, in an opposite direction to that of the inflammation.

The progress of the inflammation, as indicated by the pressure developed, is perhaps more clearly shown by the curves in Fig. 2. These curves have been prepared from those in Fig. 1, each separate graph representing the state of pressure along the gallery, over the distance lying between the first and the last manometer, at successive hundredths of a second beginning 95 hundredths of a second after ignition. Pressures are represented by the height of each part of each curve above its base line.

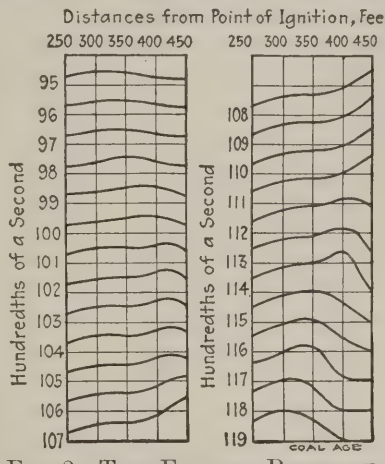


Fig. 2. The Flux of Pressure

A series of 25 diagrams showing separate pressure readings at 25 periods of time exhibiting, as in a moving picture film, the variations of pressure. The pressure summit at 0.95 sec. is at the manometer at 350 ft.; at 1.06 sec. it has moved to 450, at 1.19 sec. it has traveled back to 300. Thus the balance of pressure is first outward, then inward.

A Diagram Showing Relative Pressure at 25 Successive Instants

By comparing these successive diagrams one with another, the progress of the inflammation along the gallery can be studied; for each successive diagram, as the eye follows them in order, represents a pressure condition one-hundredth of a second later than the previous one.

On examining the successive diagrams, the manner in which the region of maximum pressure changes in position, traveling toward the open end of the gallery, can readily be seen. A sudden increase in the steepness of the curves appears between time intervals 106 and 107 (i.e., between 106 and 107 hundredths of a second after ignition); while the release of pressure between time intervals 110 and 111, followed by the movement of an impulse toward the closed end, is well marked.

Some idea can also be obtained from the curves in Fig. 1 of the speed of travel of the inflammation along the gallery. At time interval 95, the maximum pressure was at a point 350 ft. from the point of ignition; by the time the maximum is indicated 50 ft. further on, 6 hundredths of a second have elapsed, so that the speed of travel over that 50 ft. was about 830 ft. per second. Similarly, the average speed over the next 50 ft. was about 1000 ft. per second.

The Increase in Pressure Is Far Greater Than Proportional to Distance Traveled

Neither the speed of travel nor the maximum pressure attained can be called great. There is, however, a progressive increase in both as the inflammation proceeds toward the open end of the gallery. A comparison of the maxima recorded at different points along the gallery, as determined from Fig. 1, shows very clearly the cumulative increase of pressure with increased travel:

RELATION OF PRESSURE TO TRAVEL OF EXPLOSION

Distance from point of ignition, ft.	Maximum pressure, lb. per sq.in.	Increase per 25 ft. travel, lb. per sq.in
350	4.5	...
375	5.5	1.0
400	6.5	1.0
425	10.0	3.5
450	16.0	6.0

In the foregoing experiment what has been defined as "explosive combustion" had just begun after the inflammation had traveled about 425 ft. This is deduced from the fact that a sudden access of pressure at that point is indicated on the curves, previous experiments having shown that a sudden access of that nature only occurs when the combustion of the dust takes place as a whole.

The Gas Propagation Theory of Coal-Dust Explosions Not True

The idea seems to have been prevalent that the percentage of volatile constituents that a particular coal dust contains is a direct measure of the explosive properties of that dust.

The explanation usually given for this assumption is that the gases derived by distillation of the dust by the source of ignition are the real agents in propagating combustion. According to this view, distillation of inflammable gas must first take place, and it is that gas mixing with air that forms the "explosive mixture." Hence it is concluded that any dust that yields only a small proportion of inflammable gas on heating, or from which the gases are driven off with difficulty, should give only moderate explosive effects; and a dust that yields no gas at all should, according to this view, be incapable of propagating explosion.

Neither of these two assumptions is upheld by experiment. A coal dust containing 16 per cent. of "volatile matter" caused an explosion as violent as one containing 35 per cent., while wood charcoal produced an explosion as great or even greater.

Carbon "Gas"

In our view there is nothing to conflict with the belief that coal dust, when suspended in a sufficiently finely divided state in air, acts somewhat like a "coarse" gas, the aggregate of molecules contained in the one particle of dust corresponding to the single molecule that takes part in an explosion of a combustible gas and air, the heat energy necessary for propagation of explosion being derived from combustion of each dust particle as a whole without any appreciable preliminary distillation of gas therefrom.

In other words, heated oxygen molecules coming into collision with the combustible dust particles, form highly heated carbon dioxide and steam molecules, which, in

turn, transfer their energy, directly or indirectly, to other oxygen molecules and unburnt dust particles and so propagate the flame. According to this view, any finely divided dust which can be burned is capable of propagating explosion.

Distillation of Gas Is Slow

Many considerations favor this opinion. The rapidity with which explosive combustion (as distinct from inflammation) is propagated in coal-dust and air mixtures is hardly compatible with the notion that distillation of gas must necessarily first take place, and that it is the heat energy derived from the combustion of that gas which is chiefly responsible for the explosive effects. Such a distillation requires an appreciable time and absorbs energy.

If, in the propagation of flame, the time required to raise the dust and air mixture to the ignition temperature allows appreciable distillation to take place and the inflammable gases thus evolved are burnt in preference to the entire dust particles, then analysis of the products of explosive combustion should afford proof of it.

Preferential burning of the "volatile constituents" of the coal dust would result in the production of a smaller proportion of permanent gases (carbon dioxide and carbon monoxide) than would be given by combustion of the dust particles as a whole; for the "volatile constituents" contain a larger proportion of hydrogen than does the whole coal substance.

An Explosion of Dust Produces Proportionally Less Steam Than Would an Explosion of Its Gas

No evidence has been obtained of such a preferential burning of the "volatile constituents" in those experiments where *explosive combustion* has been attained. On the contrary, the gases withdrawn (just after the flame has passed*) have always shown a ratio

$$R = \frac{oxygen\ present\ as\ oxides\ of\ carbon}{oxygen\ present\ as\ steam}$$

in agreement with the ratio required for combustion of the dust particles as a whole, as determined from the chemical composition of the dust.

Samples withdrawn during the preliminary period of comparatively slow *inflammation* do indeed show that in this stage, there is a preliminary distillation of gas from the dust, and, as explained in a previous report; it is the ease with which such distillation is effected that mainly determines whether a particular dust is capable of propagating *inflammation* more or less readily.

The Sudden Rise in Pressure

The transition from comparatively slow inflammation, during which distillation of gas takes place as a preliminary to burning, to explosive combustion, during which each dust particle that aids in propagating the flame is burnt as a whole, appears to be well defined. It is characterized by a sudden rise of pressure, the change from low to high pressure taking place as the flame travels only a few feet of distance (see curve No. 5, Fig. 1). When no such "peak of pressure" occurs, as, for example, when the distance of travel has been insufficient, analysis of the products of combustion shows that preferential burning of the volatile constituents of the dust has taken place; after this rise of pressure has occurred no such preferential burning can be detected.

It is for this reason that we consider it necessary to draw a line of demarcation between "inflammation" and "explosive combustion" of coal dust and air mixtures, the difference, though mainly, of course, one of degree of rapidity of combustion, being also one of character.

*Subsequent to the passage of the explosion along the gallery, the heated products of combustion effect the distillation of gas from excess coal dust—coal dust which has not assisted in the propagation of flame—and if an auxiliary supply of air enters the gallery and mingles with this gas, a secondary explosion (of gas and air) may take place.

Annual Meeting of A. I. M. E.

The annual meeting of the American Institute of Mining Engineers will be held Feb. 17-20, 1914, at its headquarters, 29 West 39th St., New York City. All indications point to a very active and important meeting. Several interesting coal papers will be presented. Alexander Bowie will read a paper entitled, "The Burning of Coal Beds in Place." F. Donaldson is to present a paper on "The Injection of Cement Grout into Water-Bearing Fissures." George Otis Smith has a paper on "Disposition of Natural Resources." Another interesting paper will be presented by William Kent, and will deal with "Classification and Heating Value of American Coals."

Canadian Mining Institute

The 16th annual meeting of the Canadian Mining Institute will be held in Montreal, Can., Mar. 4, 5 and 6. The headquarters will be the Windsor Hotel. Among the many papers already promised are the following, which should be of interest to coal men: "Factors Influencing the Cost of Power for Mining Purposes," by J. M. Forbes, of Montreal; "Mining in British Columbia," by Howard W. Dubois, of Philadelphia, Penn.; "Coal Resources of the World," by D. B. Dowling, of Ottawa, Can.; and "Safety in Coal Mines" (illustrated by moving pictures), by a representative of the H. C. Frick Coke Co.

BY THE WAY

It is easier to be critical than to be correct.

In the spring the miners' fancy lightly turns to thoughts of strikes.

Applause is the spur of noble minds, the end and aim of weak ones.

Where doubt is, there stands truth, for doubt is the shadow of truth.

The man who has two strings to one bow may shoot strong but not straight.

Every man loves justice at another man's expense; few care for it at their own.

A "hard-boiled" (derby) hat is one of the best protections there are against the mine trolley wires.

Let a defect, which is possibly small, appear undisguised. A fault concealed is presumed to be great.

They say that money talks. Judging from the commotion out in Ohio coal fields it must be getting ready to say goodby to someone.

Editorials

What Your Coal Is Worth

It will perhaps create some opposition to state that the owner of the mine usually realizes better than his superintendent and his foreman what his coal is worth. It is this knowledge which makes the operator so keen about coal waste and so excited about the suggestion of a squeeze.

To most men the value of the coal in the hill is the sum of the prices paid for the coal area, divided by the number of tons thus purchased. To the business man the value is far greater. Before a coal property is bought at perhaps as little as $25 to $50 per acre, the company making the purchase often spends on surveys, drilling and legal expenses five and perhaps more additional dollars for that same unit of area.

These initial expenses should be added to the cost of the coal, and that figure must be increased a certain amount for the value of the improvements, if the coal seam is likely to be exhausted before the mine is worked out. Of very few mines can it be said that their life is longer than the presumed life of the bulk of the equipment.

The coal value must be loaded with this charge. It is true that it is customary to add amortization charges, depreciation and obsolescence to the annual deductions from revenue, and it may be well said that it cannot be also charged against the coal *as coal* in such an accounting. But in investigations to ascertain the question of the appropriateness of certain expenses to save coal, such a method of appreciating coal value is to be approved.

Another charge which is appropriate is one for headings driven and for drainage. The work is already done and has been paid for; to make it of no avail is to waste the money thus expended. Moreover, the wasting of coal involves a hastening of a number of expenditures which might otherwise be delayed. Rail, pipe and electric wire will probably have to be bought in quantity very little different, whether coal is wasted or not, but the time of purchase and the depreciation consequent thereon will be increased if coal is left in the pillars.

In fact, many superintendents who declare that methods such as have been practiced in the Connellsville, Pocahontas, Georges Creek and Fairmont regions would have ruined them, if put in operation in their fields, have already thrown away more heading development than would have sufficed, if economized, to put such methods into effective operation. We have noted old mines where more good heading has been thrown away than would have started two mines in the Pocahontas region along the lines required by the Pocahontas Coal & Coke Co. of all their lessees.

We leave it to our readers to value their own coal correctly. The items are so various that an estimate for mines generally would be misleading, but it must always be remembered that the values bear no close relation to the price paid to the farmer for his land. Railroad cost may be the largest element at some mines, the plant may be the big item at another, and in a third with few improvements and low coal the heading and drifting cost may be the leading item.

The value of coal in the hill is a subject well worthy of consideration, for on its determination depends the successful operation of the mine. Many a man has become bankrupt through his economies.

Nystagmus

It is a remarkable fact, not chargeable, we believe, in any large degree to malingering, that in the British Isles 1819 cases of nystagmus were carried over from 1911 to 1912 and that in the latter year 1376 cases received compensation for the first time.

The disease has spread with startling rapidity in a country where the mining conditions have not markedly changed. The mines have been worked with safety lamps for many decades; for centuries men have lain on their sides and undermined coal. In view of the new development of the disease, neither of these causes can be regarded as reasonable sources of nystagmus though it has often been ascribed to their influence.

If imperfect light is the cause, why does the disease get more frequent as the light given by lamps increases? We have progressed from the firewheel to the Davy and Geordie with their metal-shaded flames and deficient light-insuring draft. From that we have reached lamps with glass cylinders through which the full light of the flame is secured and draft is perfected. We have changed oil for naphtha and in some cases installed electric lamps but, with all our changes, nystagmus appears to have increased.

We believe we are right when we assert that nystagmus is unknown in the United States. If so, why does not nystagmus occur here, for we have safety lamps exactly similar to those which have been accused of doing so much harm in England? Why are the conditions so different across the intervening ocean? It may appear bold to suggest in absence of proof that nystagmus is a germ disease and propagates more freely in deep mines than in those that are shallow. But such an interpretation of the facts appears quite reasonable.

It seems that the depth of the mines and their consequent high temperature is the cause of the ankylostomaisis scourge in Europe. Perhaps their shallowness here keeps the United States immune. However, that disease seems not to spread on the outside of the mines in Europe, while some cases of nystagmus have occurred in others than miners in England. Here, therefore, the parallelism is not complete.

Nystagmus, as an English court has said, is rather a symptom than a disease and in discussions of its character the symptoms rather than the basal disorder are considered. If it were a newly discovered *cause* like appendicitis and not a newly found symptom, we might believe that it existed years before it was listed as an ailment.

But we cannot believe that a *symptom* did so exist, and we must, therefore, favor the idea that nystagmus is of recent origin. Consequently we are justified in our belief that it has rapidly spread and is not an old ailment which merely suddenly sprung into discussion as a result of scientific research and the fostering care of the Workman's Compensation Act.

We can remember how the story that the South was a hot bed of ankylostoma aroused the whole country. It seemed unlikely that a parasite, of which few had even heard and which was unknown at the beginning of the last century had done so much damage to a people as proud and as capable as the mountaineers of the Southern States.

Perhaps we will find that nystagmus is similarly caused, probably, however, not by a nematode, but by some lower organism, and will have a similar spread wherever favorable breeding conditions exist. For the description of nystagmus seems such that we can hardly conceive of it as a disease of the eye, but rather as a muscle or nerve trouble of a specialized kind and of extreme severity, brought on by a specific germ.

The Mining Industry and the Public

Almost all miners live in rented buildings and not in their own homes. While better paid and better housed than the tenantry of Europe, their economic condition is really in no great degree different. Such men have no reserves of any kind. Idleness and penury are with them synonymous, and discontent is inevitable. Nor is the argument that, all men could save if they would, one which appeals with any force. It does but excuse the coal operator morally; as a reasonable being who desires content as an adjunct to successful industry and as an assurance against syndicalism, the sense that he is *morally* justified is not sufficient.

The new propaganda for the destruction of capitalism of all kinds will be fostered by our creating large aggregations of people who have no reserve capital, who after periods of comfortable living are by reason of strikes and industrial irregularities frequently plunged into the most bitter poverty. The "new unionists" declare such people have "nothing to lose but their chains." They have indeed something to lose, to wit, that industrial activity and the advantages created by the accumulated capital of many years which make possible the cheap production of articles of utility. Let either be destroyed, the earning power of all of us is reduced to a minimum.

But they have no capital to lose. In this they are absolutely right, and it is not well for us to forget that in a camp full of workmen, not owning a foot of land, a single stick of timber or a brick, we have a condition which may easily become a menace.

It is true that hitherto there has not been a great demand on the part of miners to furnish their own homes; on the other hand, such a desire as existed has not been encouraged. It has its economic disadvantages, it is true. It has on occasion extended strikes, for men owning their homes are better able to withstand the stress of idleness, especially where they have both houses and farms.

Perhaps temporarily the operator is better off with "tenantry" instead of "yeomanry," if we may transfer and slightly strain those words, but the nation and ultimately the operator will suffer if the stake of the citizens in the prosperity of the nation is reduced. In fact, the coal operator is before all a citizen, a most important citizen, we think, and if he continues to create barracks, however exemplary they may be, he will help to form a new United States, composed of two classes only—the plutocrat and proletariat.

No nation has been successful long without a middle class. It may have failed to recognize that it had a linking body of citizens, but they were there nevertheless.

These facts are given emphasis by the Indianapolis convention, where the United Mine Workers of America entertained a resolution opposed to the militia, which is used to protect property such as the mine workers, for the largest part, do not possess. The modern unionism and the new industrialism join in condemning the militia and the state constabulary because they prevent acts contrary to the law. They do not desire a reform of these bodies, but oppose their very existence.

In Europe the same condition exists. Tom Mann served nine months in jail for endeavoring to seduce the military forces of Great Britain, and in France the syndicalists have paid a stipend to every soldier in the army, a sort of bribe to keep him friendly to their aims and considerate to them in the breaches of the law which they quite openly advocate.

Let the operator remember that every town of tenantry is a menace to the body politic, which he should strive to convert into a village of homes as rapidly as he can.

The Ethics of the Mine Cave Problem

A remarkable suggestion, according to the Scranton (Penn.) press, was made at the annual meeting of the Board of Trade of that city, Monday evening, Jan. 19, 1914, and promptly adopted with but a single dissenting vote.

The author of the suggestion, "speaking as a mining engineer of forty years' experience," is quoted as stating that the city has suffered a depreciation of $25,000,000 in property values by reason of the publicity it has received concerning mine caves.

The suggestion was put in the form of a motion, to the effect that newspapers should be requested to "soft-pedal" the news of mine caves. To the credit of one man, the head of a local coal company, COAL AGE is proud to say, a strong appeal was made in opposition to the motion—a plea for *honesty and integrity* in all business dealings and transactions.

The suggestion, though approved by the Board, will not receive the indorsement of responsible mining engineers, whose ethics are too sound to permit their profession to be disgraced by an acknowledged concealment of facts that concern the public good and safety.

In just and equal dealings of this nature, there is nothing to hide from public print, and we opine that no paper loyal to the reading public will withhold what it is the public's right to know. The time of domination is rapidly passing; and the right of the people to rule has never been more strongly upheld than it is today. Let right prevail; let the interests and the people of Scranton get together and prosperity for the great anthracite valley will be insured.

The Policy of Hush!

A prominent member of the board of trade of the city of Scranton, at the annual meeting today declared that the real estate of the city had decreased 25 per cent. in value because the newspapers gave too much space to mine caves. He presented a motion that the newspapers be requested to suppress all sensational news regarding surface disturbances. The motion carried, only one dissenting voice being heard.—"Scranton Truth," Jan. 19, 1914.

The above news item suggested the following:

What if a settling breaks a main,
Spreading death in the unleashed gas,
Firing the houses in its train,
Burning all to a shapeless mass?
Handle the news with care and tact,
Quite as a decent person should.
Bury the knowledge of the fact;
Keep it mum, for the common good.

Only the fool, with disordered brain,
Still gives vent to the outworn creed
"We are the victims of lust for gain,
Sacrificed to the god of greed."
Only the traitorous and the weak
Dare to tell, to the city's shame,
That which the loyal scorn to speak.
Keep it mum, or you'll soil our fame.

What if the schools and churches fall,
Shattered wrecks on the shaken sod?
These are the things that we ought to call
Signs of wrath from an angry God.
What if the bottom drops clean out,
Letting a city block go down?
Don't go telling the tale about;
Keep it mum, or you'll hurt the town.

What if a flimsy shack or two,
Roofing a litter of dirty wops,
Splits and vomits its frightened crew
After the surface quakes and drops?
Why should a fevered, frantic fuss
Over a thing like that be made?
Can't you see how it injures us?
Keep it mum, or you'll kill our trade.

Kingston Coal Co.'s Improvements

The Kingston Coal Co., at its No. 4 shaft, in Edwardsville, has established a surgical operating room. The intention is to perform operations in this building before moving the patient to a distant hospital or his home. An abandoned storehouse has been reconstructed so as to serve the purpose described. This work alone will cost over $1000.

Surgical Operating Room

The main compartment will be known as the "first-aid room." It measures 22x24 ft. and like the other rooms it has been floored with cement, and the floors, ceilings and walls have been covered with an enamel paint which permits of sanitary cleansing. The first-aid room will contain an operating table, operating chairs, sterilizers and instrument cabinets, all of steel and coated with white enamel. Adjoining this compartment is a bathroom with tub, shower and foot baths, basins, etc., and adjacent to both is a locker and supply room. All fixtures are portable so as to permit moving the furniture for cleaning. The building is heated with steam and lighted by electricity.

One man will be always in attendance and no one else will be admitted as this exclusion is necessary to maintain asepsis. Dr. D. H. Lakes will be summoned as soon as a man is injured in the mines and he will be at the hospital before the man arrives at the surface.

Bathhouses

A description of the washhouse at No. 1 shaft of the Kingston Coal Co. will be of interest, as it is typical of those at other plants of the corporation. There are three rooms, one equipped with baths and two with clothes lockers. In the bathroom are 36 cement bath tubs, 12 basins and 6 showers.

The company is renovating their houses, which are being made spacious and airy and are being equipped with baths. Many of the sidewalks are being paved and the company has taken part in many of the town improvements at its own cost. It is largely through aid given by the coal company that the work of the Visiting Nurse Association has been made so extensive. Eventually a lecture hall for instruction in first aid, mining and other educational work will be built.

Recent Legal Decisions

Assumption of Risk by Miner—A mining company is liable in damages for death of a miner resulting from negligent failure of the company's inspection officers to discover the necessity for timbering the roof from which the rock fell which caused the accident, but there is no such liability if the miner's own work created the dangerous condition, and he remained at work knowing the hazard. (Kentucky Court of Appeals, Cooké-Jellico Coal Co. vs. Richardson's Administratrix, 161 Southwestern Reporter 537.)

Abandonment of Rights Under Lease—A lease in favor of a coal-mining company, giving the company the right to explore for and mine coal, if found in paying quantities, upon certain conditions, did not give the company such vested right in the coal in place as prevents a finding that it abandoned its rights under the lease, though the period within which an ordinary action to recover an interest in land might be brought had not expired. Whether the lease was abandoned depends upon the intention of the company and the surrounding circumstances of the particular case. (Iowa Supreme Court, McColl vs. Bear Creek Coal Mining Co., 143 Northwestern Reporter 532.)

Liability for Injury to Miner—The rule of law that an employer is not responsible for the safety of a place to which an employee's duties do not take him cannot be extended to exempt a coal-mining company from liability for injury to a miner, caused by the fall of rock from a mine roof at a place which he was passing in returning tools borrowed from a co-employee, although the miners were required to furnish their own tools; it appearing that the company knew of, and had not disapproved, a custom of miners to borrow tools from each other. (Iowa Supreme Court, King vs. Mendota Coal Co., 143 Northwestern Reporter 539.)

Effect of Iowa Mine Law—Where the operator of an Iowa coal mine has control of the entries of the mine and certain employees are by custom required to repair any defects in the same, the operator is liable for injury to another employee resulting from negligent failure to keep the entries in a reasonably safe condition; miners being required by the Iowa mine law to prop or support the roof of only such entries as are under their control, respectively. (Iowa Supreme Court, Carnego vs. Crescent Coal Co., 143 Northwestern Reporter 550.)

The Underwood Colliery

The Underwood Colliery of the Penn. Coal Co. at Dunmore, Penn., is expected to be ready for the shipment of coal in the spring of 1914. It is designed to ship 3000 tons of graded coal per day. There are 9 beds of coal of good quality, and it is figured that there is coal sufficient to permit of operation for 50 years. Shaft No. 1 has 4 cageways, and all the coal will be hoisted at that point. Shaft No. 2 is for hoisting men and for an airway. Shaft No. 3 is for the same purposes and for pumping, and lowering supplies. There is also to be a fourth opening, a slope, by which only supplies will be delivered.



UNDERWOOD NO. 3, FOR LOWERING MEN AND MATERIAL, FOR PUMPING AND VENTILATION

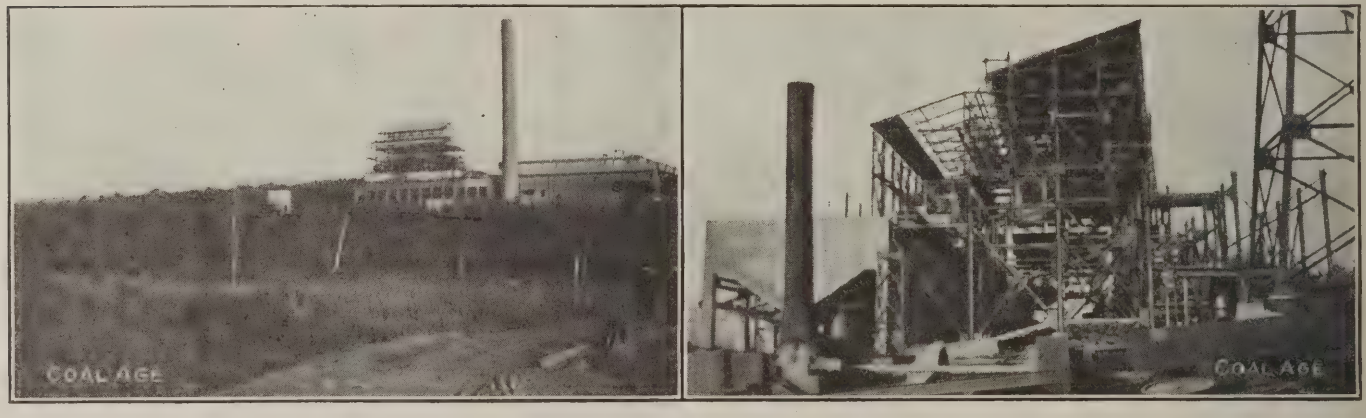
Twenty double houses are being constructed to house 40 families. The street on which they front is paved, and each house will have a sidewalk and shade trees. The rooms will be lighted by electricity. Each half of each double house will have 6 rooms, a closet and a sink. There will be two bathhouses, one for the women and the other for men. These will be kept clean by a caretaker appointed by the company.

There are 8 single, plastered-frame houses for the foremen. W. A. May is general manager, and W. W. Inglis, general superintendent.

More Rescue Maneuvers

The car of the Bureau of Mines which was stationed for three months at Fairmont, W. Va., has been moved to Uniontown, Penn., and at Revere an abandoned slope has been offered the rescuemen at which maneuvers like those at Chiefton, W. Va., can be practiced. The car is in charge of E. Steidle and C. W. Riggs, the latter being the first-aid instructor. Two rooms in the old Y. M. C. A. building on East Main Street, Uniontown, are being used as training headquarters, and are temporarily equipped with 10 sets of breathing apparatus.

The slope at Revere which belongs to W. J. Rainey, has been fitted for the training work by the bratticing off of a section of the mine about 400 ft. long. In this section a dense smoke and harmful gases will be formed by burning wood. The companies sending teams are the Tower Hill Connellsville Coke Co., Consolidated Connellsville Coke Co., Oliver & Snyder Steel Co., Coal Department, Republic Iron & Steel Co., Coal Department, W. J. Rainey and the Puritan Coke Co.



UNDERWOOD COLLIERY BOILER PLANT AND BREAKER



A NEW VILLAGE IS BEING BUILT WITH PAVED STREETS. THE ILLUSTRATIONS SHOW THE FRONT AND REAR OF THE HOUSES RESPECTIVELY

Discussion By Readers

Working Coal under Watery Strata

Letter No. 2—Replying to the inquiry of Geo. MacPhail, COAL AGE, Jan. 3, p. 30, I will answer the questions in the order they are asked, giving my own experience under similar conditions. It may be stated, however, that the data given in the inquiry are scarcely sufficient for the satisfactory solution of a question of so much importance.

The first question asked, If the coal is taken out to such an extent as to break the sandrock, would it be reasonable to expect the same inflow of water as was experienced in sinking the shaft? In reply to this question, I would say that my own experience is that if the roof was fractured only, and no cave took place, although the flow of water might be considerable at first, it would gradually diminish and, in some cases, might cease altogether. The impervious nature of the bed lying above the coal and underneath the sandrock will, in many cases, close the fissures as the strata settles. Should a heavy cave occur, however, the pressure of the water might be sufficient to cause a further fall that may extend to the sandrock. In that case, the inflow of water would probably be as great as that encountered in sinking the shaft. In my opinion, the question of the measures breaking up to the sandrock seems to be a more important matter than the breaking of the sandrock itself.

The second question asked, Would it be advisable to leave in a possible 50 per cent. of the coal as pillars to support the roof, in order to prevent the breaking of the sandrock. In answer to this question, I would advise leaving 50 per cent. of the coal or whatever is necessary for the proper support of the roof. I would suggest that working this seam on the panel system would be advantageous and present opportunities for testing the amount of coal that can be safely taken out in the first working, besides affording ample means of damming off any section in which an inflow of water might occur.

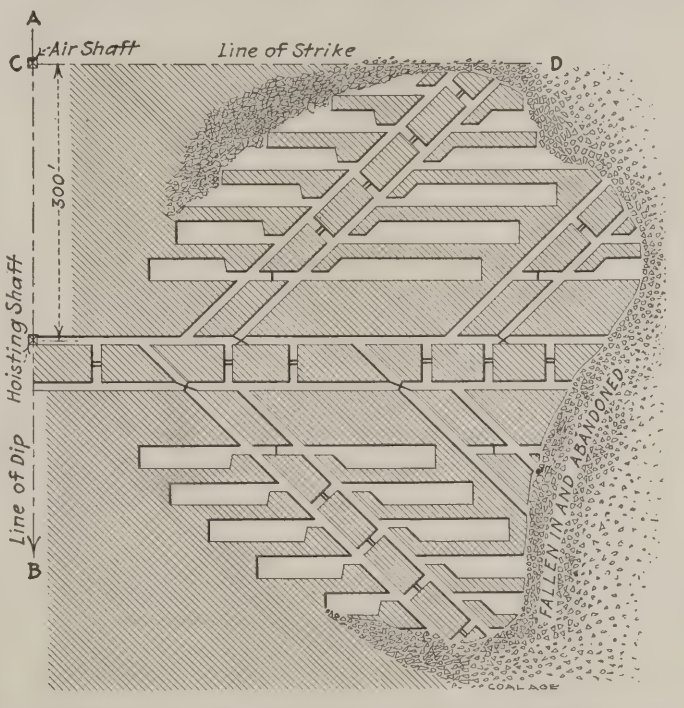
The third question asked, Will the proposed hoisting shaft sunk 300 ft. away from the airshaft make the same amount of water? In reply, I would say should a fault exist between the two shafts, it is possible for the second shaft to pass through practically dry ground, assuming the source of the water supply to lie on the other side of the fault. Otherwise, however, it is probable that the same quantity of water will be met in sinking the second shaft, as in the first shaft sunk. But a sharp rise of the measures toward the second shaft might reduce the volume of the flow.

JOHN E. SPICER.

Cumberland, B. C., Canada.

Letter No. 3—The data given by Geo. MacPhail, in his inquiry, COAL AGE, Jan. 3, p. 30, are so meager, that it will be necessary to make several assumptions, which may or may not be true in his case. However, assuming that no unusual amount of water was encountered before reaching the sandrock when sinking the airshaft, it may be inferred that this stratum is the natural channel for the water entering it at the outcrop or along the line of some geological formation, and that the sandrock bed forms a natural reservoir for whatever water percolates through the overlying strata.

In answer to the first question asked, I will assume that the dip of the seam is in the direction *AB*, indicated by the arrow in the accompanying figure, and the line of strike *CD* perpendicular to the dip *AB*. Assuming, further, that the seam is developed by driving the main entries on the line of strike or parallel to *CD*, and that



ILLUSTRATING SUGGESTION ON DRAWING PILLARS ON THE RETREATING PLAN

cross-headings are turned at an angle to the left and right of the main headings, and rooms are driven off these cross-headings, when the first break occurs in drawing back the pillars on the retreating system, as shown in the figure, an increasing inflow of water may be expected in the dip workings or those lying below the main entries where the break advances toward the rise. On the other hand, a decreasing flow of water would naturally be expected in the rise workings or those lying above the main entries where the line of break is advancing toward the dip.

The reasoning on which I base this opinion is that in the rise workings, the first break would produce the maximum flow of water. Following this, each successive break made in the roof by the retreating pillars, would produce only the water stored in the sandrock directly over that joint. In other words, the first break, occuring to the rise of the pillar workings, would cut off the subsequent inflow of water from the strata higher up the

pitch; while, in the dip workings, the reverse of this is true and the inflow of water would increase with each successive break.

Replying to the second question asked, I would say that since the airshaft is making nearly one-half of the assumed pumping capacity, good judgment would dictate leaving in sufficient pillar coal to support the roof and prevent a cave. If the workings are of any considerable extent, it would only take a small additional inflow of water to overtax the capacity of the pumps and, therefore, any serious break in the sandstone would result in the flooding of the mine. In order to prevent the loss of a large percentage of coal, under the conditions named, it will be necessary to adopt some method of support of the roof that will be equally as effective as the pillar coal left in the first working.

In the working of a thin seam of coal, under similar conditions, we adopted the plan of driving four rooms in a range of 32 yd., leaving a 4-yd. pillar between each range or block. By the time the rooms were driven up their proper distance (75 yd.), this pillar had grown much less. It was necessary to take down roof or lift bottom on the roads; and this material was thrown into the waste on each side of the road, but no particular care was taken to build packs. The roof varied from slate to fireclay in different portions of the mine, and the seam was underlaid with a stratum of hard fireclay interspersed with ironstone. The roof settlement, in this system of mining, was uniform and falls were rare. Even these could have been prevented, had proper care been taken in building packs. In mining a seam of the thickness mentioned by Mr. MacPhail, the waste material produced in driving the entries could probably be used to good advantage in building the packs required in the rooms. The method of culm flushing, as used in the Pennsylvania anthracite region, is worthy of consideration in this connection.

Replying to the third question asked as to whether the proposed hoisting shaft will produce the same quantity of water as the airshaft, permit me to state that, in my opinion, this will depend upon the location of the second shaft with respect to the first. My experience, in this regard, has taught me that if the second shaft be sunk on practically the same line of dip as the airshaft and below the latter it will not make the same quantity of water, for the reason that the water flowing into the airshaft cuts off, in a large measure, the water that would otherwise drain into the second shaft. If, however, the second shaft is sunk to the rise or to one side of the airshaft, practically the same flow may be expected.

I. C. Parfitt.

Jerome, Penn.

Letter No. 4—Replying to the inquiry of Geo. MacPhail, I want to suggest a plan that we have found to work successfully in the gas and oil sandrock in Oklahoma. Although the conditions are somewhat different from those described by Mr. MacPhail, I believe the same method could be employed to advantage in his case also. I have sunk a shaft through quicksand that had to be frozen before we could pass through the stratum. Also, I have seen 14x16-in. oak timber crushed when mining under water-bearing strata.

My suggestion is as follows: If possible, find a basin not far away from the proposed location of the hoisting shaft. Drill a 10-in. hole to the sandrock in this basin and shoot the hole with some high explosive. We use for this purpose about 90 qt. of nitroglycerin, in holes 1200 to 1500 ft. deep. In the present case, the hole being, say 150 ft. deep or less, I would suggest using about 25 to 30 qt. of the explosive. The effect, I believe, should be the same as that produced in our sandrock, which is very hard. The force of the blast should open up the water strata and, perhaps, cause the well to overflow at the surface; but if not, a pump can be used to handle the water and drain the territory in the vicinity of the shaft. The question may properly be asked, Would such a blast shatter the strata between the sandrock and the coal? I do not believe that it would, as my experience is that while this explosive will crack shale, it pulverizes rock and granite, which is of a coarser grain.

In reply to the second question, I would say that, inasmuch as there is a bed of shale beneath the sandstone, interstratified with slate and fireclay, this should be sufficient to keep the water from penetrating to the seam, assuming, however, that proper precautions are taken in mining the coal. Due care should be taken to prevent a cave of, say over 40 or 50 ft. Under ordinary conditions, a shale roof will not cave higher than 30 ft., but will arch over and form a natural support for itself.

The answer to the third question will, in my opinion, depend on the extent to which the drillhole, mentioned, drained the territory in which the shaft is sunk. The manner of shooting this hole is as follows: The explosive is lowered into the hole in cans, by hand or winch, using a double cable fastened to the explosive by a slip noose, so that the cable can be released and drawn from the hole when the charge is at the bottom. The charge is then exploded by dropping a weight or heavy iron bar into the hole. A chisel-pointed bar, called a "go-devil," 4 ft. long and made of 7/8-in. drill steel, is sometimes used. At times, the hole is fired by dynamite, using insulated wires and a blasting battery.

H. Gedosh.

Poteau, Okla.

The Certificate Law

Letter No. 14—I have noted with interest the wide difference of opinion expressed in reference to the mine foreman's certificate, issued in different states. For my part, I fail to see why a man who holds a certificate of competency to act as mine foreman in Pennsylvania, should have to pass an examination in another state before assuming a similar position therein.

A number of arguments have been advanced to the effect that the conditions differ so greatly in the different states, that no matter how good a man may prove to be in the management and control of a mine in one state, he must begin at the bottom and learn the business again, which seems to me absurd. Coal is coal whether here or in China, and the manner of formation of the deposit is practically the same. While some seams may be thicker or somewhat more inclined in one state than in another, it must be remembered that the same differences occur in the districts of a single state. There is the same variety of conditions in the state of Pennsylvania, in respect to coal mining, as exists in any two states in this country. In my opinion, it would be just as absurd to require a man who has been acting as mine foreman in Clearfield County

and desires to take a position as foreman in the Pittsburgh district, to obtain a new certificate before assuming the duties of that position.

Again, many men have gone from Pennsylvania into other states to act as superintendents and are not required to procure certificates and yet they seem to produce good results. In general, the conditions of mining are much the same in one state as another; the mine gases are the same; roof conditions, methods of ventilating and draining the workings; methods of timbering and systems of haulage differ in no material way. In some states, the coal is "shot off the solid"; but that practice is fast disappearing, except in the anthracite region. The greatest difference may be and probably is in the methods of working employed; but no state has a hard-and-fast rule in this regard; and, generally, the mine foreman must work to a plan that has been laid out and adopted by the management.

I fully agree with Mr. Clark, Letter No. 10, COAL AGE, Jan. 10, p. 100, except where he says that a mine foreman should undergo an examination every three years. I would like to ask, what would a doctor, a lawyer or anyone who has passed a civil-service examination think if they had to pass such an examination every three years, in order to keep abreast of the times? I consider that the mine foreman who does not take sufficient interest in his work to keep himself posted on the best means and methods employed in mining, without being compelled to do it through the possible loss of his certificate, is unfit for the position.

THOMAS HOGARTH.

Heilwood, Penn.

Letter No. 15—Referring to the discussion of the certificate law, there seems to me much wisdom expressed in the letters of R. J. Pickett and Geo. N. Lantz, COAL AGE, Dec. 27, pp. 987-8. Of special interest is the suggestion of Mr. Lantz, that certificates be classified according to the classification of mines, and that such classification be made general in the coal-producing states.

In Alabama, we have two classes of certificates; the first applying to mines generating explosive gas and the second to nongaseous mines, which fact implies a similar classification of the mines in this state. It would be manifestly unwise to make a holder of a second-class, Alabama certificate eligible to a similar position in another state, without regard to the gaseous character of the mine, although he would be fully competent to handle a nongaseous mine in any state. Again, the manner of handling gases under various conditions is so similar in all coal mines, that the holder of a first-class Alabama certificate should be qualified to hold a similar position in any state or country. In like manner, the qualifications of a fireboss are practically identical everywhere.

It appears to me that sufficient importance has not been attached, in this discussion, to the part every employer takes in the selection of a mine foreman or fireboss. No employer will risk his property and the safety of his employees by giving a man charge in a mine, before he has fully satisfied himself of that man's knowledge and fitness for the position he is to occupy. He will inquire to ascertain whether his experience has been such as to make him familiar with the conditions he is to handle.

It should be borne in mind that the holding of a certificate of competency is not the supreme qualification of a successful foreman or fireboss. The ability of a foreman to handle men, plan work, think correctly and act quickly in an emergency, as well as his judgment, alertness, industry, soberness, devotion to duty and loyalty to his employer are even of greater importance than the certificate he holds. A man may possess a first-class certificate with a high grade and yet be deficient in many of these essentials. The point I desire to urge is that a man who holds a certificate of qualification, granted in one state, and who is able to satisfy a would-be employer in another state, as to his ability to fill the position successfully, should not be barred by law from taking that position until he has passed a similar examination in the state in question. Such requirement works a hardship on the man and handicaps the employer in his attempt to secure an efficient foreman or fireboss.

It is a fact that many a competent man hesitates to give up a position in one state, upon the offer of a higher position in another state, because of the risk he takes in being able to pass the required examination. Attention has been drawn frequently to the fact that many of the best and most successful mine managers and foremen had little or no early education; but by diligent study and application, they have risen to a position of responsibility. Such men are ill equipped to solve offhand many of the purely theoretical problems required in an examination; and many of these problems rarely confront the mine foreman, in actual practice.

It should be remembered that the most practical mine foremen and firebosses today are studying the actual problems involved in their work. Their spare time is largely devoted to the reading of mining journals and other literature that will keep them fairly well informed on occurrences and abreast with the times in respect to mining practice. It is rare that much of this time is spent in brushing up their mathematics. Again, the excitement and uneasiness that usually take possession of a man in an examination on which much depends, prevents him from doing his best work. Under these conditions, he will often make mistakes that he would not make under other conditions.

I have in mind a successful mine official whose great est misfortune was that his early education was deficient; but, by means of a correspondence course and hard study, he obtained a sufficient knowledge of mathematics to enable him to pass an examination with a high percentage mark. He has been since that time preëminently successful and is considered by all who know him best, including his present employers, as the best all-around mining man in the state. However, in the absorption of his duties, he has forgotten what mathematics he knew, and today would be unable to pass an examination, as he could not solve a simple triangle, without reference to his handbook. The fear of failing to obtain a certificate in another state has kept this man from accepting positions at higher salaries outside of his own state.

In most cases, it is idle to say that if a man is truly ambitious, he will study sufficiently to pass the examination required for the position he desires. Most men will refuse to "cram" *today* for an examination, and to study to remember things that they will not use again and forget *tomorrow*. We must take men as they are and not as we think they ought to be. I may add that

the limitation of a practical man's employment to a single state is not his loss alone, but one that affects the mining industry in all states. A classified universal certificate, or interchange of certificates between states, would benefit all concerned.

WM. KELLUM, Sup't.,
Southern Coal & Coke Co.

Glen Carbon, Ala.

The McAllister Experience

In reading the discussion on Retarding Ventilation when Firing, COAL AGE, Jan. 17, p. 122, I was surprised and disappointed to find that Mr. Paul should speak so disparagingly of the narrated experiences of Mr. McAllister, who conducted a series of experiments in a Kansas mine a few years ago. The experiments were fully described in a number of letters in COAL AGE, a year ago; but the letter to which Mr. Paul particularly refers, COAL AGE, Vol. 3, p. 25, describes a remarkable experience in the rescue of men after an explosion.

To throw doubt on *all* of Mr. McAllister's experiences and statements; because he said that he found "a small tunnel of air traveling in the center of the entry," is, to say the least, in my opinion, ill-advised and unwarranted. We may reject Mr. McAllister's conclusions, but nothing is gained by disregarding facts that are evidently true. Also, we are compelled to admit that this man has rendered valuable service in his investigations of the phenomena of mine explosions. In my opinion, he has shown himself to be a courageous, observing, practical miner, who has repeatedly risked his life in attempts to ascertain the true facts. Because he may have failed, in a scientific sense, to express correctly his meaning is no excuse for discrediting his statements.

After any mine explosion, there is bound to be a reflex movement of the air in order to bring about an equalization of temperature throughout the entry. As Mr. McAllister entered the mine immediately after the explosion, this reflex movement of air, which was especially marked along the bottom or floor in the center of the entry and which I have often myself experienced, was probably more pronounced under the conditions existing in that mine, than anything observed by Mr. Paul. In his description, Mr. McAllister does not state that the air traveling in the center of the entry was "pure," as Mr. Paul quotes him; but, in his rescue of the men, he proved that this air would sustain life and permit strenuous bodily exertion at the same time.

JOHN VERNER,
Ex-Mine Inspector.

Chariton, Iowa.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Example—To show the effect of natural air columns in fan ventilation, assume a shaft mine ventilated by means of a fan; the seam is practically level; the fan shaft is 800 ft. deep and the hoisting shaft 600 ft. deep.

(a) Assume the fan is exhausting and produces a circulation of 200,000 cu.ft. of air against a water gage of 2 in., in the winter when the outside temperature is 30 deg. and that of the mine 60 deg. F., and calculate the resulting water gage and the volume of air that the fan will circulate, running at the same speed in the summer season when the outside temperature is 70 deg. and that of the mine, as before, 60 deg. F.

(b) Assume the same conditions in the mine and the same respective temperatures and calculate the water gage and volume of air this fan will produce when running at the same speed and blowing instead of exhausting the air, for the winter and summer seasons, respectively.

Solution—(a) When the fan is exhausting, the fan shaft being the upcast, the effective depth of air column is D = 800 ft. The natural water gage due to this depth (barom., B. = 30 in.) is

$$\text{Winter,}\quad w.g._n = \frac{1.3273 \times 30\,(60 - 30)\,800}{(460 + 60)\,(460 + 30)\,5.2} = 0.72\ in.\ (positive)$$

$$\text{Summer,}\quad w.g._n = \frac{1.3273 \times 30\,(70 - 60)\,800}{(460 + 70)\,(460 + 60)\,5.2} = 0.22\ in.\ (negative)$$

In the circulation of 200,000 cu.ft. of air, under a 2-in. water gage, as stated in the question, therefore, the water gage due to the action of the fan is 2 — 0.72 = 1.28 in., the natural water gage, in this case, assisting circulation, being positive. In the summer season, the fan exhausting at the same speed as before will create the same ventilating pressure and water gage (1.28 in.); but, the natural air column now being negative (0.22 in.), the effective water gage producing circulation is 1.28 — 0.22 = 1.06 in. Then, since the circulation in any given mine or airway varies as the square root of the pressure or water gage, the quantity ratio is equal to the square root of the water-gage ratio.

$$\frac{x}{200{,}000} = \sqrt{\frac{1.06}{2}} = \sqrt{0.53} = 0.728$$

Summer (exhausting), $x = 200{,}000 \times 0.728 = 145{,}600$ *cu.ft. per* ***min.***

(b) When the fan is blowing the hoisting shaft is the upcast and the effective depth of air column is then D = 600 ft. The natural water gage is then 600/800 = ¾ of the value previously found; or ¾ × 0.72 = 0.54 in. (winter), and ¾ × 0.22 = 0.165 in. (summer). As before, the natural gage is positive in winter and negative in summer, which makes the effective gage 1.28 + 0.54 = 1.82 in. (winter) and 1.28 — 0.165 = 1.115 in. (summer). The circulation is then

$$\text{Winter (blowing),}\quad x = 200{,}000\sqrt{\frac{1.82}{2}} = say\ 190{,}800\ cu.ft.\ per\ min.$$

$$\text{Summer (blowing),}\quad x = 200{,}000\sqrt{\frac{1.115}{2}} = say\ 149{,}400\ cu.ft.\ per\ min.$$

The Coal Age Pocket Book

EXAMPLES FOR PRACTICE

1. How many feet of air column is equivalent to a mine water gage of three inches?

Solution—Under ordinary or normal conditions water weighs 815 times as heavy as the same volume of air; hence,

1 *ft.* (12 *in.*) *water column* = 815 *ft. air column*
1 *in. water gage* = 815 ÷ 12 = 68 *ft. air column*
3 *in. water gage* = 3 × 68 = 204 *ft. air column*

2. Express the pressure equivalent to 200 ft. of ordinary air column, in pounds per square ft.; ounces per square inch; inches of barometer; inches of water gage.

Solution—

200 ÷ 13 = 15.39 *lb. per sq.ft., nearly*
200 ÷ 117 = 1.71 *oz. per sq.in., nearly*
200 ÷ 920 = 0.22 *in. of mercury, nearly*
200 ÷ 68 = 2.94 *in. of water gage*

3. What is the pressure of the atmosphere, in pounds per square inch, corresponding to a barometric pressure of 30 in.?

Solution—

30 × 7.86 = 235.8 *oz. per sq.in.*
235.8 ÷ 16 = 14.74 *lb. per sq.in., nearly*

4. Find the pressure in ounces per square inch corresponding to a water gage of 2.5 in.

Solution—

2.5 × 0.58 = 1.45 *oz. per sq.in.*

5. Find the barometric pressure in inches of mercury corresponding to a water gage of 3.4 in.

Solution—

3.4 ÷ 13.6 = 0.25 in.

6. If an aneroid barometer gives a reading of 29.65 in. on the surface, what should be the reading at the bottom of a downcast shaft 500 ft. deep where the ventilating pressure caused by a blowing fan gives a water gage of 2.85 in., assuming all readings are taken at about the same time?

Solution—The air column in this shaft will increase the barometric pressure 500 ÷ 920 = 0.54 in. The water gage due to the blower will still further increase the barometric pressure, at the foot of the downcast shaft, 2.85 ÷ 13.6 = 0.21 in. The reading of the aneroid, therefore, should be 29.65 + 0.54 + 0.21 = 30.4 in.

7. In a mine ventilated by an exhaust fan, giving a water gage of 2.33 in., if aneroid readings taken on the surface and at the bottom of the upcast shaft show a difference of 0.76 in., what is the calculated depth of the shaft?

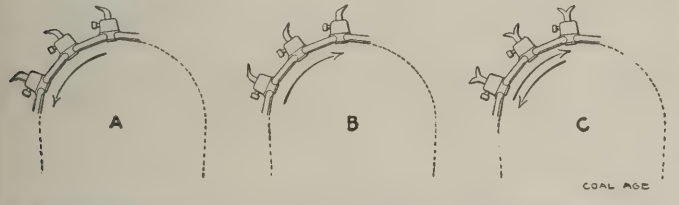
Solution—The action of the exhaust fan makes the aneroid reading at the shaft bottom lower than it would be if the fan were not running, and decreases the difference of the surface and underground readings 2.33 ÷ 13.6 = 0.17 in. of mercury. The difference of reading due to the depth of the shaft only is, therefore, 0.76 + 0.17 = 0.94 in. of mercury. Reducing this barometric difference to air column gives for the approximate depth of the shaft 920 × 0.94 = say 865 ft. under ordinary conditions.

Inquiries of General Interest

Reversible Coal-Cutting Machine

I would like to draw attention to the reversible feature of the Sullivan "Ironclad" *C E-7*, shortwall machine. Those familiar with this machine know that it operates on the same principle as previous types of Sullivan continuous-cutting machines, for use in room-and-pillar work. The machine is sumped under the coal at one rib and undercuts the entire face of the room to the other rib where it is backed out and loaded for transportation to the next working place.

The new feature to which I refer, in the ironclad model, is its reversibility, which enables the machine to cut from right to left or from left to right. To do this, however, it is necessary to change the bits from the position shown in the sketch at *A*, to the position shown at *B*. The arrows show the direction in which the cutting



A Suggestion of a Double-Tooth Bit in a Reversible Coal-Cutting Machine

chain revolves, the first (*A*) cutting from right to left and the second (*B*) cutting from left to right. Of course, after changing the bits, the motor must also be reversed.

I want to make a suggestion, which, if possible or practicable, would greatly expedite the work, by enabling the machine to cut, either right to left or left to right, without the necessity of changing the bits. The suggestion is to use a double-toothed bit, as shown in the figure at *C*.

The scheme, if practicable, would possess another advantage, as it would then be possible, if a tooth was broken or dulled badly, to reverse it by loosening the set-screw and turning it over. I would like to have the views of readers of Coal Age who are familiar with this machine, in reference to this suggestion.

A Reader.

Oliphant Furnace, Penn.

Longwall Mining

I am much interested in the matter of longwall mining on the retreating plan, and would like to ask two questions:

1. Can any of the readers of Coal Age suggest a method of timbering or cribbing and the general arrangement of a longwall face over 300 ft. in length, when working a seam of semibituminous coal averaging 3½ ft. in thickness, under 300 ft. of cover. The roof is a hard slate, varying from 1 to 12 ft. in thickness; and overlying the slate is sandrock or a sandy shale, from 10 to 20 ft. thick. There are slips in the slate running almost at right angles to the face of the coal. What I most desire to know is the best method of arranging the timbering or cribbing to secure the proper breaking of the roof.

2. Is there a method of longwall retreating being worked successfully in either the Pittsburgh or Central Pennsylvania district; and, if so, where? I shall much appreciate any suggestions from readers who have had experience in this system of mining.

Bituminous.

Windber, Penn.

One of the most essential features in successful coal mining is a roof that will bend without breaking. The breaking of the roof over a longwall face almost invariably results in disaster. Success in the operation depends on maintaining a constant, traveling weight that advances with the progress of the work, only enough pressure being thrown on the face to break down the coal when it is undermined.

Cribs are only used in special cases of longwall mining. The more common method is to employ two and sometimes three rows of posts parallel to the face of the coal. These posts are set on a slight mound of dirt or slack that will enable them to take the pressure gradually without breaking and that will make it possible to draw them more easily, at the proper time. As the working face advances, a new row of posts is set in front and the posts at the rear are then drawn, so as to allow the roof to settle uniformly on the packs or waste.

In this connection, we would refer to the article by Samuel Dean, on Retreating Longwall Mining Methods, Coal Age, Vol. 4, p. 722; and the two interesting letters discussing this method, by Charles Waine and William James, Jan. 10, p. 99. We shall be glad to hear from readers in answer to the second question and to have further suggestions on this important subject.

Ventilation

Kindly answer the following question in Coal Age: What is the theoretical velocity of air corresponding to a 1-in. water gage? I am unable to recall the formula required for this calculation.

Forgotten.

Welch, W. Va.

The formula for finding the theoretical velocity of any fluid, air or water is $v = 8\sqrt{h}$.

Now, since 1 in. of water gage is equivalent to 68 ft. of air column, under normal conditions (Coal Age, Dec. 27, 1913, p. 990), we have, for the theoretical velocity of air (ft. per sec.), expressed in terms of water gage (in.),

$$v = 8\sqrt{68\ w.g.} = 66\sqrt{w.g.}$$

Therefore, for a 1-in. water gage, the theoretical velocity of air is $66\sqrt{1} = 66$ ft. per sec.

Examination Questions

Miscellaneous Questions

(*Answered by Request*)

Ques.—What method would you use in extracting pillars, using mining machines for this purpose, under ordinary conditions of roof and floor?

Ans.—Assuming a level seam and the conditions of roof and floor such as to enable mining machines to be used with safety in the extraction of pillars, two general systems are in use. Under suitable conditions of roof and floor, permitting the extraction of a considerable percentage of the coal in the first working, the rooms are often driven the usual width, say 20 or 24 ft., with pillars varying from 10 to 16 ft. wide, between them.

In that case, when the rooms have reached the limit the pillar is cut across at the end, by the machine, the cut being about 7 or 8 yd. wide. This being done, a stump is left that varies from 5 to 8 ft. wide, depending on roof and other conditions, and another cut, 7 or 8 yd. wide, is made across the pillar with the machine, as before. The coal is loaded out as each several cut is made, until the pillar is cut across. When this is done, the 5- or 8-ft. stump is removed with a pick and the roof allowed to fall. The same process is continued until the entire pillar is removed up to the entry stump.

Another method is adapted to roof conditions that are not as favorable to wide openings. In this case, the rooms are driven up as stalls 4 or 5 yd. wide, with pillars varying from 10 to 20 yd. in width, between them. Where the conditions will permit, wider pillars (100 yd.) are left and a face track is then laid along the face, the pillar having first been crosscut at its inby end. It is now worked out on the retreating plan.

In this method, two or three rows of posts are set parallel to the face of the pillar and at such a distance back as to permit the machine to be worked freely between the coal face and the first row of props. A cut is made with the machine across the entire face of the pillar. This coal is loaded out in the usual manner and a new row of posts set, after the track has been shifted forward a distance equal to the depth of the cut. The back row of posts is then drawn, after which another cut is made with the machine, as before. This process is continued until the entire pillar is removed, up to the entry stumps.

Ques.—(a) What percentage of fuel will be saved by heating the feed water of a boiler to 150 deg. F., by means of the exhaust steam, before introducing the water into the boiler, instead of feeding the water to the boiler at a temperature of 50 deg. F. Assume the total heat of vaporization or the heat above 32 deg. F., for a boiler pressure of 100 lb. per sq.in., as 1185 B.t.u. (b) Assuming that this percentage of fuel is saved, at a mine using 1200 lb. of coal per hr., what weight of coal will be saved in a day of 8 hr.?

Ans.— (a) The weight of coal burned being proportional to the heat (B.t.u.) developed, the percentage of fuel saved is the same as the percentage of B.t.u. saved in the heating of the feed water from 50 deg. to 150 deg. F. The heat thus saved is 150 — 50 = 100 B.t.u., per lb. of water evaporated, or steam generated. At a boiler pressure of 100 lb. per sq.in., the heat in the steam above 32 deg. F. being 1185 B.t.u., the heat above 50 deg. F. is 1185 + 32 — 50 = 1167 B.t.u. The percentage of heat saved is, therefore, 100 × 100 ÷ 1167 = 8.57 per cent. As previously stated, this is the percentage also of fuel saved by heating the feed water from 50 deg. to 150 deg. F., by means of the exhaust steam.

(b) The saving of fuel at a mine burning 1200 lb. of coal per day is, therefore, 0.0857 (8 × 1200) = 822+ lb.

Ques.—What would be the height of motive column in a mine where the depth of both the upcast and downcast shaft is 300 ft., the temperature of the downcast shaft being 32 deg., and that of the upcast, 48 deg. F.?

Ans.—Assuming a level surface, or what is the same, a level seam, the motive column, in this case, depends on two temperatures only; namely, those of the upcast and downcast shafts, respectively. The motive column may be calculated in terms of the downcast air, as follows:

$$M_d = \frac{(T - t)\ D}{460 + T} = \frac{(48 - 32)\ 300}{460 + 48} = \frac{4800}{508} = 9.45\ ft.$$

In terms of the upcast air, this air being lighter than that of the downcast, the column will be longer. The calculation is as follows:

$$M_u = \frac{(T - t)\ D}{460 + t} = \frac{(48 - 32)\ 300}{460 + 32} = \frac{4800}{492} = 9.75\ ft.$$

Ques.—What pressure will be necessary to pass 20,000 cu.ft. of air per min. through an airway 6x14 ft. and 3000 ft. long? Assuming there is no change in the temperature of the air current and ignoring any change in volume due to a decrease of ventilating pressure, if the volume of the return air is found to be 20,300 cu.ft., what percentage of gas is contained in this current; and, assuming that the gas present is all marsh gas, what indication would be shown on the flame of the safety lamp in the return current?

Ans.—Under the assumed conditions, the increase in volume, which is 20,300 — 20,000 = 300 cu.ft. per min., represents the volume of gas in the return current. The percentage of gas present is then $\frac{300 \times 100}{20{,}300} = 1.47$ per cent. It would not be possible to detect this percentage of gas on the flame of an ordinary Davy lamp.

Corrections

(*Examination Question, Dec. 13, 1913, p. 914*)

Ques.—If 20,000 cu.ft. of air and gas, etc.

Ans.—The answer should read as follows:

24,600 + 1892 — 20,000 = 6492 *cu.ft. per min.*

(*Examination Question, Jan. 10, p. 103*)

Ques.—We have a tank full of water, etc.

Ans.—The answer should read as follows:

2394 ÷ 672 = 3.56 *hours, say 3 hours 30 min.*

Coal and Coke News

Washington, D. C.

There seems every reason to expect an elaborate inquiry will be made into both the Colorado and Michigan mining strikes by the House Committee on Mines. It is believed that the hearings on the subject will begin within a couple of weeks and that an effort will be made to thresh out all of the facts in both situations just as was done with reference to the West Virginia mine strike situation.

Sharp criticism of this plan is being offered by a number of congressmen who are of the opinion that the controversies in question do not involve any subject over which the United States Government has jurisdiction. Insofar as the Government has anything to do in the matter, it is claimed by them, the subject is one for investigation by the Department of Labor which is under the law specifically vested with powers of mediation and conciliation whenever it can induce employers to accept its offices in that capacity.

Some time ago an attempt was made to induce the new industrial relations commission to look into both of these strikes and it was semi-officially announced that the commission had been brought to the point of accepting this work as one of its duties.

Later on the decision was reached not to take up the investigation of contemporary labor controversies, and while the rule thus established was broken in the case of the New York garment-workers strike, this apparently was only a temporary lapse from the position then taken, inasmuch as it has now been practically resolved by the mines committee to take up this work, thus indicating that the effort to shoulder it off upon the industrial commission was not successful.

HARRISBURG, PENN.

The constitutionality of the 1913 act providing for a tax on anthracite coal was attacked in the Dauphin County Courts on Jan. 22, when a suit in equity was filed by the People's Coal Co., of Scranton. Frederic W. Gleitz, counsel for the company and an ex-Attorney General, filed the proceedings, which are directed against Auditor General Powell and State Treasurer Young, fiscal officers of the state. The Attorney General's department accepted service.

The act signed June 27, last, provides for a 2½ per cent. tax on coal mined, and the money thus raised is to be divided equally between the state and the municipalities of the county where the coal is mined.

It is set forth by the papers filed that the constitution is violated because the tax is confiscatory, and that the coal companies would not be doing their duty to their stockholders or the public if the act were not tested. An injunction asking that the Auditor General and State Treasurer be restrained from assessing, collecting or distributing the tax is sought.

The People's Coal Co. asserts that the tax it must pay will amount to $15,000 annually and that the total tax will reach in the state over $7,000,000.

The chief contention will be that the measure is class legislation and that it is in conflict with the 14th amendment of the constitution of the United States, and is also in violation of the constitution of the state.

If the tax is to be laid, then, all coal should be included and not only anthracite. It is also contended that the bill in effect is not a revenue-producing act, but levies a personal tax. The method of distributing the tax is also unconstitutional, it is contended, upon the ground that the money would be distributed among municipalities by means of special appropriations.

A great many people believe the strongest point against the law is its alleged conflict with the clause of the United States constitution forbidding any state to levy export duties, that being the exclusive privilege of congress. A considerable quantity of anthracite is exported to Canada, and it is said it would be impossible to differentiate on the product mined for that country and that intended only for home consumption. The test of the validity of the law will be carried to the United States Courts as well as those of Pennsylvania.

Filing of the action in equity will not halt the steps taken by the Auditor General for the collection of the tax, because the bill entered in the case does not ask for an injunction, except after the hearing. Operators have until the end of January to file their sworn statements of production during 1913, and then bills will be sent out from the capitol.

Attorney-General Bell will determine during the week the manner of meeting the suit, whether a demurrer or an answer should be filed. It is probable that the suit will be argued in Harrisburg before the Dauphin County Court within a few months, and that other coal companies will enter into the proceedings in order to test questions that have arisen.

PENNSYLVANIA

Anthracite

Scranton—The legal suit against the Peoples Coal Co. by the Lackawanna Coal Co. begun as an injunction proceeding to restrain the former firm from mining coal out of its bounds in West Scranton has been terminated by the Peoples Coal Co. purchasing the land in dispute.

Hazleton—The building of five new mess houses at as many collieries has been authorized by the officials of the Lehigh Valley Coal Co. These structures will be of a standard design based on that of the mess house built experimentally at the Prospect Colliery of this company. The size will, however, depend upon the number of men working at the various operations. Their construction will be started at once.

Wilkes-Barre—Judge Garman, of Luzerne County recently granted a compulsory non suit in the case of Cornelius Vistock against the Pennsylvania Coal Co. Holding that the mine foreman and not the coal company or mine superintendent was responsible for the safety of mine passages after they were opened. The Supreme Court in a somewhat similar decision holds that neither a superintendent nor the owners of the colliery are at liberty to disobey the mine foreman's instructions as to how business inside the mine shall be conducted and managed.

Plymouth—The grievances of the miners employed at the No. 11 Colliery of the Lehigh & Wilkes-Barre Coal Co. regarding the reinstatement of check docking boss Joseph Bogdan has been decided in favor of the miners, and the checking boss is back at work. The contentions of the officials was that the presence of Bogdan at the colliery created trouble and finally resulted in a strike. The difficulty was brought to a temporary settlement by the appointment of District Vice-President Joseph Yanis as check docking boss.

Bituminous

Johnstown—Extensive changes are expected to be made shortly in the Kennerly coal holdings in this vicinity. Philadelphia banking houses are said to be interested both in the property of the Valley Smokeless Coal Co. and the Seward operations of Mr. Kennerly. It is said that one firm is interested to the extent of $100,000 and another for about $250,000 which indicates that the bankers now control the property.

Furnace Run—The general repair shops of the Allegheny River Mining Co. at this place were recently placed in operation. Repair work for all of the mines of the above mentioned company in Jefferson and Armstrong counties will be done at these shops.

Rockwood—Hitchman Bros. are making preparations for the opening of their big coal tract about 4 miles west of Rockwood, comprising approximately 5000 acres of coal. It is said that two openings will be operated and that construction work will be begun in the near future.

Du Bois—The strike which has been in progress for some time at the Eriton shaft has been ended, a satisfactory understanding, which is to be in force until the present wage-scale agreement expires, having been arrived at.

Washington—The entire town of Desco, together with a modern coal and coke plant recently became the property of I. W. Semans, of Uniontown. This town, which has just been completed, comprises 57 houses, 257 coke ovens, and 300 acres of coal land together with an uptodate mine.

Wampum—I. E. Ingham & Co. will shortly open a new coal mine at this place. It is expected that about 65 more men will be employed.

WEST VIRGINIA

Charleston—A $60,000 coal tipple of the Boomer Coal & Coke Co. was completely destroyed by fire recently. It was necessary to use dynamite to blow up this structure in order to save three smaller ones which were in close proximity. The cause of the fire was unknown.

Attorneys E. W. Keatley and C. M. Alderson recently returning from New York where they conferred with the English and American representative of the British syndicate which contemplates the purchase of the entire New River coal fields state that there is every prospect of a consummation of the deal.

Clarksburg—The entire holdings in the Irvington-Late Coal Co. have been purchased by Gordon D. Late, who will continue the operation of the plant under the name of the Gordon D. Late Coal Co.

The organization of the First Aid to the Injured Association, which was to have been effected at Fairmont, Jan. 22, was postponed indefinitely on account of there not being enough of the coal operators present to express their sentiment regarding the matter. Such associations have been formed in a number of states, and many of the coal operators throughout West Virginia are desirous of forming a like organization here.

Fairmont—Fire recently destroyed the tipple of mine No. 21 of the Consolidation Coal Co. at Gypsy. The origin of the conflagration is unknown. The construction of a temporary tipple was at once begun and it was stated that no men would lose time on account of the fire.

TENNESSEE

Chattanooga—The Continental Coal Corporation has sold approximately 3000 acres of its undeveloped lands in Bell County, Kentucky, for about $550,000. This transaction means a reduction of something like $700,000 in the company's bonded indebtedness and about $100,000 in its floating loans.

KENTUCKY

Madisonville—Rumors continue to circulate in the western Kentucky district, to the effect that deals are pending for the transfer of coal rights in that section, in addition to those already reported as consummated. Options are said to have been given on large properties to the same interests which have made the purchases heretofore noted. These reports, however, continue to limit themselves to undeveloped property, and no options or sales have yet been suggested relating to existing operations.

Pineville—Reports are to the effect that contracts have been let for the camp construction and development work on four large coal operations in the Harlan county field, which, when finished, will add about 2000 tons a day to the production of the field. This is already estimated to be about 6000 tons a day. Other developments are projected in that field, following various deals which have been reported within the past few months.

OHIO

Columbus—A joint committee of operators and miners will assist the newly created safety commissioner John M. Roan to prepare regulations to reduce the hazard in mines. A meeting of mine bosses and superintendents of the Hocking Valley field, held at Athens, has promised to give the movement enthusiastic support. The plan is to have all regulations promoting safety passed upon by both miners and operators, so that there will be no friction in introducing reforms.

Bellaire—The property of the Gordon Coal Co., of Stewartsville has been leased to J. F. Johnson, of this city, who has also secured a 14-months' option on the property which consists of one coal mine and all the necessary equipment. It is expected that the output of this mine will be approximately doubled in the near future and the number of men employed greatly increased.

INDIANA

Terre Haute—Nine miners were injured, Jan. 27, one probably fatally, when the engineer at Mine No. 1 of the New Central Coal Co. lost control of his engine, causing the cage carrying the men to run wild to the bottom of the pit, a distance of 200 ft., where all were hurled out. The injured men were brought to this city.

Indianapolis—The convention of Michigan, Ohio and Indiana Coal Dealers will be held in this city this year, the directors having accepted an invitation extended by the Indianapolis Retail Coal Merchants Credit Association. It is expected the date will be about June 15. H. H. Deam, Bluffton, Ind., is president of the association and B. F. Nigh, Columbus, Ohio, is secretary.

ILLINOIS

Duquoin—Abe Eaton, manager of the Majestic mine, has been acquitted at Mt. Vernon on the charge of murdering Wm. Sisney, president of the miners' union here. The case was taken to Mt. Vernon on change of venue. The trouble arose over an argument several months ago.

Danville—An idea as to what business conditions in Illinois have been during the year 1913, may be gained from the fact that the Federal Court of the Eastern District of Illinois, shows that there were 177 bankrupts in the southern part of Illinois during the year. The number in 1912 was 110. For years previous to 1912 the number was far below 100. Included in the number for 1912 and 1913 were several big coal companies.

Pana—Owing to the mild weather and slight demand for coal nearly a score of the largest coal mines in the central Illinois district have recently suspended operations. These suspensions have thrown more than 3000 men out of employment.

Chicago—The Chicago, Rock Island & Pacific R.R. Co. has stored about 500,000 tons of coal at Des Moines and West Liberty, Iowa. This has been done on account of the threatened general strike of the miners in the Middle West on Apr. 1.

KANSAS

Topeka—Based on the number of men used in the mines 30% more coal was produced at the State Penitentiary during 1913 than in 1912. Five months' daily reports show 33,323 working days in the mines in 1912 as compared with 27,858 working days in the same period of 1913. Last year the men from the mines were worked in the construction of the prison twine plant and buildings destroyed by the fire in April. At the present time only about 175 men are used in the mines as compared with 250 a year ago.

SOUTH DAKOTA

Woonsocket—Excitement has been caused here by the discovery of a bed of lignite coal on the farm of Joseph Dodd

WYOMING

Cumberland—A diamond drill operated by representatives of the Union Pacific Coal Co. has located a vein of coal 18 ft. thick, seven miles south of Cumberland in Uinta County.

RECENT COAL AND COKE PATENTS

Coke Oven. W. M. Person, Sparrows Point, Md. 1,079,062, Nov. 18, 1913. Filed Aug. 31, 1910. Serial No. 579,897.

Fire Box Construction. J. M. McClellon, Everett, Mass. 1,078,933, Nov. 18, 1913. Filed Dec. 26, 1911. Serial No. 667,841.

Smoke Consuming Mechanism. D. D. Keltner, Des Moines, Iowa. 1,078,927, Nov. 18, 1913. Filed Oct. 14, 1912. Serial No. 725,561.

Mine Car Lubricator. J. H. Thomas, Independence, Col. 1,080,500 Dec. 2, 1913. Filed May 29, 1913. Serial No. 770,716.

Gas Producer. C. M. Garland, Assignor to Camden Iron Works, Camden, N. J. 1,079,234, Nov. 18, 1913. Filed Jan. 6, 1913. Serial No. 740,469.

Self Acting Conveyor for Coal and Goaf-Packing in Colliery Inclines of Low Gradient. L. Hyve, Dorignies, France. 1,079,176, Nov. 18, 1913. Filed Oct. 15, 1912. Serial No. 725,851.

PERSONALS

E. T. Hendon, receiver for the Oak Leaf Coal Co., a bankrupt concern of Cordova, Alabama, was recently elected trustee without opposition at a meeting of the creditors.

J. J. Malloy for the past 7 years a mine foreman at Davidson, Penn., has been appointed superintendent of the Filbert plant of the H. C. Frick Coke Co. He will assume his new duties on Feb. 1.

H. H. Robertson, president of the Asbestos Protected Metal Co. of Beaver Falls, Penn., has been elected vice-president of the Pittsburgh Branch of the National Council for Industrial Safety.

L. O. Mellinger, superintendent of the Furnace Run operations of the Allegheny River Mining Co., has resigned to accept service with the Rochester & Pittsburgh Coal & Iron Co. He will be succeeded Feb. 1 by Samuel Wallwork.

L. C. Sherrill, prominently identified for the past few years with the Pioneer Coal & Coke Co., of St. Louis, has resigned that company to accept the sales management of the fuel department of the Roman & Bush Pig Iron & Coke Co.

Ralph Lockhard formerly superintendent of the Quemahoning Coal Co.'s mines at Ralphton, Penn., has been elected manager of the Canadian Collieries, Ltd., which has developments under way in the vicinity of Cumberland, B. C.

Thomas Davis, of Nanticoke, has been elected a member of the executive board of the United Mine Workers of America by the members of the union in that district, to fill the vacancy caused by the death of John Fallon, of Wilkes-Barre.

Heber Denman has been appointed asst. general manager under Thos. Fisher, of the Berwind-White Coal Mining Co. at Windber, Penn. This company recently abolished the office of general superintendent formerly held by Walter R. Calverley.

At the recent annual meeting of the St. Louis & O'Fallon Coal Co., T. M. Jenkins, former general manager of the St. Louis & Suburban Ry., was elected president; Adolphus Busch, Third, vice-president; Geo. Kauffman, secretary and treasurer.

William A. Rodda, of the United Mine Workers of America, was held up on the night of Jan. 19, by two men on the limited train of the Baltimore & Ohio R.R. and robbed of the membership rolls of the newly organized lodge of the United Mine Workers in Frostburg, Md.

Daniel F. Connor, general sales agent of Whitney & Kemmerer, returned recently from a trip looking over the conditions throughout the territory. He was very optimistic over the outlook of the industry and was gratified at the progress which has been made during the winter. He expects to sail for Panama, Feb. 7.

A. Reiche formerly general manager of the Orenstein-Arthur Koppel Co. at Koppel, Penn., has severed his connection with the firm to assume the position as managing director of a German concern manufacturing locomobiles and agricultural machinery. He will be succeeded by Mr. Erich Joseph formerly of New York.

Edgar Wallace, editor of the United Mine Workers Journal, has given bond in the Federal Court in Indianapolis for his appearance in Colorado to answer an indictment of officials of the union charging them with violation of the Sherman anti-trust law in restraining trade in coal and boycotting mines not employing union labor. Other officials were also indicted.

John R. Bryden, for many years the general manager of the Scranton Coal Co. and the Elk Hill Coal Co., has tendered his resignation, and has been succeeded by Wiliam L. Allen, formerly general superintendent of the two companies. In addition to having been the general manager, Mr. Bryden was a member of the board of directors, and also vice-president. It is not known whether or not he is to retire from these positions as well.

OBITUARY

D. D. Shumway, vice-president and treasurer of the Springfield Coal Mining Co., a prominent coal man of the state of Illinois, suffered a stroke of appoplexy at 5 o'clock, Jan. 20, and died at St. Johns' Hospital a few hours later. The coal company of which Mr. Shumway was an officer, recently suspended operations at all of its mines for an indefinite period and it is thought that the failure of the company to show a profit is partly responsible for the death of the vice-president and treasurer. Mr. Shumway is survived by his widow, three sons, one brother and two sisters.

CONSTRUCTION NEWS

Furnace Run, Penn.—An additional 500-kw. Westinghouse turbo generator is being installed by the Allegheny River Mining Co. at this place.

Hartford, Ark.—The Central Coal & Coke Co. announces that it will shortly spend between $150,000 and $200,000 in opening a new coal mine near this place.

Salem, Ohio—The Dunn Coal Co., of this city, which has under lease a large area of coal north and east of Beloit, is preparing to open mines early in the spring.

Superior, Wis.—The mammoth coal dock of the Berwind Fuel Co. will be completed this year. It is also contemplated to build a briquette plant during the coming season.

Somerset, Penn.—The Consolidation Coal Co. is rushing work on its openings on the John Biesecker farm in the Jenner field. A number of new mines will shortly be opened.

Kittanning, Penn.—A 750-kw. alternating current generator direct connected to a Ridgway engine is being installed at the Conifer operations of the Allegheny River Mining Co.

Columbus, Ohio—An order for 1000 coal cars has been placed by the Kanawha & Michigan Ry. with a Columbus car manufacturing company. The Hocking Valley Ry. has also contracted for 1000 cars with an eastern concern.

Louisville, Ky.—The Harlan Coal Mining Co. has awarded a contract to the Roberts & Schafer Co. for a new "Marcus" coal tipple and retarding conveyor. This plant will be built at Coxton, Ky. at an approximate cost of $25,000.

Tacoma, Va.—The Greenough Mining Co. will increase its plant by opening five new mines in close proximity, largely increasing the output. The company a few days ago increased its capital stock from $50,000 to $1,000,000.

Jenkins, Ky.—The Consolidation Coal Co. makes the announcement that it will open a number of new mines, starting work about Feb. 1. This will greatly increase the coal tonnage from the works in the Kentucky coal field.

Charleston, W. Va.—The Roberts & Schafer Co. of Chicago has secured a contract from the Paint Creek Collieries Co. for the building of a new mining plant in which the "Marcus" table screen will be installed. This tipple will be built at Olcott, W. Va., at an approximate cost of $27,000.

Viper, Ky.—The Lexington & Eastern Railroad Co. is completing plans for the construction of an 8-mile branch up Mace's Creek from Viper to reach rich coal and timber land holdings of a number of corporations, one of them the Kentucky River Harwood Co. having a number of large mills.

Pound, Va.—The Indian Creek & Pound River R.R. will start immediately the construction of the Upper Pound River branch of the road to reach extensive coal and timber fields soon to be developed by the Guest River Coal Co. and the Tidewater Lumber Co. The development will total several hundred thousand dollars.

Athol, Ky.—The Louisville & Nashville Railroad Co. building a 20-mile cut-off between Athol and Beattyville Junction in order to reduce curves and heavy grades has begun laying steel on the new line. It is expected, that this work will be completed and in operation within 60 days. The company is spending about $2,000,000 in the work.

Whitesburg, Ky.—It is announced here by representatives of the Mineral Development Co. that a big development work will be started by this company Mar. 1 at Lower Boone's Fork above here where at least two good-sized industrial cities will be built and a large number of mines opened. Several million dollars will be expended in the development.

Fleming, Ky.—S. T. Mundy who has the contract for the construction of the three-mile branch road up Yount's Fork—a spur of the Lexington & Eastern—has just put 400 extra men on the work in an effort to push its construction. The road will be completed and in operation within 60 days. The Mineral Fuel Co. will spend several million dollars in developments on Yount's Fork.

Waynesburg, Penn.—Rumors are circulating in Greene County to the effect that the Baltimore & Ohio R.R. is planning an east and west line through Greene County, which would open up rich coal territory. It is anticipated that this line would pass through Waynesburg, Rogersville, Rutan and Graysville emerging through the southern section of West Finley Township, Washington County, where but a short line would connect it with the Pittsburgh & Wheeling division of the Baltimore & Ohio.

Whitesburgh, Ky.—A number of large coal developments have been recently started in the eastern Kentucky field especially along the Lexington & Eastern R.R. Among these might be mentioned the Wolf Valley Coal & Coke Co., which proposes starting development work in the next few days and having everything in readiness to ship coal by spring. The Garret-Hardwick Coal Co., has also made the necessary arrangements to start immediately the work of development. A modernly equipped mining plant will be built as well as a number of large sawmills. The Williamson & Pond Creek R.R. Co. also contemplates building 17 miles of coal and

lumber road from the head waters of Pond Creek, to a connection with the Chesapeake & Ohio R.R.

Whitesburg, Ky.—The present year will see an unusual amount of railroad building throughout the Big Sandy and Kentucky River valleys, which comprise a large portion of the coal fields of eastern Kentucky. The Kentucky River and Tug Fork R.R. Co. was recently organized to build a line 17 miles long from the head waters of Pond Creek connecting at Shelby Station, with the main line of the Chesapeake & Ohio up to Big Sandy, also the Baltimore & Ohio branch reaching the Consolidation Coal Co.'s extensive operations at Jenkins. A branch line of the Baltimore & Ohio at Long Ford near the Letcher-Pike border, a distance of 8 miles, has also been announced. This is to reach the holdings of the Elkhorn Gas & Coal Mining Co. A large number of branches of the Lexington & Eastern are assured in Letcher and Perry Counties. These include the Pottersfork, Younts Fork and Bottom Branch extensions to reach the holdings of the Mineral Fuel Co. Branches of the Lexington & Eastern are also planned up Big Leatherwood, Line Fork, Mace's Creek and Rockhouse Creek. It is expected that all of these will be built during the present year.

NEW INCORPORATIONS

Linton, Ind.—The Linton-Summit Coal Co. has increased its capital stock from $45,000 to $50,000.

Danville, Ill.—The Beach Flats Coal Co. has increased its capital stock from $100,000 to $125,000.

Danville, Ill.—The Two Rivers Coal Co. has increased its capital stock from $100,000 to $125,000.

Strattanville, Penn.—The Co-operative Coal Co. has been incorporated with an authorized capital of $50,000.

Cincinnati, Ohio—The Beddall Coal Co., of Union County, has changed its name to the Hercules Coal Co.

Lexington, Ky.—The Eureka Coal & Mineral Co. has been incorporated with a capital stock of $75,000 to develop coal lands.

Salem, Ohio—The Salem Mining Co. has filed papers with the secretary of state increasing its capital stock from $75,000 to $150,000.

Barbourville, Ohio—The Tye-Wheeler Coal Co. has been incorporated with a capital stock of $10,000. The incorporators are George W. Tye, R. R. Wheeler and Myrtle Tye.

Nashville, Tenn.—The Tennessee River, Coal & Coke Co., of Hamilton County, has been organized with a capital stock of $125,000. The incorporators are J. P. Gillespie, F. T. Tarver, J. T. Walker, J. E. Pride and G. D. Murray.

Wetumka, Okla.—The Hokesy Mining & Development Co. has been organized with a capital of $6000. The incorporators are Thos. H. Dunson, Laura E. Dunson and F. H. Williams, all of Wetumka.

Columbus, Ohio—The Bixler-Ohio Coal Co. has been organized in Columbus to mine and deal in coal. The capitalization is $20,000 and the incorporators are R. T. Irwin, J. W. Miller, A. Roahrig, R. M. Stimmel and D. R. Postlewaite.

Uniontown, Penn.—The Biddle Coal & Coke Co. has been organized in Uniontown to mine coal and manufacture coke. The capital stock is $250,000, and the incorporators are A. P. Austin, J. P. Robinson, John B. Carr, John E. Hess and George Patterson, all of Uniontown.

INDUSTRIAL NEWS

Cincinnati, Ohio—Fire believed to be of incendiary origin recently totally destroyed the coal elevator of the Baltimore & Ohio Southwestern R.R. in Cincinnati entailing a loss estimated at $10,000.

Waynesburg, Penn.—George E. Rice, of Waynesburg, recently closed a deal for several small tracts of coal in Belmont County. This purchase gives Judge Steel and his associates title to about 8000 acres of coal on the Baltimore & Ohio R.R.

Charleston, W. Va.—The Safe Deposit & Trust Co., of Pittsburgh, Penn., has purchased from Edward E. Duff, trustee, 14,386 acres of land in Kanawha and Boone Counties, formerly owned by the Forks Coal Co. The price was reported as being $124,000.

Cairnbrook, Penn.—Noah Blough, owning about 100 acres of coal land above Shade Furnace, closed a deal with H. C. Cook, of Johnstown, for the purchase of the tract for $25,000. This sale means another opening along the Cairnbrook extension of the South Fourk branch.

Fairmont, W. Va.—A report was recently circulated that negotiations were under way which looked to the merging of the Elkhorn Fuel Co. with the Consolidation Coal Co. The properties of these two firms in Kentucky are contiguous and if the deal is effected, it will bring under one management over 400,000 acres of coal in Kentucky.

Philadelphia, Penn.—Figures for the first 11 months of 1913 show that the Reading R.R. shipped more soft coal than hard. Of the total shipments of 27,609,127 tons of coal handled during the first 11 months 15,761,638 tons were bituminous coal and 11,847,489 were anthracite. In other words 57 per cent. of the total coal shipments over the road were of bituminous.

Wheeling, W. Va.—During the past week or so the coal industry in West Virginia has revived considerably, and the mines are now working smoothly and steadily while the demand for coal has increased. The uneasiness over the conference between the miners and operators which will take place in April is thought to be partly responsible for the increased purchasing of coal.

Columbus, Ohio—Requests have been made of Attorney-General Hogan that he drop the suits started by the state against the Columbus & Ohio, Hocking Valley and the Kanawha & Michigan railways to dissolve joint ownership between the three lines. It is said by the officials of the railway companies that the federal decision dissolved the relationship and that this has been lived up to.

New Orleans, La.—The Alabama & New Orleans Transportation Co. recently launched the largest lighter ever built in the South. This craft, which is to be propelled by internal combustion engines has a carrying capacity of 1000 tons, is 240 ft. long and has a rate of coaling vessels of 275 tons per hour. The vessel will be a valuable acquisition to the large fleet of steel barges now owned and operated by the company.

Elkhorn, Ky.—The Elkhorn Fuel Co. which recently purchased a large area of fine coal land from the Long Fork Coal Co. on Long Fork Creek, Pike County, makes the announcement that it will begin immediately the initial work of development there. A first-class coal mining plant will result. The company is well under way on a mammoth coal mining plant on Beaver Creek, building two industrial cities Wayland and Allen.

Indianapolis, Ind.—Resolutions sent in to the national convention of the United Mine Workers of America from various parts of the central competitive field indicate that it is probable that the scale committee's demands will include one for a 10% advance in wages, and that probably the Ohio miners demand for "run-of-mine" will be broadened out to include the remainder of the central competitive field. These demands will be laid before the operators at Philadelphia Feb. 3.

Fayetteville, W. Va.—It is rumored in mining circles that the Virginian R.R. will soon award six leases in and around Mullens. It is stated that several applicants for the leases were in the field, but probably two large mining syndicates will be awarded all six. The territory embraced in the field is understood to be 5000 acres, which the road recently acquired in exchange for land situated on Cabin Creek. The whole territory is located on the main line of the Virginian.

Pittsburgh, Penn.—More than 1,000,000 bushels of coal were shipped down the Ohio River, Jan. 22, towed by boats operated by engineers, who, according to the Marine Engineers Association, are strike breakers. The Monongahela River Consolidated Coal & Coke Co. and the Diamond Coal Co., the heaviest shippers on the river, are holding out against the union engineers who on Jan. 1 demanded an increase in salary from $100 a month and board to $125 a month and board.

Birmingham, Ala.—Chief Mine Inspector Nesbitt has announced the successful candidates for state mining certificates for the first- and second-class mine foreman and fire bosses in the examinations held Jan. 20 to 22. In the first class foreman's list William Drury took first place with an average of 91. William Chase and William Mulholland taking second and third places. Among the first class fire bosses J. Y. Malone and Edgar McElreath tied for first place. U. West made the highest mark for second-class mine foreman. The percentage of failures was comparatively low. Many of those who would have applied for certificates were not allowed to do so because they had not had actual experience with safety lamps in the mines. Without this knowledge, other qualifications are of no avail.

Coal Trade Reviews

General Review

Slowing down in operations and lower prices characterize the anthracite market; consumers have full supplies and demand light. January bituminous trade considered the worst in years. Accumulations the rule and much coal on demurrage. Producers have lost their former confidence and even strike scare fails to stimulate business.

The stimulating effect of the recent cold snap has died out, and the anthracite trade has again relapsed into its former lethargy. The heavy production and light consumption, due to the unseasonable weather, has resulted in such large accumulations that operators are being forced to restrict production for the second time this year—a most unusual procedure in the mid-winter season. The dealers are filled up on all sizes with the possible exception of some of the steam grades; there is only a scattering demand, and orders are promptly filled. The independents are endeavoring to force the market with substantial concessions, particularly on egg coal.

The bituminous market is under equally heavy pressure. Accumulation at all points is the rule, and the spot market is much depressed with substantial concessions on the regular circulars being freely offered. The January trade is considered by some as the worst for that month, in the history of the industry. Even under heavily curtailed operations, the producers are experiencing much difficulty in placing their tonnage. As a rule, the movement on contracts continues fair, but some suspensions have even been noted in this business. Consignment coal is appearing in all parts of the country, which is tending to make buyers cautious.

The Pittsburgh district reports little inquiry with prices still being cut, and operations reduced to 50% of full rated capacity. The opinion prevails among many that there will be a suspension of some duration beginning April, which will be followed by a short but active and profitable summer trade. The new January circular in Ohio has been fairly well maintained, but the consistently warm weather has severely shaken the confidence of the sellers. The possibility of a suspension in mining Apr. 1 is doing little to stimulate the market, a great many manufacturers, working under restricted operations, finding it possible to accumulate stocks on their regular requisitions.

The accumulations at Hampton Roads last week were the highest for some months, while the demand from all sources was particularly light, although prices continue holding moderately firm with some agencies even short of tonnage for immediate loading. The demand in the Southern markets continued far below the average for this period, some inquiries on contracts being the only favorable feature in that market.

Although there has been an occasional cold snap in the Middlewest, the more or less continued mild weather has produced almost summer-like conditions in the coal trade. Prices have reacted to new low levels, and even the strike scare has failed to help matters. Quotations on contracts are holding moderately steady, but there is considerable shading on spot business. It is stated that the operators will go into convention with the miners, with instructions to effect a settlement at any cost. There is also a strong movement to continue operations pending a settlement so that consumers feel relatively safe.

EASTERN MARKET

BOSTON, MASS.

Active campaigning for contracts already begun on Hampton Roads coals but buyers are expected to be slow responding. Low spot prices have unfavorable effect. Stocks large everywhere. Anthracite inquiry confined to odd sizes and buyers are conservative.

Bituminous—Preliminary canvassing for contract business on the part of some of the Pocahontas and New River agencies is causing considerable comment. Buyers especially are beginning to feel this will be an "easy" year and they are not much inclined to close business until they can get a better line on spring developments. Practically all the Southern shippers are expected to make an aggressive campaign for contracts but it is probable that the season will be slow starting and further that it will spread over longer than usual.

Meanwhile the accumulations at the Virginia piers are still very much in excess of current requirements and this in spite of rigid curtailment at most of the operations. The spot market is considerably depressed and reputable coals have been offered more or less freely at a considerable discount from the $2.85 basis. Further offerings of "market coal" for delivery inland have had an unfavorable effect on the market as a whole and particularly those buyers who might otherwise be disposed to come in early. Government and off-shore requisitions are few in number and even the large corporations are backward about accepting their full monthly quotas on contract. Outside of these factors that are pressed with coal to move there is, however, almost nothing doing on Pocahontas and New River in this territory at this writing.

Georges Creek shares the general apathy, and shipments are extremely light for the season. The demand for the higher grade Pennsylvania is still very quiet, with no significant change to report. Stocks are large in every direction.

Anthracite—There is only scattering demand, and that for odd sizes to piece out the next month or so. Few dealers have courage to buy further ahead as February weather is uncertain. The slow movement of barges is inducing some to be more forehanded, but there is almost no life to the trade.

Water Freights are somewhat firmer on account of the storms that have prevailed; 75c. is now the minimum rate for steam or barge tonnage from Hampton Roads to Boston, but inquiry is confined to a few large shippers.

Current wholesale quotations are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.55	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.20@2.80	2.50@2.85	2.92@3.02	
New York*	2.50@3.10	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.50@3.67
Providence†				3.58@3.72

*F.o.b. †On cars.

NEW YORK

Full stocks of anthracite, both at tidewater and all-rail. Operations heavily curtailed and individual prices on domestic grades decline sharply. Bituminous also at a low ebb. Much consignment coal reported and practically no spot business being negotiated.

Anthracite—The New York hard-coal trade is unchanged but slower if anything. As is to be expected in a weather market, such as now prevails, the dullness is accentuated on the domestic sizes. These are all in poor demand, the trade being full up both all-rail and at tidewater. Egg coal is probably the heaviest and if the unseasonable weather continues, and there is no curtailment in mining, there will be considerable stocks of this grade carried over. Stove coal is not in such excess supply.

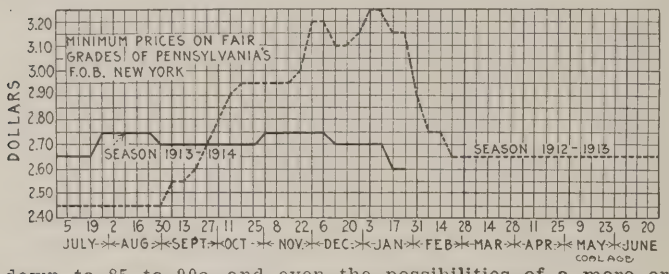
Curtailment in mining has become generally established throughout the region. Nearly all the large companies are restricting operations to a greater or less extent while individuals are said to be down to a basis of about three days per week. Since the consumption of the steam sizes is not affected so much by the unsatisfactory weather conditions, there is somewhat of a shortage of these due to the curtailed operations. Rice, barley and No. 2 buckwheat are particularly short, but all the finer grades are in rather active demand as the output of these is much reduced by freezing weather.

We quote the New York market considerably off from last week, as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	$4.50@5.00	$5.05	$4.45@4.95
Egg	5.25	5.25	5.30	5.20
Stove	5.25	5.25	5.30	5.15@5.20
Chestnut	5.50	5.50	5.55	5.35@5.45
Pea	3.50	3.55	3.50	3.45
Buckwheat	2.75	2.75	2.70@3.45	2.25@2.70
Rice	2.25	2.25@2.35	1.95@2.20	1.90@2.20
Barley	1.75	1.75@1.80	1.70	1.50@1.70

Bituminous—The soft-coal situation is even worse than anthracite. Nearly everyone seems to be stocked up to the limit and quite a little demurrage coal is being reported. Operations in Pennsylvania are about 75% capacity and business is confined mostly to contracts, requisitions on which are fair. Companies who failed to get their production covered are the principle sufferers from the depression.

The outlook is mostly conceded to be pessimistic. Railroads are stocked up with full supplies. Coal is offered



down to 85 to 90c. and even the possibilities of a more or less protracted suspension in mining after Apr. 1 has failed to have any reviving influence on the situation. There are some optimists in the market, however, who feel that the buying has been so light recently that consumers stocks must be down to a low point, and this together with the possibility of labor troubles, will start a sharp buying movement about the middle of February.

We quote the New York market still weak but with the price base unchanged as follows: West Virginia steam, $2.60 @2.75 good grades of Pennsylvania, $2.75@2.85; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.

PHILADELPHIA

Zero weather stimulates demand for hard coal but conditions still slow. Mining restricted and the demand continues rather light. Bituminous market fails to rally in sympathy.

Anthracite—The local hard-coal market last week was more encouraging. The appearance of real winter weather early in the week stimulated the demand and increased consumption to a greater extent, even more than the most optimistic operator or dealer anticipated. The change was badly needed as the operators were contemplating half-time operations but conditions have now assumed a better aspect.

The continuous large shipments and the decreased consumption, because of the mild weather, had been seriously felt here for several months. Throughout the city yards and cellars were filled with coal that has not been required. The result was that since the middle of November there has been an exceedingly slack trade with the usual concessions in prices. Now the trade feels that it has come into its own at last and that normal activity is to be expected by the end of this month.

Bituminous—Conditions have not altered in the bituminous trade. Some coal is moving on contracts but new orders are scarce. Cheap grades can be bought at from 90c. to $1 but good grades are bringing $1.25@1.40.

BALTIMORE, MD.

Low prices for soft coal continue. Demand not active and suspension of contract obligations in evidence. Retail hard-coal market fairly good.

The entirely unsatisfactory period of low-priced soft coals continues in this market. Demand is the worst for a close of January that has come to the trade for some years. All of the mining centers near-by are feeling the effects of this condition. Some of the largest mines are only working about two days per week. Even at that there is trouble in disposing promptly of the coal produced. One of the great troubles of the trade just now is the suspension of contracts.

Prices to the trade in West Virginia do not give any great encouragement. Slack was quoted down to 65 and 70c., and three-quarter gas around 75 and 80c. West Virginia steam coals were again quoted around 90c. West Virginia low-grade fuels were bringing from 90c. to $1, while best grades were offered from $1.20 to $1.25.

The anthracite coal trade is experiencing but a fairly good period. The weather as a whole is below the seasonal average, despite the occasional colder spells, and household trade has not been quite up to the mark. The much talked of merger of some twenty of the largest coal concerns here is now reported to be progressing favorably, and an announcement of its consumation may be made in the next couple of weeks.

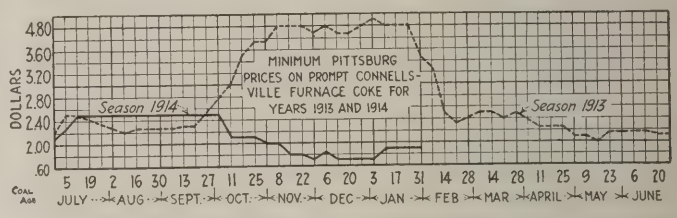
In export lines fairly good progress is being made. Mexican shipments have been resumed, although they are not as heavy as they should be. The month of January, however, is expected to show a considerable tonnage moved from this port to foreign points.

CENTRAL STATES

PITTSBURGH, PENN.

Mine operations continue light, about 50% capacity, with prices being cut on prompt. Miners in convention at Indianapolis. Connellsville coke market quiet, with some operators showing low production.

Bituminous—Mine operations continue on a very restricted scale, little, if any, above 50% of full mine capacity. Many mines are closed entirely, while a few are operating at nearly normal. Prices continue to be cut by a number of sellers except in the case of slack, which is bringing $1@1.15, or above list. While there is little inquiry regarding contracts, full list prices would doubtless be quoted, and we repeat the list as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25, mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district. While the exact demands of the miners in connection with a scale for the new period beginning Apr. 1 are not known, it is well understood that the convention at Indianapolis will demand advances, together with the establishment of a straight mine-run rate, instead of a rate on screened coal with a differential for mine-run.



Connellsville Coke—The market has been quiet, but it maintains some show of strength. Prompt furnace coke is not openly offered below $1.90, though it is reported that one furnace interest, which refused to pay above $1.75 for any coke for this year, has picked up various odd lots at not over this figure. There is nothing doing by way of contracts, and two or three inquiries recently put out do not seem to have led to business. Several consumers covered for January only and their inquiries for February are expected within a few days. Some of the operators who held out for the full $2 price are showing extremely light operations. We quote: Prompt furnace, $1.90; contract furnace, $1.85@2; prompt foundry, $2.40@2.65; contract foundry, $2.40@2.65, per ton at ovens.

BUFFALO, N. Y.

Some improvement in the bituminous trade. Steady winter weather will soon restore activity. Surplus coal about gone. Anthracite more quiet. Coke stronger.

Bituminous—The bituminous trade in general agrees that the demand is better than it was a month or even a week ago. Both here and in Canada the consumer is beginning to take an interest and if the weather should become cold there will be plenty of business before long.

It is generally thought that the miners will go out at the end of March and as a rule the operators will not object. Indications point to a suspension of considerable length, followed by a short summer season with a good, paying trade. The feeling in the Philadelphia market, which depends largely on coal from nonunion mining districts is said to be more confident, but the cue of the operators is to let the miners do what they like in the matter. If they elect to go out they can do so and the suspension will be allowed to last till the market is out of surplus coal. Quite often this plan is not carried out very fully, but there seems to be every reason for it now.

Coke—There is also an added firmness in the higher grades of coke, the best foundry output being quite scarce in most markets, due both to restricted output and to a better demand. The lower grades are, however, plenty enough and promise to remain in surplus for some time. Prices are based on $4.50 for best 72-hr. foundry, with a slight upward tendency.

Anthracite—There is no stir in the anthracite trade, one reason being the heavy overstocks and the short duration of the occasional cold snaps. This trade is more affected by weather conditions than others and the fact that the winter in the West and Northwest is even milder so far than it is East has a distinctly depressing effect.. All anthracite mines are running on part time, and still there is some unsold coal from independent companies reported here and there. No premium has been obtained over the regular circular this season.

TOLEDO, OHIO

Domestic market was slightly stimulated by lower temperatures. Operators and dealers are still optimistic. Prices are holding up better than was anticipated. Little track coal and traffic moving well.

A briskness in the demand for domestic is noted as the result of some real winter weather in Toledo. Despite the return of milder temperatures toward the end of the week operators and dealers are still confident and the weather bureau has predicted continued lower temperatures. A strong demand for Pocahontas egg is evident and dealers need orders for lump coal in order to meet the demand for egg. Pittsburgh No. 8 is also strong.

Owing to curtailment at various factories steam coal is in light demand. Three of the sugar plants also shut down last week and this threw an extra tonnage on the market. One comforting fact in the local situation is that prices are holding up wonderfully well. Two weeks ago it seemed as though this would not be the case but the scarcity of various grades at the mines has served well to pull the former firm prices back to normal.

COLUMBUS, OHIO

Little change in the local trade reported during the past week. Weakness still apparent in both steam and domestic. Mining operations are not active. Little stocking reported as yet.

Continued slowness has characterized the coal trade in Ohio during the past week. The mild weather has affected the domestic trade adversely and dealers are not placing orders extensively. The steam trade is also quiet and on the whole the market is completely at the mercy of weather conditions. The price list of the middle of the month is being well maintained, although there are some instances of cutting to force trade.

Contrary to expectations there is little being done by steam users toward stocking up to guard against a suspension after Apr. 1. Manufacturing plants are accumulating stocks from their usual requisitions which are not being consumed because of the warm weather and slack orders. Some railroads which do not penetrate any coal fields are stocking up some, but on the whole most of the consumers are not worrying over the future.

In the domestic trade dealers are loath to place orders, even for future delivery. The continued mild weather has interfered with trade seriously and many of them have let a number of wagons go into other business. Small orders are the rule and the larger users who laid in their supply in the fall have not been compelled to place second orders. There is some demand for the fancy grades, but even these are weak.

Production has increased very slightly. In the Hocking Valley and Pomeroy Bend the output is estimated at 50% normal. In the strictly domestic fields it is only about 40% of the average, but eastern Ohio is increasing, reports showing about 55 to 60%.

What steam contracts expire at this time are being renewed without a great deal of trouble. The prices generally are the same as prevailed in 1913.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50 @ 1.45	.....	$1.50 @ 1.45	$1.50 @ 1.40
3-4 inch	1.35 @ 1.30	$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.25
Nut	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.80 @ 0.75	.....	0.85 @ 0.80	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	1.00 @ 0.95	0.75 @ 0.70	0.70 @ 0.65

DETROIT, MICH.

Some indications of industrial improvement had a mildly stimulating effect, but the market still rules dull at a discouraging low level. Demand fails to materialize as a result of the strike talk. Negotiations on contracts for the new year.

Bituminous—There is some improvement in new business, but track and spot coal remain about the same with perhaps a decrease in the supply of cheaper grades. Interest is beginning to focus on the making of new contracts, and there are rumors of an advance of 10c. per ton over last year's figures. It is doubtful, however, if operators will succeed in maintaining an increase of even 5c. per ton.

Anticipated labor troubles, Apr. 1, have failed to create any renewed activity at the mines. Some indications of improvement in general industrial manufacturing had a mildly stimulating effect, but the reports of an almost unprecedented surplus of idle coal cars was a weakening factor in the situation. The domestic market continues dull and uninteresting at a discouraging low level. The colder weather of last week created some demand, but coal came in, in unlimited quantities to meet it. Local coal men have hopes, however, of a profitable season this year.

Anthracite—The supplies of hard coal exceed requirements, and it is now almost certain that stocks will be carried over into the spring.

Coke—Coke is slightly more active, local ovens which have been closed for the past month having gone in blast. Connellsville is quoted at $2.25, Solvay at $3.25, and gashouse at $3 f.o.b. ovens.

HAMPTON ROADS, VA.

Coal accumulation slightly above normal. Norfolk & Western Ry. makes record day's dumping. Some shippers still short and prices holding remarkably well.

In consequence of only a fair movement from tidewater the accumulation of coal is somewhat larger than it has been for some months. The demand from all sources has been particularly light during the entire week. In addition to the falling off in cargo vessels there has also been a decrease in the arrival of bunker steamers. The falling off in the latter is probably due to light export shipments from the Southern ports. Although there is more than the normal supply on hand some of the largest shippers are short of coal for tonnage actually in port.

Even with the light demand it is impossible to find that there has been any cut in prices. Some spot sales have been made during the week but it is impossible to ascertain at what prices. It is not believed, however, that they were made below the regular circular.

Notwithstanding the light shipments from Hampton Roads the Norfolk & Western Ry. on Jan. 19, had the heaviest day's dumping ever made over the piers of that road at Lamberts Point. Five barges and a like number of cargo steamers were loaded with 832 cars, a total of 36,692 tons. This is 2834½ tons more than was dumped on Dec. 22, 1913, the largest previous record. The total dumpings for December 22 was 33,857½ tons.

LOUISVILLE, KY.

Consumption abnormally low and few dealers are inclined to buy. Large surplus of railroad cars. Mine operations much restricted. Price cutting becoming general.

The coal trade is still facing an almost unvarying continuance of mild weather, one or two days of comparatively low temperatures early in the week not being sufficient to affect the market appreciably. This has made domestic coal increasingly difficult to move, inasmuch as the stocks accumulated during the past month still remain much too large. Consumption has been at an abnormally low point and domestic users are not inclined to buy in view of the approach of the second month of the year and the last of the winter.

The present excellent car supply, and the rapidity of the movement are largely due to the small volume of business as compared with a normal season. It is reported that many mines are only working two days a week, while other operations have stopped entirely, the supply of coal already in the hands of the trade being excessive. The high stage of the Ohio for the past month has enabled the river companies to replenish their holdings considerably, so that there is a large supply of coal in all quarters with little demand.

Quotations on the best grades of eastern Kentucky block are made at $1.85, but this is shaded to effect a sale. It might be said that there is practically no market for the domestic grades, and hence no figure which would represent a fair average price. The steam market is somewhat more satisfactory, the supply being larger than the limited operations would seem to provide, while prices are fairly good, considering the general state of the market. For the first grades 85c. is about the average figure, while for second qualities and western Kentucky screenings 15 to 20c. lower is the market.

SOUTHERN AND MIDDLE-WESTERN

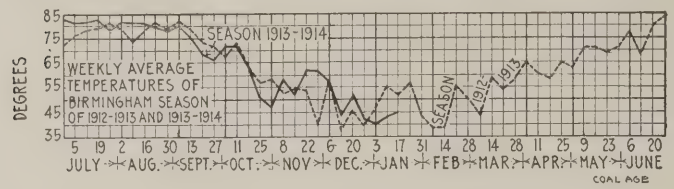
BIRMINGHAM, ALA.

Very little change in coal market. Furnace and foundry coke still quiet and blacksmith coal satisfactory. Large sales of pig iron with prices slightly below $11. Car situation improving.

From the indications about ten days ago, it seemed that the coal market was picking up, but the past week has brought little improvement, either on lump or steam coal, and while the demand is slightly better on both grades than it was two weeks ago, still, it is far below the average for this season of the year. As a rule, all mines are being rushed to their full capacity to fill lump orders, but the operators are experiencing some trouble in keeping their output moving

regularly. The steam trade is not in a much better condition, though the past week has brought out inquiries for contracts amounting to approximately 50,000 tons.

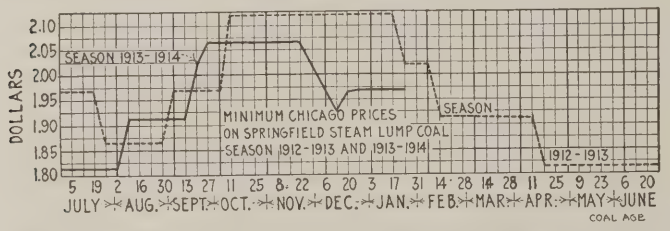
The conditions generally are not satisfactory. Furnace and foundry coke are still quiet, though prices are holding up. Blacksmith coal is moving in about its normal tonnage. Furnaces report large sales of pig iron, one operator reporting approximately 25,000 tons sold for the week, the base price being slightly below $11 for 2 Foundry f.o.b. Birmingham. The car situation has improved to some extent, and little trouble is being experienced for want of equipment.



CHICAGO

A continuation of warm weather and light buying has caused some prices to reach new low levels. Steam users are not in the market except for comparatively small amounts. A renewal of activtiy in the southern Illinois fields has been noted.

Lack of usual buying by consumers has been a noticeable factor in the anthracite trade. Consumption in apartment houses and other dwellings is about normal, but there has been a marked falling off in other business. Easier conditions prevail so far as smokeless is concerned. It is not difficult to obtain a lot of mine-run from small producers at $1.25 a ton, although the larger operators are still demanding $1.40, the mines. The demand for lump and egg is fairly good, the market being firm at from $1.85 to $2.25, the mines. The circular price of Hocking remains at $1.75, although there are many sales at $1.50 for the best grade.



The attitude of many concerns in restricting expansion until they can ascertain what Congress proposes to do on the subject of anti-trust legislation is having an important effect on the steam trade. Smaller concerns are following their example and the result is slow business.

An increase in activity has been noted in the southern Illinois fields. The major producers of Franklin County coal are selling lump and egg at $1.65@1.75. The action of the railroads and some other large consumers of steam coal in making purchases for storage purposes has had a beneficial effect on the market. A reduction of 5c. a ton in Springfield steam lump and mine-run and a cut of 10c. in the price of screenings has been recorded. Indiana operators report light buying and few signs to indicate that business will be accelerated to any marked degree in the near future. The current needs in furnace and foundry coke are being taken care of by small purchases. Few contracts are being closed. Carterville producers are selling lump, egg and No. 1 washed at $1.50 to $1.75.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.32	$2.55@2.80	$2.27	
Steam lump	1.92		1.97	
Egg		2.55@2.80		$3.90@4.30
Mine-run	1.32	2.30	1.87	3.30@3.45
Screenings	1.47	1.75	1.47	

Prices quoted for Harrisburg coal are: Domestic lump and egg, $2.55@2.85; steam lump, $2.25; mine-run, $2.25; screenings, $1.75; No. 1 nut, $2.55@2.85; No. 2 nut, $2.55.

Carterville prices are: Lump, egg and No. 1 washed, $2.55@2.85; No. 2 washed, $2.55.

Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; byproduct, egg, stove and nut, $4.90@5; gas house, $4.65@4.75.

INDIANAPOLIS

Mild weather a check to good business. Dullest January on record at the mines. Brief spells of cold weather prevent demoralization, but some bargains being offered. Miners making about half-time.

Continuation of mild weather tends to make conditions dull in the coal industry. It would be unprecedently so, if there were not brief interspersions of cold weather that make it necessary for the domestic consumers to keep an ample supply on hand. Operators say that, taking the season as a whole, the 21,000 miners of the state have not made better than half-time. They cannot recall a January when mining operations were so slow. Better reports are coming from the iron and steel industry, however, and this means an improvement in the coal mining industry.

There has been a check to the buying caused by fear of a suspension of work after Mar. 31, when the present wage contract runs out. Operators and miners have both passed resolutions opposing any shut-down during wage negotiations, no matter how prolonged these may be. The final action concerning this, however, is in the hands of the interstate joint committee that meets in Philadelphia, Feb. 3. The feeling is general that there will be no material change in the wage schedule and some Indiana operators are so certain of this that they are trying to make yearly contracts on the same wage basis as last year. The largest consumers also seem to be taking it for granted that if there is a suspension it will be a short one.

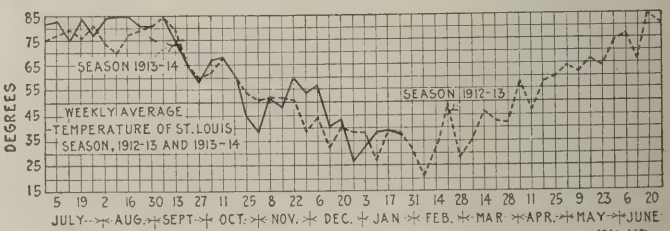
Mines that do a large part of their total business on contracts are holding prices steady but some bargains are being offered at retail, probably indicating concessions made by some mines. Several yards have cut prices 25c. all down the line and on some coals 50c. a ton. One of them offers "good, clean Indiana lump, best quality," at $2.90 a ton, as against $3.50 the general price, and Hocking lump at $4.20, as against $4.75.

ST. LOUIS

Market conditions continue adverse, owing to mild weather, and failure of big steam users to put in usual storage supplies. Colder weather predicted which it is hoped will bring better conditions. Rumors from the strike zone.

Market conditions here continue in practically the same rut as for the past several weeks. Continued warm weather has kept business in perhaps a worse condition than it could possibly be in the middle of the summer. Usually at this period of the year, preceding the termination of a wage agreement between the miners and the operators, there is an unusual amount of storage coal bought, but there is little if any being purchased at this time, principally because the railroads have been stocking up gradually for several months, on account of the attractive prices.

Manufacturers, as a rule, are not expecting at the present time to place for any great amount of storage coal. They are under the impression that the miners and the operators will accede to the demands of certain railroad interests. It seems that one of these demands is that operators on certain railroads have been instructed by the road's officials to do everything possible to prevent a suspension and they will go to the convention instructed this way. On the other hand, the small operators would welcome a suspension of from two to three months. It would bring good prices now and enable them to shut down during a period when there is no business under the most favorable conditions.



Locally, the screenings market has dropped off and seems to be getting lower, and strange to say, the same applies to the screened sizes. All these latter have dropped during the past week, and there is no immediate indication that there will be any advance soon, although there now seems to be a likelihood of St. Louis getting a little real winter weather.

Anthracite, smokeless and coke are moving slow; the first is usually a demurrage proposition at East St. Louis.

The prevailing market is:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump				$0.90@1.00
3-in. lump			$1.40	
6-in. lump	$1.25 @ 1.50	$2.25	1.50	1.15@1.25
Lump and egg	1.85 @ 2.15			
No. 1 nut	1.15 @ 1.40			
Screenings	0.75 @ 0.80			
Mine-run	1.10 @ 1.20			
No. 1 washed nut	1.60 @ 1.75	2.25	1.60	
No. 2 washed nut	1.25 @ 1.35		1.25	
No. 3 washed nut	1.15			
No. 4 washed nut	1.05			
No. 5 washed nut	0.50			

KANSAS CITY, MO.

Operations at the mines much restricted. Market dull and hinging entirely on weather conditions. Prices resisting any tendency to decline.

Remarkably variable weather has prevented the coal operators from making much of a gain during the past week. Arkansas mines have operated only about half-time. Those in Kansas and Missouri have done a little better, as a rule, running about four days. The weather, the key to the situation, has been inconsistent, providing extreme cold one day and balmy breezes the next. The market has been steady, but far from strong.

OGDEN, UTAH

Moderate weather prevails and mines idle because of no orders. Operators believe season's demand for coal is over and are putting mines on half-time basis. Freight rate reduction to Northwest. Shipments to sugar factories discontinued.

During December 1913 the operators had a hard time to keep orders coming in fast enough to take care of the production. January 1914 opened up weak and it has been a continual fight to dispose of the output. Many of the operators kept their mines running in order to hold the men, thinking January would bring some winter weather, and increase the demand for coal; however by January, 15, it was the general impression that such would not be the case. Reports from Portland, Walla Walla and Spokane show that weather conditions are above normal and that these points have had practically no winter weather. One report states that the rose bushes in the parks at Spokane show indications of budding.

All of the sugar factories have completed the season's run and shipments of slack and steam coal have been discontinued. This has caused a surplus of slack coal at the mines. There is also a surplus of nut coal and prices have been lowered at times. A permanent reduction of 25c. on nut for shipment to Nebraska was established early in January in order to move the surplus.

The Union Pacific, Oregon Short Line and Oregon, Washington Railroad & Navigation Cos. announced a reduction in the freight rate on coal from Rock Springs effective Jan. 8, to points northwest of Huntington, Oregon. This reduction was made necessary by the commission's reduction in the freight rate on coal in the Sheridan district of northern Wyoming. These coals originate on the C. B. & Q. R.R. and come in direct competition with Rock Springs coal in Washington, Oregon and northern Idaho. The reduction in the Rock Springs rate varies from 25c. to 90c. per ton.

Present quotations are rather weak and unsteady on the following basis:

	California	Nebraska	General
Lump	$3.00@3.50	$3.00	$2.75
Nut	2.50@3.00	2.00	2.25
Mine-run	1.85	1.85	1.85
Slack	1.00	1.00	1.00

PRODUCTION AND TRANSPORTATION STATISTICS

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for December and the twelve months of 1912 and 1913 in short tons:

	December		Twelve Months	
	1913	1912	1913	1912
Anthracite	1,012,125	1,036,717	10,711,335	10,312,348
Bituminous	4,354,729	4,271,702	51,526,267	46,434,187
Coke	880,962	1,242,882	13,892,825	13,371,345
Total	6,247,316	6,5 1,301	76,330,427	70,117,880

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during December, 1913, and the twelve months, as compared with corresponding periods of 1912 in short tons:

	December		Twelve Months	
Coal	1912	1913	1912	1913
Tidewater, foreign	84,083	150,886	1,343,311	1,542,950
Tidewater, coastwise	258,216	331,829	3,583,283	3,805,847
Domestic	1,355,189	1,353,108	17,716,575	18,543,672
Coke				
Tidewater, foreign	.....	575	52,762	31,082
Domestic	134,763	116,730	1,416,856	1,499,302
Total	1,832,251	1,953,128	24,112,787	25,422,853

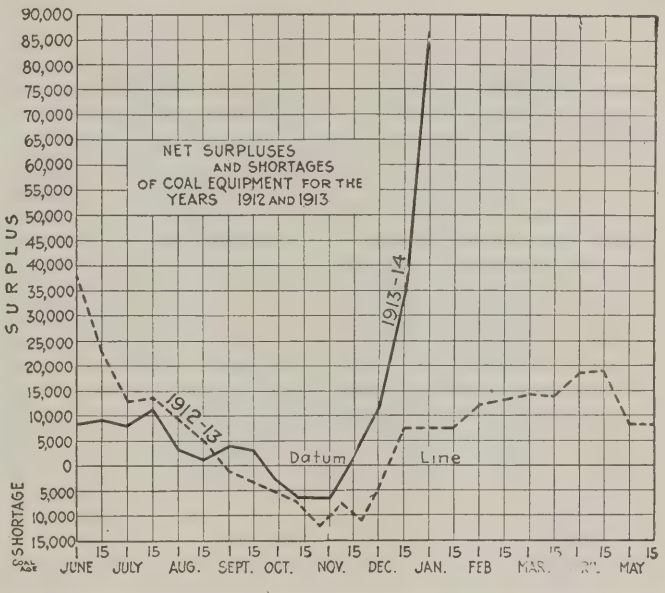
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Jan. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	633	0	**633**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	22,362	350	**22,012**
Ohio; Indiana; Michigan; Western Pennsylvania	40,065	109	**39,956**
West Virginia, Virginia, North & South Carolina	4,419	254	**4,165**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	7,347	55	**7,292**
Iowa, Illinois, Wis., Minn.; North & South Dakota	3,609	15	**3,594**
Montana, Wyoming, Nebraska	460	0	**460**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,770	0	**2,770**
Texas, Louisiana, New Mexico	468	6	**462**
Oregon, Idaho, California, Arizona	5,016	0	**5,016**
Canadian Lines	0	0	0
Total	77,149	789	**86,360**

	Sept. 15	Oct. 1	Oct. 15	Nov. 1	Nov. 15	Dec. 1	Dec. 15	Jan. 1
Surplus	8,714	7,953	6,614	6,720	10,520	17,621	36,425	72,535
Shortage	7,731	10,393	12,502	12,595	8,477	5,095	2,295	57
Net*	**983**	2,440	6,488	5,875	**2,043**	**12,526**	**34,140**	**72,478**

***Bold face** type indicates a surplus.



FOREIGN MARKETS

GREAT BRITAIN

Jan. 16—The position is unchanged, buyers being still able to purchase upon easy terms for prompt loading, and as regards forward shipment, inquiries are being held off the market. Outputs are very heavy.

Quotations are approximately:

Best Welsh steam	$4.56	Best Monmouthshires	$4.17
Best seconds	4.44	Seconds	4.05
Seconds	4.26	Best Cardiff smalls	2.64
Best dry coals	4.56	Seconds	2.46

The prices for Cardiff coal are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, exclusive of wharfage, and for cash in 30 days.

BELGIUM

Belgium imports and exports for 11 months ended November, 1912 and 13 were:

	Imports		Exports	
	1912	1913	1912	1913
Coal	8,116,243	7,409,763	4,498,231	4,652,783
Coke	1,032,131	860,784	1,013,221	923,206
Briquettes	430,612	391,744	580,835	578,752

COAL FREIGHT DECISIONS

Suspension Docket No. 242—Engine-switching charges

Proposed increase in rates on interstate shipments of coal from Chicago, Ill., to Ravenswood, Ill., and reduction of amount of absorption on such shipments by line carriers found not to be justified and suspended tariffs required to be withdrawn.

Financial Department

Lehigh & Wilkes-Barre Coal Co.

This company reports for the year ended June 30, as follows:

	1913	1912	1911
Rec., all sour	$20,628,564	$18,742,623	$16,879,575
Op. exp., tax, etc	15,019,733	14,982,262	13,406,193
Dep. coal land fd	.....	.....	.....
Net	5,608,831	3,760,361	3,473,382
Interest	724,690	814,390	814,390
Sinking fund	461,089	360,000	460,000
Surplus	4,423,051	2,485,971	2,198,992
Ded. to com. break. and deb. coal in stock	.....	.....	.....
Less feder inc. tax	.....	.....	17,193
Bal. surp	4,423,051	2,485,971	2,181,798
Dividends	1,197,462	1,197,625	1,197,625
Refund. debt	.....	.....	.....
Profit and loss	3,225,588	1,285,346	984,173

The number of tons of coal mined and shipped during the year was 5,189,221, an increase of 1,202,795 tons, and 541,559 tons were purchased, a decrease of 144,969 tons, as compared with the previous year. The tonnage sold was 5,678,373, an increase of 497,914 tons over previous year. The tonnage of prepared sizes sold, including lump, equaled 66.73%, and of pea and smaller, 33.27%.

The amount in the sinking fund for the consolidated loan on June 1, 1913, was $1,426,829, of which all but $641 cash was invested in interest-bearing bonds. The year before the amount in the fund was $932,743.

President Baer says:

"The several leases under which the Parrish Coal Co. were operating on this company's property were to expire June 1, 1916. It was deemed advisable not to renew or extend these leases, and in order to properly conserve the company's property it was decided to purchase the property, imporvements, equipment, etc., of the Parrish Coal Co., and possession was taken on Feb. 1, 1913.

"Under the statute applying to counties with a population of more than 300,000, the assessment of property in Luzerne County is no longer under the control of the county commissioners, but is placed in the hands of a board of assessment appointed by the court. This board has just completed its work, and has made a very marked increase in the value of property generally, particularly coal lands. This has necessitated further appeals, and, from present indications, it will be some time before an equitable basis of valuation on coal property is finally determined.

"On June 27, 1913, an act assessing a tax of 2½% of the value at the mines of coal prepared for market became effective. This company's tax under this act will be approximately $375,000 per annum.

"To facilitate the movement of coal from tidewater to eastern points, the sea tugs and barges owned by the C. R. R. Co. of N. J. were purchased at an appraised valuation. The fleet consists of three tugs and fifteen barges, with a carrying capacity of 20,000 tons.

"In compliance with the decision of the Supreme Court of the United States in the matter of the so called 65% contracts, all of such contracts held by this company were at once cancelled, and no coal has since been purchased, except in special cases, in small quantities, of a particular size."

The balance sheet as of June 30, shows total assets $37,805,911, an increase of $947,321. The working assets total $6,762,205 and current liabilities $918,155.

At the annual meeting of the company, President George F. Baer and the directors were unanimously reëlected. The board consists of George F. Baer, George F. Baker, Samuel Dickson, Edward T. Stotesbury, Andrew H. McClintock, Charlemagne Tower and Thomas A. Wright.

Taxes on Coal Bonds

The "New York Times Annalist" has prepared the accompanying data re taxes on coal bonds. Four definitions of status are used as follows:

(1) **Free,** meaning that the corporation pays;

(2) **Taxable,** meaning that the holder pays;

(3) **Company has refused to pay,** which means generally a debatable interpretation of the mortgage provisions by the corporation, and

(4) **Doubtful,** which means that the provisions of the mortgage are obscure and that interpretation is in suspense.

As a rule, corporations have been liberal in their interpretation of obscure provisions; a number have rather agreed to pay the tax than to dispute the point. The list follows, in the alphabetical arrangement of the Stock Exchange sheet:

Buffalo & Susquehanna Iron Co. 1st 5s,	June 1, 1932	Free
Clearfield & Bituminous Coal Corporation 1st S. F. 4s,	Jan. 1, 1940	Free
Colorado Fuel & Iron Co. Gen. S. F. 5s,	Feb. 1, 1943	Taxable
Colorado Fuel Co. Gen. 6s,	May 1, 1919	Taxable
Colorado Industrial Co. 5s,	Aug. 1, 1934	Free
Consolidation Coal Co. 1st & Ref. S. F. 5s,	Dec. 1, 1950	Free
Consolidated Indiana Coal Co. 1st S. F. 5s,	June 1, 1935	Free
Continental Coal Co. 1st 5s,	Feb. 1, 1952	Free
Grand River Coal & Coke 1st 6s,	Apr. 1, 1919	Taxable
Jefferson & Clearfield Coal & Iron Co. 1st 5s,	June 1, 1926	Taxable
Jefferson & Clearfield Coal & Iron Co. 2d 5s	June 1, 1926	Taxable
Kanawha & Hocking Coal & Coke Co. 1st 5s,	July 1, 1951	Free
Pleasant Valley Coal Co. 1st S. F. 5s,	July 1, 1928	Taxable
Pocahontas Consolidated Collieries Co., Inc., 5s,	July 1, 1957	Free
Rochester & Pittsburgh Coal & Iron Co. (Helvetia) Purchase Money 5s	May 1, 1946	Taxable
St. Louis, Rocky Mt. & Pacific Co. 1st 5s,	July 1, 1955	Free
Sunday Creek Co. Coll. Trust 5s,	July 1, 1944	Free
Tennessee Coal, Iron & R.R. Co. Gen. 5s,	July 1, 1951	Free
Tennessee Coal, Iron & R.R. Co., Birmingham Div. 1st Cons. 6s,	Jan. 1, 1917	Taxable
Tennessee Coal, Iron & R.R. Co., Cahaba Coal Mining Co. 1st 6s,	Dec. 1, 1922	Taxable
Utah Fuel Co. 1st S. F. 5s,	Mar. 1, 1931	Taxable
Victor Fuel Co. 1st S. F. 5s,	July 1, 1953	Taxable
Virginia Iron, Coal & Coke Co. 1st 5s,	Mar. 1, 1949	Taxable

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Jan. 24:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	84½	83	84½	84†	82†
American Coal Products Pref	105¾	105	105	106	106
Colorado Fuel & Iron	33¼	32	33½	33¾	28½
Colorado Fuel & Iron Pref	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102½	....	....
Island Creek Coal Com	48	47	48	48½	47
Island Creek Coal Pref	85	84	85	85	83½
Pittsburgh Coal	21½	19⅜	20½	21½	17⅞
Pittsburgh Coal Pref	90¾	88	90	90¾	86
Pond Creek	20¼	19	19⅞	19⅞	18⅜
Reading	172¼	168¾	170⅝	172¼	166½
Reading 1st Pref	88	87⅜	87⅝	88	87½
Reading 2nd Pref	92¼	90¼	92½	92½	90¼
Virginia Iron, Coal & Coke	46	45	46	46	40

Bonds	Closing Bid	Asked	Week's Range or Last	Sale	Year's* Range	
Colo. F. & I. gen. s.f.g. 5s	96¼	Sale	93	96¼	90	99½
Colo. F. & I. gen. 6s	104	106½	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	80½	Sale	79¾	80½	75	85
Cons. Ind. Coal Me. 1st 5s	76	79	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s	89	92	87¾	Dec. '13	87	87¼
Gr. Riv. Coal & C. 1st g 6s	..	..	102½	April '06	..	..
K. & H. C. & C. 1st s f g 5s	91	..	92¼	Dec. '13	91	98
Pocah. Con. Coll. 1st s f 5s	84½	85½	84	84⅛	85	87¾
St. L. Rky. Mt. & Pac. 1st 5s	77¼	79	77¾	Jan. '13	73	80½
Tenn. Coal gen. 5s	101	Sale	100	101	96	103
Birm. Div. 1st consol. 6s	101½	103	101½	Jan '14	100⅜	103
Tenn. Div. 1st g 6s	101½	..	101	Jan '14	100¾	102
Cah. C. M. Co. 1st g 6s	101	..	103	July '13	103	103
Utah Fuel 1st g 5s	..	..	..	.....	..	..
Victor Fuel 1st s f 5s	..	84	80	May '13	79¾	80
Va. I. Coal & Coke 1st g 5s	94¾	Sale	94	95	92	92

*For the full year 1913. †Sale involving less than 100 shares.

DIVIDENDS

Reading Co.—Regular quarterly dividends on the first preferred of 1%, payable Mar. 12 to holders of record, Feb. 24.

St. Louis, Rocky Mountain & Pacific Co.—Dividend No. 2 of ½% on the common stock, payable Feb. 15 to holders of record, Feb. 3 to 14.

Jefferson & Clearfield Coal & Iron Co.—Dividend of 2½% on the preferred, payable Feb. 16 to holders of record, Feb. 6.

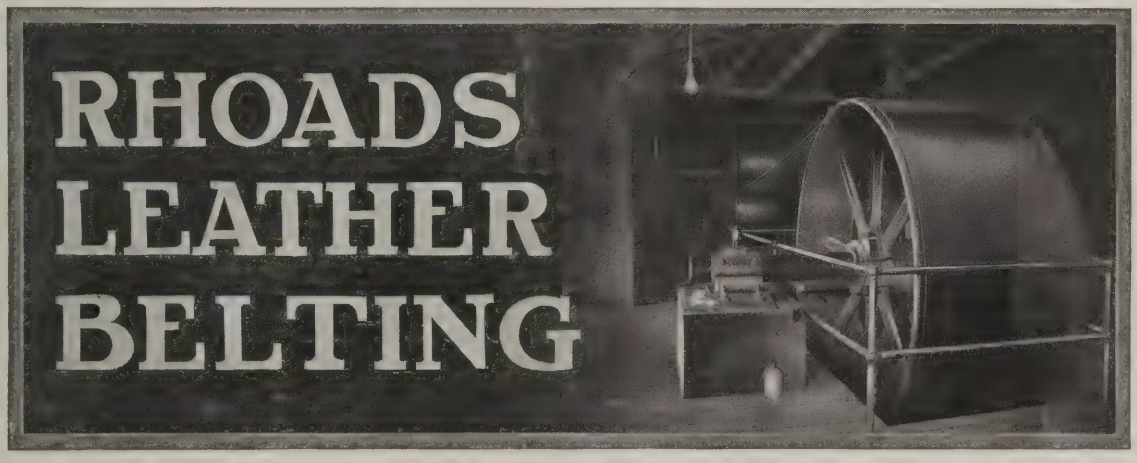
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 6
Issued Every Saturday
Hill Publishing Company

NEW YORK, FEBRUARY 7, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Saves Stops Saves Trouble

It saves break-downs and output lost by stoppage.
It does not so soon stretch loose and slip.
It saves you take-ups and repairs.
It lasts longer and costs less per year.

REASONS:

Its long life comes from our special toughening process. Also from our close assortment of the leather to exclude any pieces that would cause weak spots.

Our stretching is unusually thorough. Skillful workmanship secures strong, flexible joints.

TWO INSTANCES:

A certain concern told us that 23 years previously they refitted their mill with Rhoads Leather Belts, all of which but one were still doing good work.

A planing mill wrote in 1911 that in 1894 they equipped throughout with Rhoads Belting and had had very satisfactory service. Some of the belts, though running almost continually since the date of installation, were still in good condition, and these were on hard drives.

IN COLLIERIES:

Similar satisfaction in collieries is shown by long use of Rhoads Belts by big coal companies.

Write for samples of our belt record tags, and try them on Rhoads Belts and others in comparison.

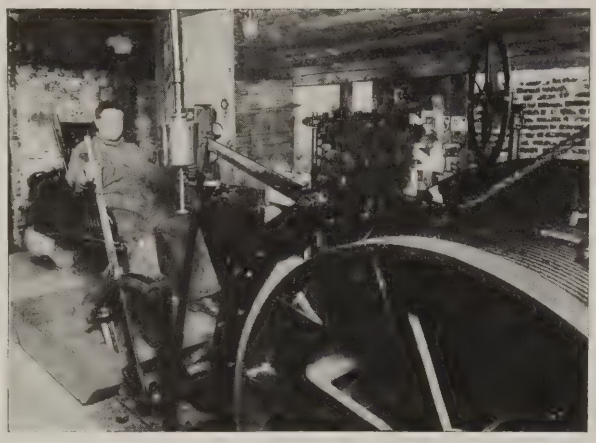
For damp places, use Rhoads "Watershed Oak."

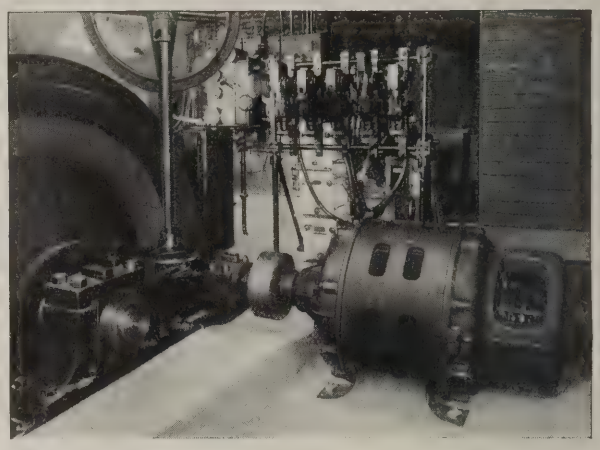
J. E. Rhoads & Sons

PHILADELPHIA: 34 N. Third St. NEW YORK: 124 Beekman St.

CHICAGO: 344 W. Randolph St.

Factory and Tannery, Wilmington, Del.





Westinghouse Motor Driving Mine Hoist.

Maximum Output in a Given Time Is Assured from Hoists Equipped with Westinghouse Electric Motors

These Motors have been designed with the knowledge that any accident to the hoisting equipment will not only impair production until service is re-established, but may also cause damage of the most serious nature.

Hence they are made as reliable as it is possible to make any motor. Mechanically they are far stronger than the service for which they are intended requires, and electrically they will withstand heavy overloads without injury.

The bearing brackets are heavy and massive, the bearings large in area, the windings are so braced that they cannot chafe, and the shafts are extra large in diameter and **made of axle steel,** the best material to withstand severe stresses.

Write to the nearest office listed below for full information about Westinghouse Motors for Mine Hoists.

Westinghouse Electric & Mfg. Company

East Pittsburgh, Pa.

DISTRICT OFFICES:

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W.Va.
Boston, Mass.
Buffalo, N.Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Louisville, Ky.
Los Angeles, Calif.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N.Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N.Y.
St. Louis, Mo.
Salt Lake City, Utah.
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
Syracuse, N.Y.
Tacoma, Wash.
Toledo, Ohio.
Washington, D.C.

*Westinghouse Electric & Mfg. Co. of Texas.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 FEBRUARY 7, 1914 NUMBER 6

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 231

Some remarks concerning the evil practices of shyster lawyers who hang about coal camps and hatch up fake damage suits. One mine manager solved the problem by employing a private detective to follow the shysters.

IDEAS AND SUGGESTIONS: *Pages* 232-233

Efficiency When Approaching a Limit—A Plea for More Frequent Inspection of Mines—Safety First on the Man-Trip—Superfluous Legislation.

*PURCHASED POWER AND BITUMINOUS COAL MINING: *Pages* 234-239

There has been a vast increase in the amount of central-station power purchased by coal producers during the past five years. The principal uses and advantages of this source of power to the operator are here discussed. A. E. Rickards. COAL AGE, Vol. 5.

*HYDRO-ELECTRIC POWER FOR WEST VIRGINIA COLLIERIES: *Pages* 239-242

A description of the generating and distribution system of the Appalachian Power Co., which furnishes electric energy to many mining operations in the Pocahontas and adjoining fields. C. A. Tupper. COAL AGE, Vol. 5.

THE SPIRIT OF MANAGEMENT: *Page* 242

Poem by Berton Braley. COAL AGE, Vol. 5.

*SAFETY IN WEST VIRGINIA: *Pages* 243-247

Some of the means employed by the United States Coal & Coke Co. to prevent accidents. Frank K. Kneeland. COAL AGE, Vol. 5.

*CONNECTING MOTORS TO MINE FANS: *Pages* 247-248

It is frequently advantageous in mine ventilation to be able to shift the fan drive from one motor to another. Two arrangements for accomplishing this end are here described. H. J. Booker. COAL AGE, Vol. 5.

THE INDIANAPOLIS CONVENTION: *Pages* 248-250

With only about a dollar to spend per man on the coming strike in the spring, the United Mine Workers of America was inclined to be conservative, though men were present who figured every dollar over a hundred times and found use for all. There is plenty of evidence that the direct-action element will soon replace the socialists as disturbers in the organization. COAL AGE, Vol. 5.

PROPOSED LAW FOR KENTUCKY COAL MINES: *Page* 250

*FIREDAMP RESERVOIRS IN ROOM-AND-PILLAR WORK: *Pages* 251-252

Cavities above coal workings, when caving has taken place, often contain large quantities of gas which cannot be removed by ventilation. It is suggested, therefore, that holes be drilled for the purpose of tapping these reservoirs, which are a standing menace to the lives of the miners. Frank Haas. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 253-254

Purchased Power—The Ethics of Unionism—Making Men—The Coming Spring Agreement.

LEGAL DEPARTMENT: *Page* 255

MUST A CONTRACT TO SELL COAL BE IN WRITING? By statute in most states, agreements for sale must be evidenced by signed writings, if the price exceeds a fixed amount, if no part of the price is paid, and if no part of the property sold is accepted and received by the buyer. What the courts have held in coal-trade cases. A. L. H. Street. COAL AGE, Vol. 5.

SOCIOLOGICAL DEPARTMENT: *Pages* 256-257

More Club Rooms for Mine Workers—*Concrete Vaults in Colliery Villages—Restoratives—Vineyard Orchards in Pocahontas Region—Work of Rescue Car in Arkansas.

DISCUSSION BY READERS: *Pages* 258-260

Rope Lubrication. Letter No. 1—Fan Ventilation—The Certificate Law. Letters Nos. 16 and 17—Colorado Strike Investigation.

STUDY COURSE IN COAL MINING: *Page* 260

INQUIRIES OF GENERAL INTEREST: *Page* 261

Study Questions—*Regulators.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 262

BOOK REVIEWS: *Page* 263

COAL TRADE REVIEWS: *Pages* 268-272

COAL AND COKE NEWS: *Pages* 264-267

ADVERTISING INDEX: *Page* 64

CIRCULATION OF THIS ISSUE 12,000

None sent free regularly, no returns from news companies, no back numbers

"G. B. S."

The Weekly Ad-Talk Page

I am ashamed neither of my work nor of the way it is done. I like explaining its merits to the huge majority who don't know good work from bad. It does them good; and it does me good, curing me of nervousness, laziness and snobbishness. I write prefaces as Dryden did, and treatises as Wagner, because I can; and I would give half a dozen Shakespeare's plays for one of the prefaces he ought to have written. I leave the delicacies of retirement to those who are gentlemen first and literary workmen afterwards. The cart and trumpet for me. *George Bernard Shaw.*

One of the best-advertised individuals in the world is George Bernard Shaw. He is as well known as Emperor William of Germany or any other potentate, as famous as Mrs. Pankhurst, or Teddy Roosevelt or even Jack Johnson. He is so celebrated, in fact, that a newspaper anywhere in Great Britain or in this country has simply to refer to him by his initials and readers know who it means.

How has George Bernard Shaw come by this exceedingly wide-spread reputation? First of all, because he has a good line of wares—clever plays, so clever indeed that most people have to get used to them before they understand them—and, in the second place, he has this wonderful ability of his to get talked about, to say the unexpected thing, the thing that will be widely quoted. In short, he has the ability to advertise himself and his wares.

"I leave the delicacies of retirement to those who are gentlemen first and literary workmen afterwards. The cart and trumpet for me," says G. B. S.

In saying so he voices the spirit of the modern manufacturing world: *First make a good product and then get out and advertise it—sell it.*

In a great many ways George Bernard Shaw is a pioneer. He is a literary genius who in defiance of the laws and traditions of a host of lesser literary men has come out and advertised himself and his ideas in the most flamboyant fashion.

"It's not dignified!" shouts the host of lesser literary lights.

But does George Bernard Shaw care? Not one little round yellow mustard seed.

As a parallel case, take some big and progressive manufacturer who begins to advertise his wares in a big and progressive way and a host of smaller manufacturers will chorus: "It isn't dignified! It isn't ethical!"—or some such tommyrot.

As a matter of fact, any man or firm or corporation which makes a good product whether it be plays or pianos, books or bathtubs *owes* it to himself and to the public good to advertise it.

Do you think a doctor who discovers a remedy for cancer (not a quack remedy but a real one) should hide his discovery, keep it to help a few selected patients? No! He should spread the news of his discovery from where the sun rises to where it sets, so that the whole of humanity can benefit.

Do you think that a manufacturer who builds a better hoist or fan should restrict himself to selling it among a few friends who happened to be mining men? Not by a long shot! He should give every one a chance to buy it. He should advertise it in the pages of his technical paper.

The best part of it is, these progressive manufacturers in the technical field do advertise. There are very, very few of them so tied down to the past that they still think advertising "undignified."

If there is any worthwhile new machine or device built that will help the mining profession, you can count upon seeing it advertised in *Coal Age* shortly after it is put on the market.

But the advertiser cannot do it all. You don't get any benefit from George Bernard Shaw's advertising until you read—or still better, *see*!—one of his plays.

And you don't benefit by the advertising in *Coal Age* until you get the habit of, not only scanning it, but *studying* it—every week.

COAL AGE

Vol. 5 NEW YORK, FEBRUARY 7, 1914 No. 6

"Still have I borne it with a patient shrug
For sufferance is the badge of all our tribe."

Mr. Mine owner, sit down for a few moments and recall the fake damage suits that have been hatched around your diggings by shyster lawyers during the past year, and then read the above quotation by Shakespeare. Are you proud of "our tribe?"

Nearly every state in the union has a bar association and each of these state organizations meets yearly and assures the public at large that they will not countenance *champerty* in their ranks.

After these solemn declarations, *champerty* ought to cease, but it doesn't. Possibly the rank and file of the legal profession assume that the layman doesn't understand what *champerty* means and so decide that they may practice it with impunity around all of the coal-mining camps that come under their observation.

Here is a part of the definition of *champerty*, given by the Century Dictionary: "The purchase of a suit or the right of suing. Champerty is a punishable offense by common law, and in some jurisdictions, by statute." If we ever get educated to a point where champerty is in every man's vocabulary, the word shyster will only survive in dictionaries.

Year by year the cost of liability insurance to coal-mining companies has risen, until it now has reached a point, in some states, where it is all but prohibitive to a small operator; and even at that, the liability companies are not declaring dividends. Still it appears the worst is yet to come.

Some operators are beginning to wake up to the fact that it is time to help the public to understand that these drains saddled upon the coal-mining industry must eventually raise the price of coal to the consumer.

A majority of the coal operators are merely practicing the sufferance act. However, a few colliery owners are taking steps to place scare-crows around their plants, for the especial benefit of the shysters.

We know of one manager who employs a detective occasionally, to follow the shysters and their agents, when they become active around his camp. It may surprise you to know that these human blots on the legal profession have decided that it doesn't pay to buy the accident claims that originate at that mine.

Most any farmer can improvise a scare-crow. Try it.

Ideas and Suggestions

Efficiency When Approaching a Limit

By W. Va. Superintendent

In resultants varying as the forces, we are apt to neglect certain factors which become operative when a limit is being approached. We say, "With a lever long enough and a fulcrum strong enough, we could move mountains; with pressure and cold sufficient, all matter might be solidified; with a telescope of high enough power, we could study the inhabitants of our neighboring planets; and separating the molecule is only a matter of sufficient microscopic power." Yet, in spite of a certain advance toward these ends, difficulties have always appeared which were not encountered when working farther from the limit.

What seems a much simpler problem is the calculation of the equipment and the number of miners to produce a given tonnage. We consult our records and find that the average miner for a given seam of coal, with given equipment, is capable of producing six, seven or eight tons per day. We then multiply the number and increase the equipment and expect to get a proportionate increase in tonnage. That is, with 100 men you have been able to produce 800 tons per day. If 100 men in one day produce 800 tons, how many tons per day will 200 men produce? That sounds just like the mental arithmetic of the lower grades, and we have but to shut our eyes in order to see the dozens of small hands flying up, eager to give the answer—1600 tons, and that answer calls for 100 per cent.

An Increase in the Number of Miners Does Not Bring a Corresponding Increase in Tonnage

But, in actual practice, if 1600 tons is approaching the calculated capacity of the mine, we find that an increase from 100 to 150 miners makes the efficiency of the miner drop to something below eight tons, and as the number rises toward 200, the number of cars per man takes another drop, so that when you have your 200 miners, they are producing considerably less than the 1600 tons, or an increase of 50 per cent. in miners has increased the output perhaps 25 per cent. Of course, you are getting a nice tonnage, but it is falling short of the calculation. At this point men begin quitting, partly because their earning capacity is not what it was when there were fewer men.

If the fall in efficiency were an average drop, affecting all miners alike, perhaps the effect of working near capacity would not cause any considerable dissatisfaction, but it is more probable that the last comers have suffered most. The old men have a way of looking out for themselves and taking advantage of car service and the cutting of their places, so the men most affected, finding that they can work to better advantage in a mine that is not so crowded, leave with more or less disgust, take some of the others with them, and pronounce the plant "no good."

Another possible factor to be counted on in approaching a limit of capacity is the chance that the last men hired may be "floaters." Every mine has its nucleus of old miners who stay while others come and go, and it is these men who are getting the tonnage when the mine is operating at less than capacity. Perhaps, too, they may realize that an increase in men may lessen their chance for service and, in a quiet way, discourage others who come around looking for work.

The Capacity of Officials for Service Is Not So Flexible as Many People Believe

We are too sure that results will come in arithmetical proportion, that is, double the men, double the tonnage. We are apt to forget the factors that show up when approaching a limit. Perhaps we are too quick to take it for granted that the man who can handle 100 men can keep 200 up to efficiency, or that the boss looking after 25 can attend to 50 just as well. In the calculation of equipment, the mine has been provided with a superintendent, mine foreman and assistants. Their capacity for service is supposed to be flexible enough to meet the demands of the mine up to the point of capacity; but, nevertheless, when their routine of daily duties has been established on a basis of only partial capacity, when the struggle comes of maintaining a maximum, it requires ability and real devotion to duty to rise to the increasing demands on time and attention.

A certain car equipment has been calculated as adequate for the limit of capacity, but when they have been distributed in a certain way for 100 men, it requires some adjustment to make a satisfactory distribution for an increasing number of men. The machines should be able to cut for 200 men, but the habits of the runner must change as he approaches capacity. A breakdown may have little effect when there is a chance to shift in other machinery, but at full capacity every delay is felt immediately by someone. Working machinery to its limit multiplies the liability to breakdown, and an injury to it while operating at its full capacity is apt to be more serious than when it is running with reserve power. And so we might go on showing why so few of our mines ever reach that capacity for which they were planned.

We are all familiar with the old preachment that success and achievement are measured by the small margins over and above what is fairly good, and that the world's record makers are champions by reason of their fractions of seconds, inches and ounces. The highest was accomplished by efficiency as it approached a limit, and the struggle to make those fractions stands out as the real point of excellence.

Applied to tonnage getting, the real struggle also begins when the mine is approaching its maximum. At a good mine with good, new equipment, favorable surroundings, and a fair organization of foremen, almost any man ought to get tolerable results from a partial complement of miners, but the man who is working at capacity and holding his men is about as rare as cham-

pionship material, or as that long lever with fulcrum "strong enough." Solving the problem is at best like extracting the square root of an imperfect square to the "n-th" decimal place.

A Plea for More Frequent Inspection of Mines

By a Miner*

In view of the fact that hundreds of men lose their lives annually in the mines, by falls of coal or rock, and considering that we have splendid mine laws that are intended to safeguard the miner and protect the property of the mine owner, it seems to me that the factors most responsible for fatal mine accidents due to falls of roof or coal, are the carelessness or ignorance of the miner and the lack of sufficient official inspection of the working places.

In many mines, where the working places are scattered over a large area, neither the mine foreman nor his assistant is able to reach some of these places, until several hours after the men commence work. Most of the serious accidents that have come under my observation could have been avoided by closer inspection, or, I would say, a more frequent inspection by the foreman or his assistant.

Suppose, for a moment, there are 20 or 25 men working on a heading; if an assistant boss had charge of not more than two headings, he could give the work better attention, advise, or better still, supervise the setting of timber; and, at the same time, increase the output of coal from his entries, by looking after the loading of the coal and seeing that the driver is not delayed by cars not being ready. In many cases, the rule has worked well, that a man loses his "turn" if his coal is not loaded and ready for the driver when he calls.

The extra cost of such closer inspection would, in most cases, be offset by the increased output of the mines, to say nothing of the reduction in the number of fatal accidents and the delays incident thereto. By giving his entire time to the men under his charge, each assistant boss becomes more familiar with the habits of his men and is better able to expedite the work in many ways.

Safety First on the Man-Trip

By Ralph W. Mayer†

A half-inch cable carried around the man-trip of cars, and having each end fastened to the main haulage rope, serves to minimize the dangers of the trip breaking in two and the men being dashed to pieces at the bottom of the slope.

When ready to put the cable in place, it is carried, tied in a neat coil, to the back end of the trip of cars. Two men each take an end of the cable and walk toward the forward end of the trip, one of them on each side of the cars. Hooks are fastened on the ends of the cable, and these are hooked into the short length of chain on the end of the main haulage rope.

A half-inch cable, one end on each side of the cars, is strong enough to hold a broken trip, and light enough to be handled easily. The last couple of cars should be pushed together, so that their couplings are slack when the cable is put in place. This makes the cable taut, while at the same time all the pull is upon the car couplings. If the couplings should break, there would be very little or no slack between the end of the last car and the cable.

The cable is held in position by hooks made from one-fourth inch round iron. These are made about 14 in. long and have a hook on each end, both being bent toward the car to avoid catching anything when the cars are in motion. One end of the hook is hung over the top of the side of the car, and the cable hung on the other end of the hook.

If the cars have boxes or bodies overhanging the wheels, the hooks should be made long enough so that the lower end reaches below the overhanging part of the box, as it is then more out of the way. Two hooks for each car, one on each side, are sufficient.

When the men are all hoisted or lowered, the cable is taken off and neatly tied in a coil. The hooks are hung over the top of a nail keg—on the inside of the keg—and everything is in order when required for use again.

Allowing no person to get on or off the man-trip after it has started, or before it has stopped, helps to decrease the danger of accident. Disciplining anyone who disobeys this regulation by compelling him to take a day's layoff from work will soon cause it to be respected.

*Bolivar, Penn.
†Roslyn, Washington.

Superfluous Legislation

A report from West Virginia calls attention to the fact that during 1913 more than fifty bills prejudicial to the coal companies were introduced in the legislature of that state. Not all of these measures were passed, but a sufficient number became law to greatly hamper the progress of the mining industry in that particular field.

Reform legislation is now the chief bugaboo of the coal-mining men. Practically every new law that is passed means an added expense to the cost of operation. Some remedial legislation here and there has been called for; but there has been no necessity for our lawmakers running amuck. The need of the hour is the strict enforcement of present laws rather than the enactment of new ones.

BY THE WAY

A disease known is half cured.

The meteor fallen to the earth is but a stone.

Let's hope the "rule of reason" is applied in Ohio.

Do not give your measure to anyone but your tailor.

True merit is like a river; the deeper it is the less noise it makes.

A man often admits that his memory is at fault, but never his judgment.

The miners are so busily engaged in determining the "booze fighting" propensities of Sam Gompers that they may not get around to asking for the customary advance. Who should worry?

Purchased Power and Bituminous Coal Mining

By A. E. Rickards*

SYNOPSIS—There has been during the past five years a vast increase in the amount of central station power purchased by coal producers. The principal uses and advantages of this source of power to the operator are here discussed.

Can a bituminous coal operator purchase electricity cheaper than he can generate it himself? Many coal producers now have this question before them. It has been created through the activities of the power companies in their endeavor to sell their product in the coal fields.

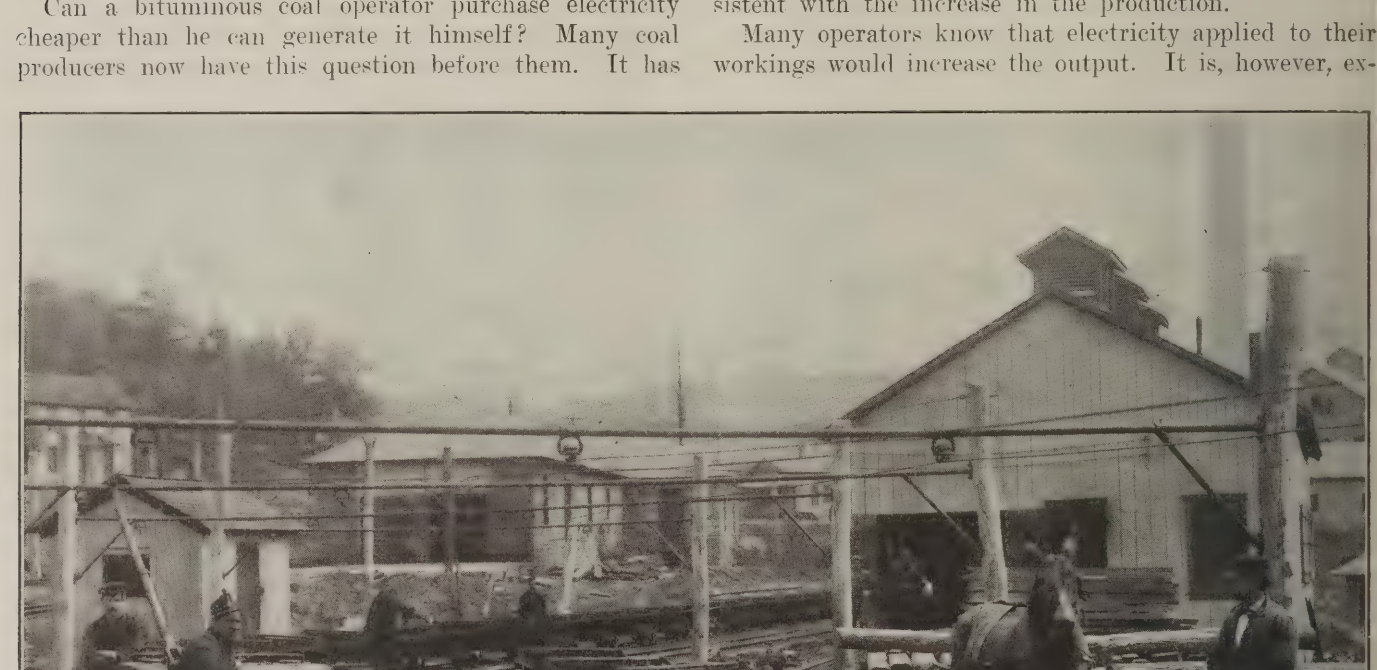
The total amount of current now purchased by the bituminous operators from central stations is estimated to exceed 100,000 hp. The income from this market to the power companies is approximately $3,250,000 per year. When one considers that the greater part of this business was obtained during the past five years, it shows a remarkable growth—there must be a reason for this expansion.

Purchased power offers so many advantages to the majority of the bituminous coal operators that it will only be a question of time when many, possibly most of them, will use it. However, before this is brought about, more must be known of its merits. Today, most of the operators know as little about what central station service affords as the power companies know about coal mining.

The situation before the average coal producer is such that purchased power supplies a means to assist in solving some of his most difficult problems. These are:

1. How to increase the production.
2. How to reduce the cost of mining.
3. How to keep the increase in the investment consistent with the increase in the production.

Many operators know that electricity applied to their workings would increase the output. It is, however, expensive to install a generating plant and equip a mine for electrical operation.



The New and the Old Method of Mine Haulage

An operation now using steam power and mule haulage can change to electric power at a minimum of expense if the current is purchased from a power company. By so doing, the greatest item of expense (the power plant) is eliminated. In this manner the tonnage can be raised with but a small increase in the capital account.

More power is required per ton of coal mined as the underground workings are extended. With an isolated plant, this increase in the demand for power frequently requires expensive alterations and additions to the generating equipment. When central station service is used additional power can be had and usually the only expense is for a new motor or motor-generator set.

The cost of power in a coal mine is an important item. A reduction in this expense means much towards lessening the cost of production. In most cases an operator can purchase electricity cheaper than he can produce it himself.

*General manager, Industrial Engineering Co., Pittsburgh, Penn.

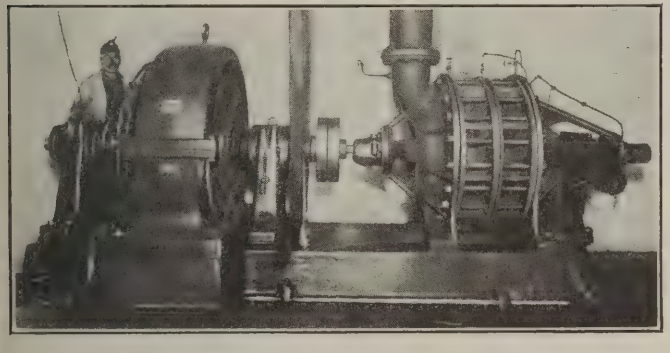
The Present Situation

The general situation confronting the coal producers is such that in the future many of them must take advantage of purchased power. It is the one means of meeting the conditions.

Today the power required by the average mine is three times greater than the amount necessary 10 years ago. Such an increase to isolated power plants is exceedingly expensive. In the same period of time the capital necessary has increased three fold.

During the past decade the demand for coal has doubled. If the present rate of increase continues, the quantity mined this decade will be twice that mined in the one just past.

With the rapid increase in the demand for coal, the cost to produce it has become greater. If central station power will be a means to increase the tonnage, reduce production costs, and allow extensions to be made at a minimum of expense, surely the operators will want



A Motor-Driven Centrifugal Pump

it. The idea of an isolated plant is, however, so firmly rooted in the average operator's mind, that he must first be taught the possibilities of purchased power.

Now comes the question of how purchased power may be advantageously applied. It may be employed to operate pumps, fans, hoists, haulage and gathering locomotives, gathering reels, coal-cutting machines and punchers.

A general plan cannot be laid down that would apply to the electrification of all mines. Each operation presents a problem in itself and must be treated as necessary to cover its own peculiar conditions. However, the following is a general outline of applications most commonly used.

Small pumps are usually driven by 250- or 550-volt, direct-current motors. The power supply is taken from the nearest trolley or cutting line. Large pumps, in many cases, are operated only at night and are driven by 2300-volt, alternating-current motors.

Fans operate continuously and are often driven by 2300-volt, alternating-current motors. The principal advantage of this application for large pumps and fans is because it allows the use of a smaller motor-generator set, the losses incurred in converting alternating to direct current being thus lessened. Furthermore, the cost of installation is less.

The haulage and gathering locomotives, gathering reels, coal-cutting machines and punchers are driven by either 250- or 550-volt, direct-current motors.

Before describing the different kinds of machines, it would be interesting to note the methods used years ago.

Former Methods of Mining

The methods used in the early days to mine coal were indeed primitive. The operation generally consisted of digging a hole in the side of a hill at the outcrop. The coal was undermined with a pick, forced down with wedges, and then loaded into small cars running upon wooden rails. After the cars were loaded, they were pushed out to the surface by hand.

As the distance from the surface became greater, the work of pushing the cars in and out became quite burdensome and the mule was initiated into the mysterious underground haulage. This faithful animal has become so firmly rooted in this occupation that it will be some time before he has become completely supplanted by more economical methods of underground transportation.

The first power required in the early operations was for the pumps. Unless the entries could be so driven that



Mine Fan Altered from Steam to Electric Drive

the mine was self-draining, more or less water would accumulate in the workings, which had to be pumped out to keep the mine in operation.

This was at first and is still, largely accomplished by steam pumps, mostly of the reciprocating type. The steam is generated in a boiler plant, located near the pit mouth and carried underground to the pumps. These steam lines are frequently of considerable length. In the hard-coal region it is a common experience to see a steam line carried over the surface of the ground for several thousand feet from the boiler plant and then conducted down a bore hole several hundred feet deep to a pump in a mine. Only poor economy can be obtained under such conditions due to the large amount of condensation, drop in steam pressure and leaks.

The reciprocating type of pump taking steam full stroke is also inherently uneconomical. Tests upon these machines often show that they consume 120 to 130 lb. of steam per horsepower hour.

Compressed air is also used to a large extent in operating pumps. The disadvantage of this system is that it requires considerable compressor capacity; also it is not as economical as the steam pump, although it has the advantage of no condensation.

In the better class of mines, the steam and air pumps are being replaced by electric-driven pumps, thus effecting a considerable saving in upkeep and in the power consumption. The losses in electric systems are comparatively low; while the maintenance can be kept low with but little attention.

For small pumps up to 25-hp., direct-current motors

geared to duplex or triplex machines, are generally used, because the power for driving is usually taken from the haulage or the cutting lines. These motors are often arranged for self-starting and require little attention. The larger pumps are generally of the centrifugal type and it is the common practice to drive them with alternating-current motors.

The practice in some of the large mines is to operate several small reciprocating pumps throughout the mine during the day, pumping into a common sump, which is emptied at night by one or more large centrifugal pumps. This arrangement improves the load factor to a considerable extent.

Ventilating Systems

The next department about the mine to require power is the ventilating system. In the early days the operators depended entirely upon the natural draft or furnaces. A forced or induced draft, produced by a power-driven fan, has become the most reliable method of ventilation. A large percentage of these fans are driven by steam engines. However, the steam lines are often long and frequently uncovered, so that the heat losses are high.

Owing to the importance of the fan operation any new method of drive must prove itself reliable before a mine operator will consent to use it. The electric motor has proven itself thoroughly dependable when applied to a mine fan. It has many advantages over the steam engine as it requires less attention, less repairs, consumes less power and the continuity of operation is more assured.

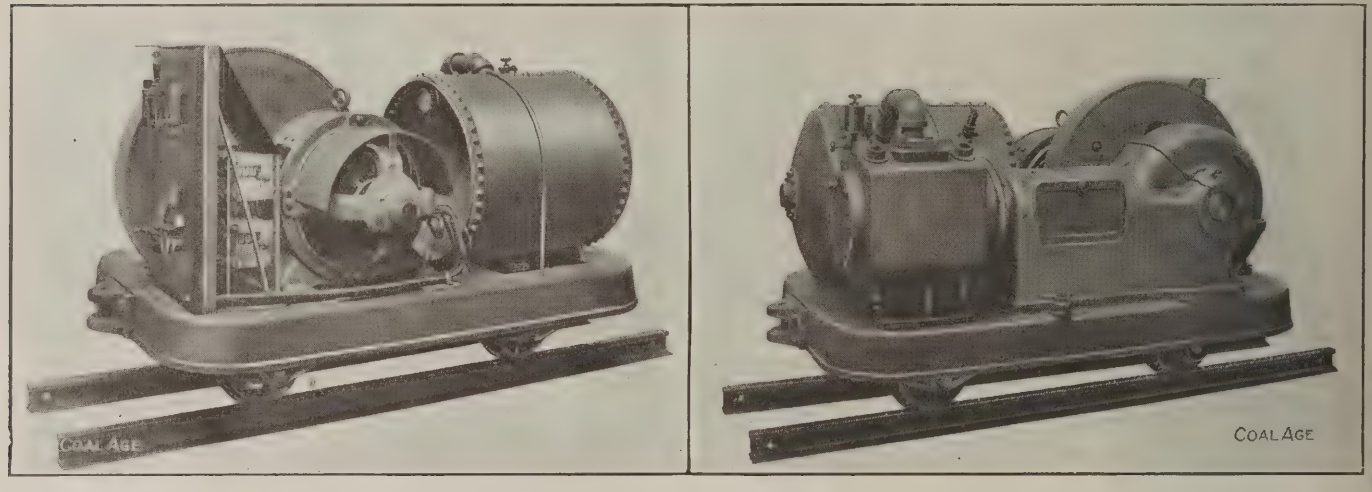
In applying an electric motor to a mine fan, it is seldom possible to use a direct connection, owing to the inherent low speed of the fan. Belting, gears and chain drives are the methods generally used. Belting is the most satisfactory when the reduction is not too great.

Both alternating- and direct-current motors are used to drive the fans, the advantages being with an a.c. motor when purchasing electricity, as no conversion of power is necessary. Furthermore, with this arrangement, the direct-current power equipment can be shut down during a portion of the 24 hours.

In some mines the fans are operated at the same speed, 24 hours per day, while in others, they are run full speed during the day and at one-half speed during the night, on Sundays and holidays. In this way considerable power can be saved. The methods to be used depend upon the locality.

When direct-current motors are used for this work they are usually of the shunt type. By using commutating poles a considerable variation in speed can be obtained by field control with high economy.

The squirrel-cage type of a.c. motor is best adapted for driving fans at constant speed. When two speeds are desired, a double-winding squirrel-cage motor is used. If a variation in speed is required, a wound secondary motor must be employed with resistance inserted in the secondary circuit to reduce the speed. With this application the economy at slow speed is, of course, low, but as the power to drive a fan varies approximately as the cube of the speed, the actual power lost is not large at greatly reduced speeds.



Two Views of a Portable Motor-Driven Air Compressor

There are a number of schemes being tried out in Europe by which variable speeds can be obtained at fairly high efficiencies. This is accomplished by using a wound-rotor, alternating-current motor in combination with two or three auxiliary machines and a rather complicated control system. While these systems are meeting with a fair degree of success in Europe, where high-class labor is easily obtainable, it is rather doubtful just what results would be obtained here where skilled labor is difficult to secure in the mining field.

The motor and control for a mine fan should be as simple and reliable as possible. A properly installed motor-driven fan will operate over long periods of time with practically no attention outside an occasional inspection. Recently, many fans, formerly driven by steam engines, have been changed to motor application.

Means and Methods of Haulage

When a mine became developed and the length of the haul increased, it soon became evident that some mechanical method must supersede animal haulage. As the length of the haul becomes greater the expense increases rapidly. Rope haulage was first tried, the rope being driven by a steam engine. There are many conditions today where this means proves the best system of haulage.

For the majority of conditions, however, the electric

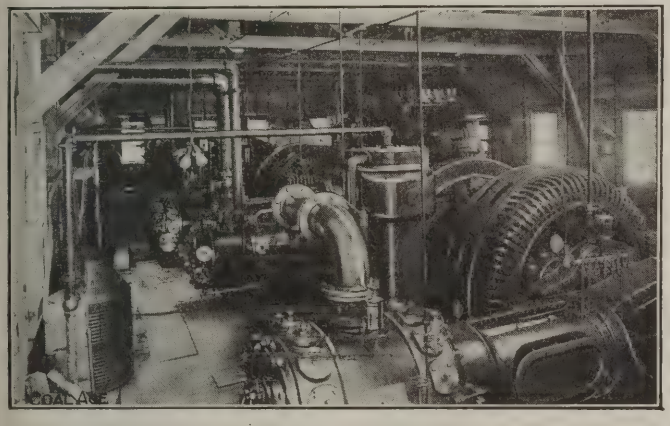
locomotive has proven the most economical and efficient method for both haulage and gathering. Our old friend the mule has been driven from the main gangway for some time and is now making his last stand in gathering.

The life of a mule underground will not average over four years. The cost for feed, harness, veterinary services and stabling will run about 50c. per day. Adding the wages of drivers to this it is not a difficult matter to show a considerable saving by the use of locomotives.

In extremely gaseous mines, compressed-air locomotives are used to advantage. This type of machine should be employed only when it is impossible to use the trolley type. Its cost of operation and upkeep is comparatively high.

The storage-battery locomotive, when properly constructed and equipped, will probably be the solution for the gaseous mine. At present its high first cost is a little discouraging.

As the mine haulage is in many respects similar to a railway system, the electric locomotive is equipped with



A Motor-Driven Compressor Plant

the same type of motor and control. In this country, direct current at 250 or 550 volts is the universal practice.

The motors are series wound and in the later types they are equipped with commutating poles which greatly increase the reliability of the machine. This feature, to a large degree, also cuts down the motor repairs and consequent delays.

The controller is of the drum type arranged for series and parallel operation.

Most locomotives are equipped with two motors, although three are sometimes used on large sizes. Where a heavier locomotive is required than the rails can carry, two machines are coupled together and operated in tandem from one controller.

Gasoline locomotives are being tried out for mine haulage, but so far have met with indifferent success.

For gathering service two types of reels are used for drawing the cars from the rooms to which the trolley wires have not been extended. The cable-reel attachment consists of a single or double conductor cable, wound upon a small drum and so arranged that a tension is kept on the cable at all times. This conductor supplies power to the locomotive and unwinds and winds up as the machine moves in or out of a room.

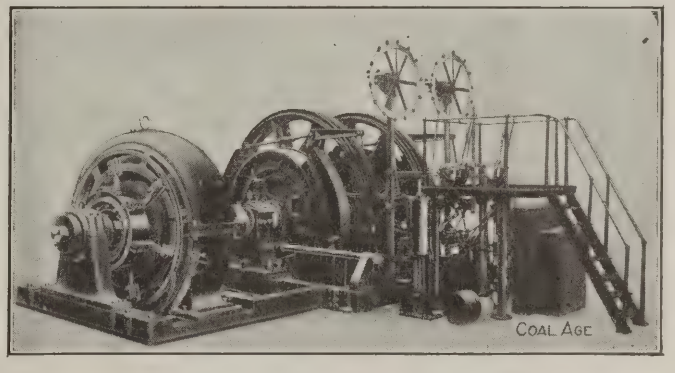
The traction-reel or crab, consists of a small motor-driven winch mounted on one side of the locomotive and is employed to haul cars out of rooms where it is not convenient to use an electric cable reel. This type of machine is best suited to mines where the rooms are worked to the dip and the grades are too severe for locomotive haulage.

For gathering, service locomotives ranging from 3½ to 8 tons are used, while for main haulage, the weights run from 6 to 20 tons, or even higher.

Rope Haulage and Hoists

The rope-haulage systems, previously spoken of, are used on grades ranging from 0 to 90°. In practically all cases these were first operated by steam, although quite a number of gravity systems are in use. Where power is purchased or the hoisting outfit is located some distance from the steam plant, an electric motor may be substituted to advantage A large number of steam haulage systems and hoists have recently been changed to electric drive. For small hoists and haulages, both alternating- and direct-current motors are used, depending on local conditions and the kind of power available.

For large haulage units or hoists of slow or medium speed, the alternating-current, polyphase, wound-rotor



A Motor-Driven Reel Mine Hoist

motor is used with a liquid or magnetic controller. For large high-speed hoists, a separately excited direct-current motor is used taking power from a special motor-generator set and operating upon either the Ward-Leonard or the Illgner systems.

The Actual Process of Mining

The actual operation of mining consists in undercutting the coal at the floor and then shooting it down with light charges of powder placed in holes drilled between the under-cut and the roof.

As previously stated, in the early days before the use of powder became the practice, the coal was wedged down. This was a slow and very tedious process. The undermining was first accomplished by hand with the ordinary mine pick. In fact today a large part of the coal is obtained by pick mining.

Among the simplest mechanical means for under-cutting the coal is the compressed-air puncher. It consists of a reciprocating chisel or pick, driven by air. The operator directs the blows of the puncher against the coal and an assistant shovels back the fine material produced, so as to leave a clear opening. This under-cut is about 16 in. high in front and 4 in. high at the rear and is from 4 to 5 ft. in depth. This wedge-shaped cut greatly assists in bringing the coal down with light powder charges without breaking it up too fine.

The compressor plant to furnish air for these machines,



A Chain Coal Cutter at Work and Being Moved

is usually located outside the mine near the boiler house. Electric-driven compressors may, however, be operated very successfully with purchased power. They furnish a steady load for synchronous motors, which in turn can be used for power-factor correction. Whenever possible, electric drive should be used because of the inefficiency of the compressed-air system.

Portable compressor plants are sometimes used to help out the main plant and keep up the pressure at the far end of some of the pipelines. Such an outfit is illustrated in the accompanying photographs.

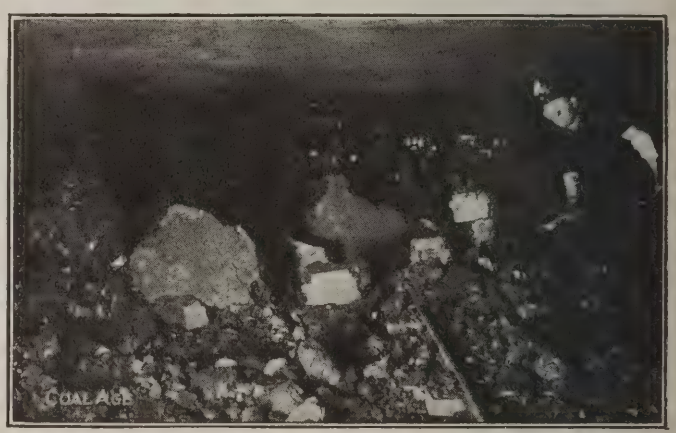
A combined electric and air puncher is in use which gives the advantage of electric transmission and the puncher under-cut. This really can be classed as an electric cutter giving a wedge-shaped under-cut which is not obtained with a chain machine.

A number of straight electric-mining machines are on the market and consist of a moving chain upon which is mounted a series of small picks or chisels. These machines make an under-cut of uniform thickness from 4 to 6 in. in height and 6 to 6½ ft. deep.

The short-wall type of chain machine will cut into the face of the coal and then move across a 25-ft. room in about 10 minutes. An air puncher will require about 30 minutes to do the same work. It is largely due to machines of the former type that the immense coal production of today is possible. The present labor supply would be far from adequate if all coal were mined by the hand-pick method.

One of the illustrations shows a chain machine making a cut across the face of a room. Another shows the same machine loaded on a truck ready to move to another place under its own power, while still another figure shows the results of blasting down the coal after having been undercut.

The chain cutting machines are generally equipped with a 30-hp. direct-current compound-wound motor of 250 or 550 volts. Recently some of these machines have been driven successfully by alternating-current, squirrel-cage motors.



Result of a Shot after Undercutting



Undercutting with Air Puncher

Driving Auxiliaries and Lighting

There is often a considerable amount of power in use on the outside at a mine. This power consists principally of auxiliary hoists, chain haulages, crushers, shakers, elevators, washers, pumps, machine shops, etc. In many cases, these auxiliaries are driven by individual steam engines whose principal virtue is that they give fairly high continuity of operation. Most such applications can be easily taken care of in a much better and more economical way by substituting electric motors for the steam engines. In many cases, alternating-current motors can be applied, which greatly simplifies the power system.

In mines not using electric power, no attempt is made to light the workings. It has been found, however, that some illumination is necessary at switches, cross-overs, partings, pumps and underground fans. The incandescent electric lamp has proven the best and cheapest method of providing underground illumination.

Conclusions

A great many mines do not use electricity at all. Of ose who have changed over from steam to electricity, has been their experience that a great saving has been ected and the output increased. Of course, after a ne has been changed over, the operating forces will re- ire some time to adjust themselves to the new condi- ns.

The saving and increase in the output by the use of ctric power make themselves most manifest when cur- nt is purchased from a central station. The "invest- nt" and the "worry and care" of a substation are much s than that of an isolated plant. This is true to such an tent, that an operator once using purchased power will rely, if ever, consider going back to his own power nt.

It is not an uncommon thing, when investigating the nditions, at a mine with an isolated plant, to find that the power generated per ton of output, is as high as 12 to 14 kw.-hr., with a corresponding cost running from 15 to 25c. per ton. With the intelligent use of purchased power, the consumption should not average higher than 2 to 5 kw.-hr. per ton and the total cost for power should not run above 3 to 7c. per ton of output.

In changing over to central station power the greatest care should be exercised in selecting the proper power system and equipment. An improper selection may increase the costs instead of decreasing them.

The purchase of power is rapidly gaining ground, as is evident by the large number of mines now operated in this manner in Pennsylvania, Ohio, West Virginia, Illinois and Alabama.

The all-electric drive and purchased power are rapidly coming into favor. It will only be a few years when it will be the exception for a mine to operate from steam power generated at its own plant.

Hydro-Electric Power for West Virginia Collieries

By C. A. Tupper*

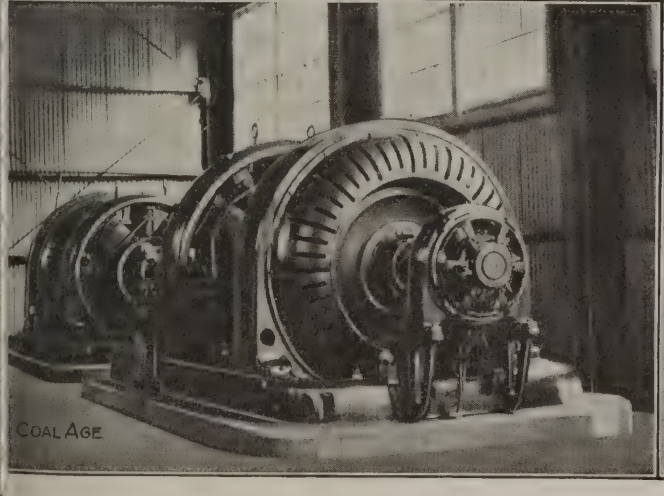
NOPSIS—A description of the generating and distribution system of the Appalachian Power Co. furnishing ctric energy to many mining operations in the Pocaontas and adjoining fields.

Projects for bringing hydro-electric power into the ocahontas coal fields of West Virginia and those closely ntified with them, such as the Tug River, Thacker, nova and Clinch Valley districts, have long been under nsideration; but the initial expense of any undertaking sufficient magnitude to accomplish the objects sought s, until recently, prevented the carrying out of such nemies.

During the past year, however, the first two of a series large water-power developments, with the necessary nerating, transmission and distributing systems, have been carried to successful completion by the Appalachian Power Co., of Bluefield, W. Va., and upward of 40 separate coal-mining operations in the Pocahontas and adjacent fields are now being served with electric energy from this centralized system, which also includes steam reserve plants to insure an uninterrupted supply of power in any emergency.

In order to secure water power of sufficient capacity it was found necessary to go nearly 60 miles to the southeast into the state of Virginia, where surveys showed that the best opportunity for a large, constant supply of hydraulic energy was afforded by the New River. This stream, which rises in the Blue Ridge Mountains, flows in a general northerly or northwesterly direction to its confluence with the Ohio. In a distance of about 30 miles through Carroll and Pulaski Counties, Va., it has a fall of 225 ft., capable of being completely utilized in four or more power sites.

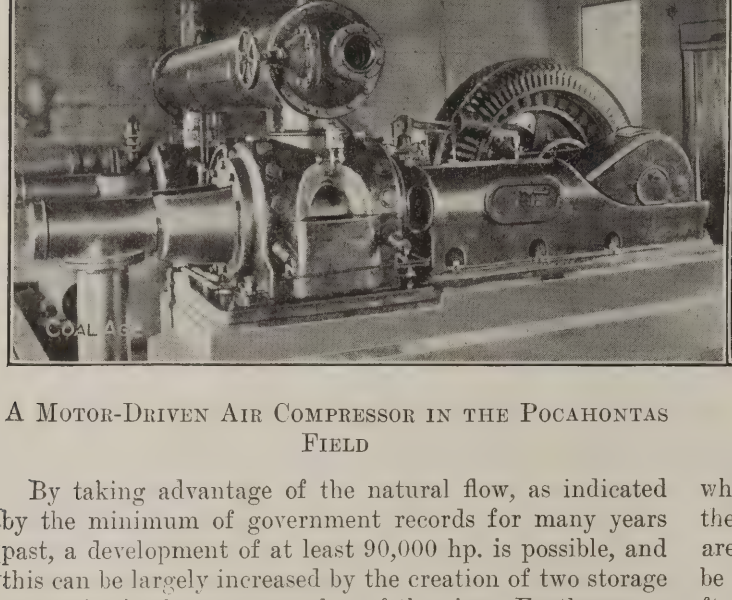
*Insurance Exchange Bldg., Chicago, Ill.



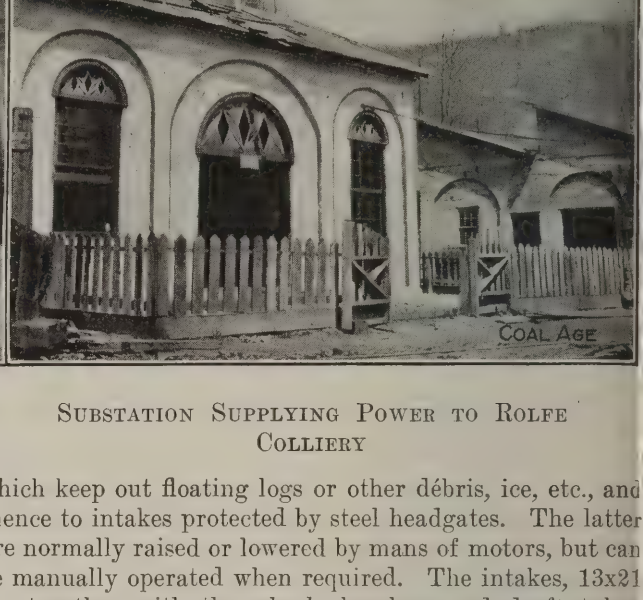
otor-Generator Sets Furnishing Direct Current for Cutting, Etc.



Interior of Hydro-Electric Plant—20,000 Hp. Installed



A Motor-Driven Air Compressor in the Pocahontas Field



Substation Supplying Power to Rolfe Colliery

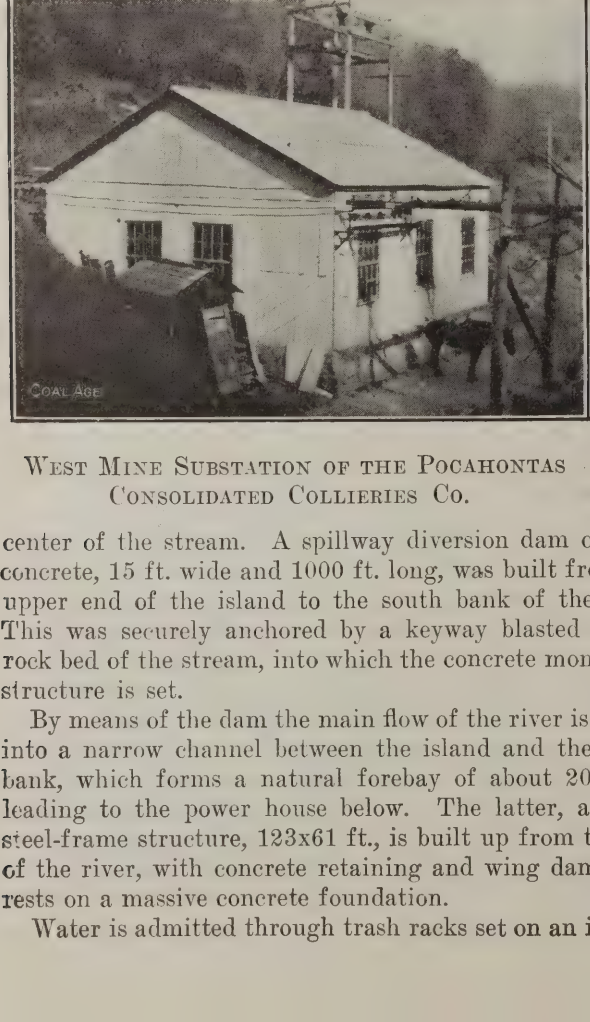
By taking advantage of the natural flow, as indicated by the minimum of government records for many years past, a development of at least 90,000 hp. is possible, and this can be largely increased by the creation of two storage reservoirs in the upper reaches of the river. Furthermore, the entire drainage basin is heavily timbered, insuring a comparatively even, constant run-off during all seasons of the year; and this is one of the most important advantages of the location both to the power company and to the collieries which it serves.

Of the four power sites already selected, it was deemed advisable to undertake the development of No. 2 and No. 4 first. In constructing the headwork for station No. 4, advantage was taken of a long, narrow island in the center of the stream. A spillway diversion dam of solid concrete, 15 ft. wide and 1000 ft. long, was built from the upper end of the island to the south bank of the river. This was securely anchored by a keyway blasted in the rock bed of the stream, into which the concrete monolithic structure is set.

By means of the dam the main flow of the river is forced into a narrow channel between the island and the north bank, which forms a natural forebay of about 2000 ft., leading to the power house below. The latter, a brick, steel-frame structure, 123x61 ft., is built up from the bed of the river, with concrete retaining and wing dams, and rests on a massive concrete foundation.

Water is admitted through trash racks set on an incline, which keep out floating logs or other débris, ice, etc., and thence to intakes protected by steel headgates. The latter are normally raised or lowered by mans of motors, but can be manually operated when required. The intakes, 13x21 ft., together with the wheel chambers and draft tubes, are moulded in the concrete which forms the foundation of the station. As the water issues from the hydraulic turbines, it flows down a tailrace 1800 ft. long, which has been blasted out of the rock.

The single vertical-shaft turbines, of the Francis type have each a capacity of 3000 hp. under the normal effective head of 34 ft. The speed is 97 r.p.m. Three of these units have been installed. Each turbine drives a vertical-shaft alternating-current generator of the umbrella type,



West Mine Substation of the Pocahontas Consolidated Collieries Co.



Substation Furnishing Power to Jenkinjones Mine

from the terminals of which three-phase, 60-cycle current, at 13,200 volts, is led to a double busbar switchboard system and thence to the step-up transformer station mentioned below.

The arrangement of the power plant, with the usual high-tension oil switches, control, intergrating and protective devices, circuits for local electric service, overhead traveling crane, etc., is thoroughly modern in every respect. The details, however, differ in no essential particular from those of other uptodate stations and will not be gone into here.

It may be said, however, that everything has been greatly simplified, avoiding the complications unduly introduced into many of the latest plants. The switch-

boards are on the generator-floor level, with most of the high-tension apparatus in a gallery just above. Excitation is furnished by two direct-current generators, which are also driven by waterwheels of suitable capacity.

In building No. 2 station advantage was taken of a narrow rock gorge, across which a solid concrete dam 504 ft. long, 56 ft. wide at the base and with an average height of 50 ft., was constructed. Between the western end of the dam and the river bank a brick, steel-frame power house, 170x50 ft., was placed on concrete foundations, with a concrete wing and core wall.

Above the power house a cut was also made for a 200-ft. overflow dam for flood times, the spillway of which discharges to a natural sluiceway formed by a depression beyond the west bank of the gorge. This sluiceway was also built up with a concrete retaining wall where necessary. The arrangement of the power house is almost identical with that of No. 4 station above described. It, however, contains four units, working under 49.5 ft. head, at 116 r.p.m., whose normal output in electric energy is 20,000 hp. There are also two waterwheel-driven exciters.

The electric current generated in both stations, at 13,200 volts, is transmitted over either section of a duplicate line system to a separate transformer station adjacent to No. 2 plant, where it is stepped up to 88,000 volts for transmission to the coal fields and other points of consumption.

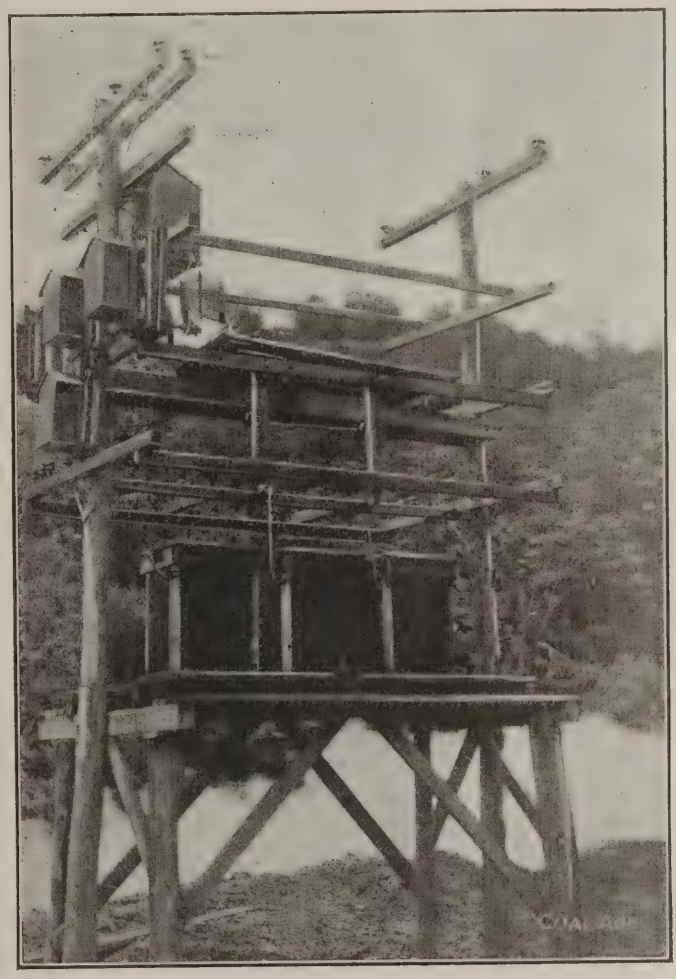
The transformer house is a steel-frame brick building, 88x44 ft., containing four 6000-kv.a. units of the water-cooled, oil-insulated type. These are set in separate brick compartments, and mounted on trucks, so that they can be rolled out when required and made accessible to an overhead traveling crane. A pit is provided in which to lower any transformer for inspection and repairs. The incoming and outgoing lines are equipped with electrolytic lightning arresters and remote-control oil switches; and storage batteries guard against any failure of current for operating the latter.

The 88,000-volt transmission system consists of 237 miles of high-tension cable. There are also 165 miles of the 13,200-volt distribution lines, besides the network of wiring from the substations served by the latter to the properties of the mining companies and others using the power. All of the lines are in duplicate, to avoid any possible interruption to the service. Aluminum cables are used throughout. These are suspended from four-disk insulators upon 45-ft. chestnut poles, cut in the district, which bear oak crossarms of the wishbone type.

The system is spread out like a fan from the transformer station. There are three distinct lines radiating in different directions; and one important cross-connecting line which gives the effect of a "ring" system. What is known as "A" line runs from the main transformer station 50.3 miles through Bluefield to Switchback. "D" line runs 69.4 miles to Roanoke. "E" line extends 51 miles to Marion and Saltville. From Switchback "C" line forms a branch to Coalwood, 16.5 miles distant. "B" line connects Switchback with "D" line, via Pulaski, a distance of 50 miles.

There are seven 88,000-volt substations, and 15 of the 13,200-volt distributing stations, with nearly a hundred banks of transformers. Private telephone lines, installed on the transmission-line poles, connect the entire system; and telephones are placed in each of the 88,000-volt and 13,200-volt substations, as well as at the receiving stations of the principal collieries served with power. All load dispatching is done directly by telephone from the transformer station at Byllesby in the vicinity of the larger generating plant.

This concentration gives the system the advantage of absolute control at a single point, where one man, the load dispatcher, handles the distribution of current over all of the trunk lines, branches and feeders, so that any necessary switching combinations can be made or any part of the system isolated in cases of emergency. It is planned, when plants No. 1 and No. 3 are built, to also pass the current from them through the main transformer and control station at Byllesby, which is so laid out on the unit method that it can readily be enlarged and its equipment extended.



OPEN-AIR TRANSFORMER STATION SUPPLYING MINE MOTORS AND PUMPS

At the 13,200-volt substations, the current is stepped down in transformers to 2300 volts for distribution to the collieries and other plants using it. By means of motor-generator sets or rotary converters it can also be furnished as direct current, some of which is necessary for haulage and other purposes in and about the mines and surface plants.

The use of electric power in the Pocahontas field is nothing new, and a number of first-class steam-driven plants for the purpose have been installed; but the tendency is at present to ship out most of the coal which was formerly burned under boilers; hence the advent of hydro-

electric power, at relatively low cost, has been generally welcomed.

The question of daily expense, however, is not the controlling factor. Water power is making its way even over cheap steam power because of its reliability and is enabling mine operators to eliminate future investments in generating plants, as well as to avoid the employment of skilled engineers and station attendants, whom it has always been difficult to secure or retain, owing to the remoteness of the mines from community advantages. A much lower grade of employees can now be used for the limited service required at the receiving stations. The introduction of circuit-breakers, which automatically reset themselves after a predetermined length of interruption, is further simplifying the need of any attendance.

Formerly, also, it was often necessary to establish the isolated power plants for collieries in locations difficult of access, to which boiler feed had to be pumped against considerable heads, or where a decidedly inferior quality of water had to be used, and tube-clogging, scaling, corrosion, etc., and other similar troubles were frequent.

In contrast to all this, with a constant supply of current, equalized among a large number of consumers, there exist the material advantages of good load and power factors over the entire system, close regulation of voltage and a practically assured supply of energy under all conditions, whether during regular shift periods, overtime, shutdowns, or for momentary or prolonged peak loads. The ability to obtain any amount of power required at any time, whether much or little, becomes of particular importance in the case of machinery such as pumps which need to be kept going even when all other apparatus is idle, as well as for lighting and various intermittent or auxiliary service, which is unduly expensive when dependent upon an isolated power plant running at fractional load.

Another advantage brought about by the use of current from a central system was one that had not been anticipated, namely, the economy in power consumption and better regulation of driven apparatus consequent upon suitable speeds. To take ventilating fans, for example, it will be recognized that the running speeds were likely to vary considerably when not so intended, due to the fact that most of the fan engines were governed by throttling. When motors were installed, however, care was taken to select those of just the right characteristics, with constant or easily regulated speeds to meet the exact requirements of the service. Similar analogies can readily be followed out in the case of other classes of machinery.

A little more than 18,000 hp. is now being taken for coal-mining operations from the system above described, the heaviest user being the Pocahontas Consolidated Collieries Co., which is also the largest single operator in the fields. A. E. Gregory, of the Appalachian Power Co., with headquarters at Bluefield, W. Va., is in charge of all the arrangements for the service, which under his direction is being rapidly extended.

The engineering and construction work for the hydroelectric generating plants and entire distribution system was carried through by H. M. Byllesby & Co., of Chicago; but the present operating engineers are Velie, Blackwell & Buck, of New York City, with G. G. Wilder, Bluefield, W. Va., as manager.

The Spirit of Management

By Berton Braley

Adapted from a poem published in "American Machinist."

We've done with the days of "hit or miss"
When we blundered along in careless bliss,
In frantic hurry and foolish haste
With useless labor and senseless waste;
We've done with the days of "more or less"
When we worked by chance and we planned by guess
And we've learned there's more to a workman's job
Than putting him down where the mine's athrob,
With pumps and motors in vast array,
And letting him blindly feel his way!

For now we study and now we plan
The work and effort of every man,
The reason "Why" and the manner "How,"
To lessen the sweat of his back and brow,
Relieve his muscles of stress and strain
And lighten the task of his harried brain;
To give him leisure for rest and fun
While swelling the sum of the work that's done!

We must show the Miner the work to do,
The WAY to do it, until he KNOWS;
We must give him the mighty spirit, too,
By which the World in its wonder grows;
For the Spirit of Modern Progress comes
From men with bodies and minds kept strong,
Not puny weaklings from out the throng
Who swarm in ghettoes and fetid slums!

And so, at last, we have come to learn
That the Health of miners is our concern—
That it's our concern as Fellowmen
And brothers all, in a world that's wide,
Where we rise and fall and rise again
Like soldiers battling side by side;
And 'tis our concern in a selfish light
For men work best when they're fully fit,
With minds untroubled and calm eyes bright,
And bodily vigor and clear, keen wit!

So here's the gospel—to do our work
With little fretting or fuss or irk;
To train the toiler, wherever placed,
To labor wisely and not to waste;
To give men pride in the work they do,
To pay them well when the job is through,
And to hold their welfare and strength and health
As source and font of our truest wealth!

That's first-class gospel, because it's fair
Because it's good for the human race,
Because it moves us to do and dare
And quickens the world on its forward pace,
Because it brings us to better ways,
And so—in the long, long run—IT PAYS!

The Peruvian government has granted sundry French capitalists permission to draw up a plan for a railway starting from Sayan and terminating in the carboniferous basins of Oyon and Cheras.

Safety in West Virginia

By Frank H. Kneeland

SYNOPSIS—Some of the means employed by the United States Coal & Coke Co. to prevent accidents.

To increase the output from 100,000 tons to 400,000 tons, on the average, per each fatal accident underground, to mine over a million tons of coal without a single fatality, to operate a mine for almost two years, without a serious mishap of any kind, shipping meanwhile over 750,000



Fig. 1. A Drift, Mouth, Fan and Substation

tons of coal, to render its operations safer than the mines of either Great Britain or Belgium, and approximately one-third as hazardous as surrounding collieries, are a few of the results attributable to the campaign for safety which has been waged by the United States Coal & Coke Co., of Gary, W. Va., during the past four years.

Such progress as this, in face of the many difficulties, such as the explosibility of gas and dust and the dangers from drawslate, rash and kettle-bottoms encountered in the Pocahontas region, could only be accomplished by the exercise of painstaking care and eternal vigilance.

The accidents occurring at a coal mine may be broadly divided into two classes; namely, those which happen underground and those which transpire upon the surface. Underground, the principal danger arises from falls of roof and coal, and from electrical apparatus, such as trolley wires, machine cables, etc. Above ground, the workman's greatest peril is from machinery. The present article will deal with this latter danger and the methods employed by the above named company for its circumvention. Accidents underground will be dealt with subsequently.

Accidents occurring with machinery may be forestalled by two distinct and widely dissimilar means, neither of which is in itself inadequate. The first of these has to do with each particular piece of mechanism itself, while the second deals with the mental attitude of the workman. In other words, the two means to be employed for accident prevention with machinery may be designated as safety appliances and morale.

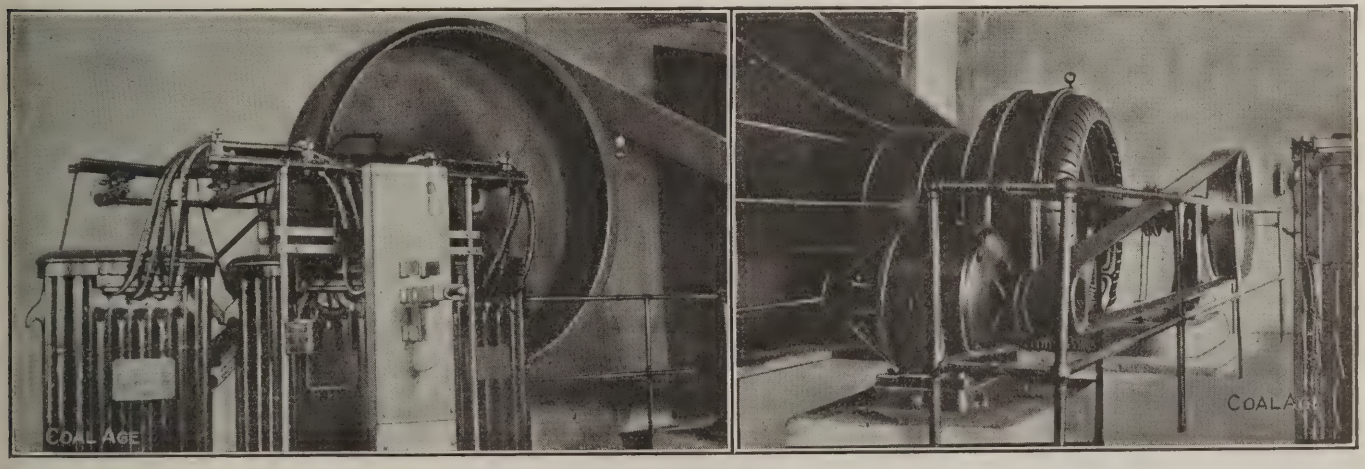
The end sought in the design, construction and application of safety appliances to machinery and mechanical devices, is a single one; namely, to render dangerous contact, intentional or otherwise, between the attendant's person and the moving parts of the machine impossible. The forms which devices to accomplish this end may take, however, are vertitably legion, and embrace everything from headless or hollow setscrews to elaborate guards completely incasing and insulating an entire machine from its operator.

The accompanying illustrations give an idea of some of the many devices employed by this company for this purpose and are for the most part self-explanatory.

The passenger car shown in Fig. 4 is used to haul the miners from the town of Anawalt, located in a valley, to the mine up an incline approximately 1200 ft. long. It is provided with a safety catch not shown in the drawing, controlled by a fly-ball governor, which releases two toothed jaws, gripping two auxiliary oak rails, should the speed at any time exceed a certain predetermined amount. Hand trips are also provided at either end of the car.

The automatic release is periodically tested by allowing the empty car to attain, during descent, the critical or trip speed. The same experiment is less frequently repeated when the car is loaded to its normal capacity with rock or other inanimate weight.

At the present time it is the endeavor of this company to purchase all new machinery adequately guarded, where possible. Many machines now in use were, however, on



Figs. 2 and 3. Two Views in Substation Shown in Fig. 1. Note Pipe Handrails around Machines and Belts

hand before the active campaign for safety started. For these it has been necessary to design and construct suitable guards for the dangerous parts. Various materials and types of guards have been tried from time to time, the designs being constantly improved and reduced to what might be termed standards.

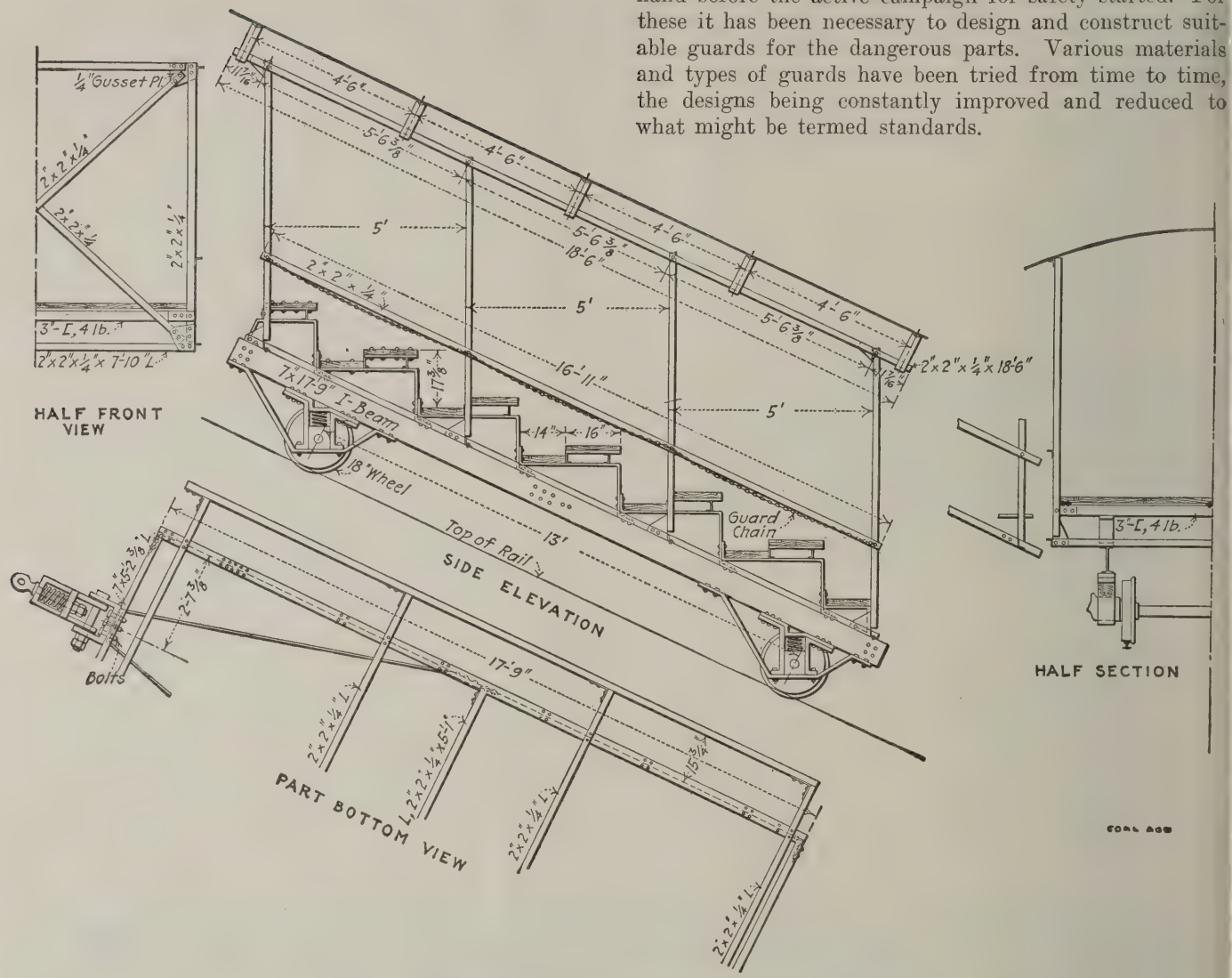


FIG. 4. INCLINE CAR FOR HAULING MINERS TO WORK

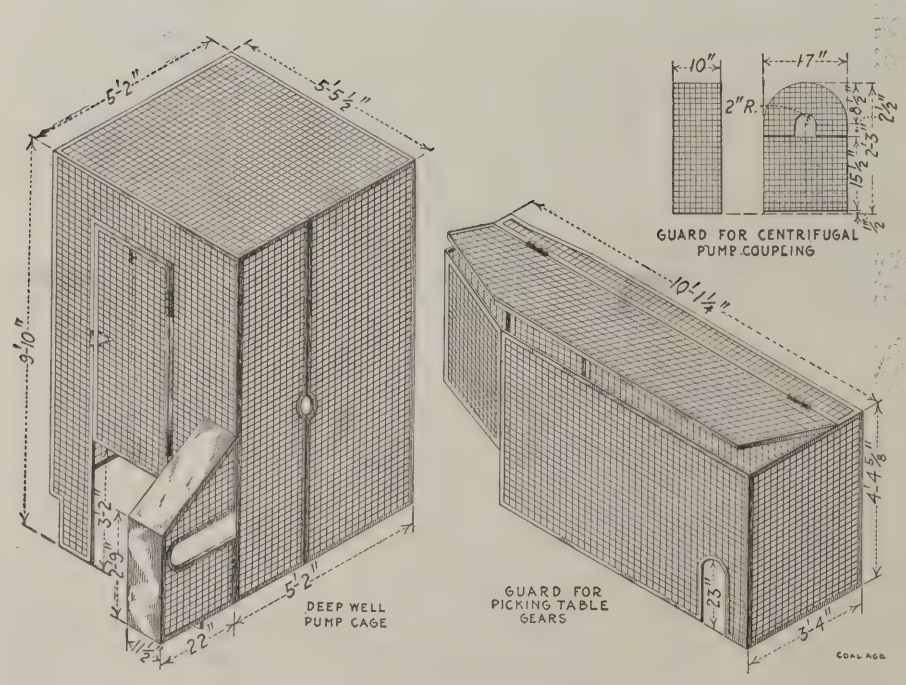


FIG. 5. GUARDS FOR A DEEP-WELL PUMP, PICKING-TABLE GEARS AND A PUMP COUPLING

Take, for example, such a dangerous piece of mechanism as the reducing gears between a picking table and its driving motor. For such places, wooden guards are both unsightly and combustible. Pipe handrails are much better, but cannot ordinarily be easily and quickly removed or returned to place in case of repairs requiring complete access to all gear parts. Sheet-iron cases are still better, but obscure the gears when in place, and have a marked tendency to chatter noisily under even slight vibration.

At the present time, heavy wire netting, carried on angle- or channel-iron frames, which may be easily unfastened from each other and thus removed, is considered standard. These guards not only absolutely prevent contact with the gears, but are neat in appearance and permit the moving parts to be at all times easily seen. Such guards are shown in Figs. 5 and 6.

For guarding pulleys and belts and many other similar pieces of mechanism, the simple pipe handrail is found very satisfactory. A few of the many applications of this type of protection may be seen in Figs. 2, 3 and 7. For protection against vertical belts, particularly in machine shops, a frame of strap iron is often employed.

rather one which is most frequently responsible for fatalities around machinery, is a revolving projection, such as a setscrew or clamp collar upon a shaft. A feather or spline, or even an open keyway, may also be the means of catching a workman's sleeve or other part of his clothing, with disastrous results.

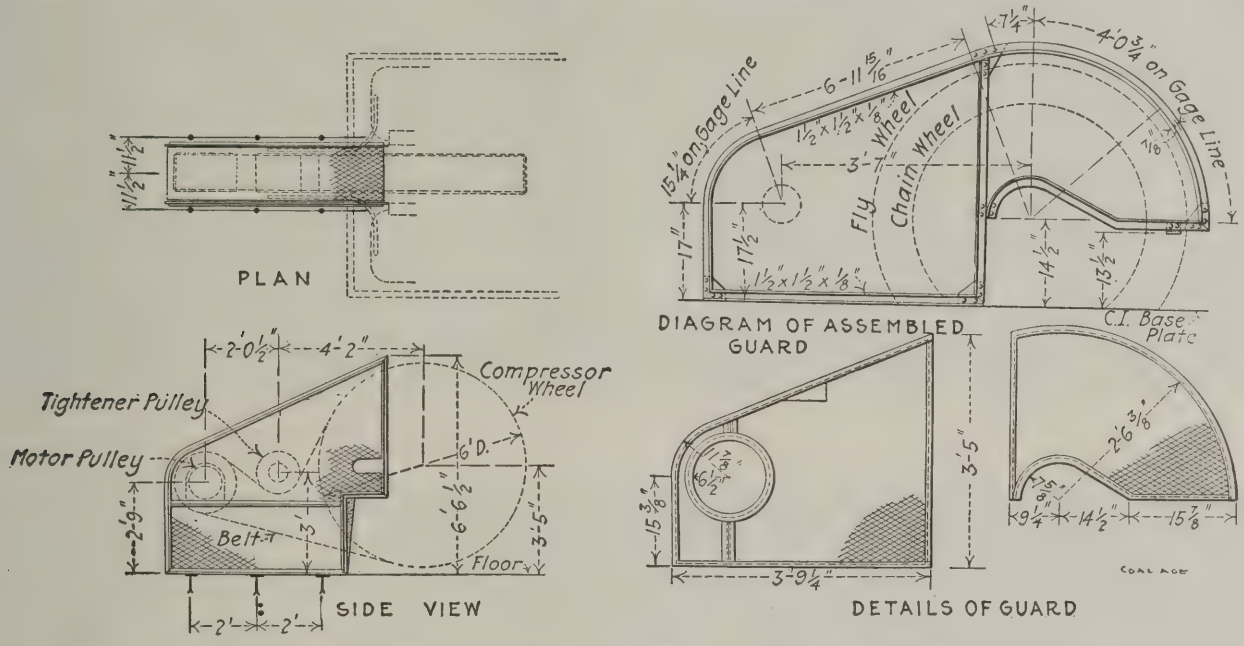


FIG. 6. TWO GUARDS FOR DRIVES TO AIR COMPRESSORS

Here, also, when a gear guard is either rigidly or movably attached to the machine, it is frequently made of a frame completely covered with sheet iron. This is not altogether objectionable where skilled labor is employed and careful inspections are regularly made. Belt and gear guards of the above named type are shown in Figs. 8, 9, 10 and 11.

One of the most dangerous pieces of mechanism, or

In the practice of this company, exposed collars must be smooth with no sharp projections. Such parts are now manufactured and sold as safety collars. Feathers which are so located as to be dangerous are guarded, and keyways similarly placed are filled up.

First-aid teams have been organized at the various mines and first-aid cabinets are conveniently located at shops, substations and tipples. These are, however, un-

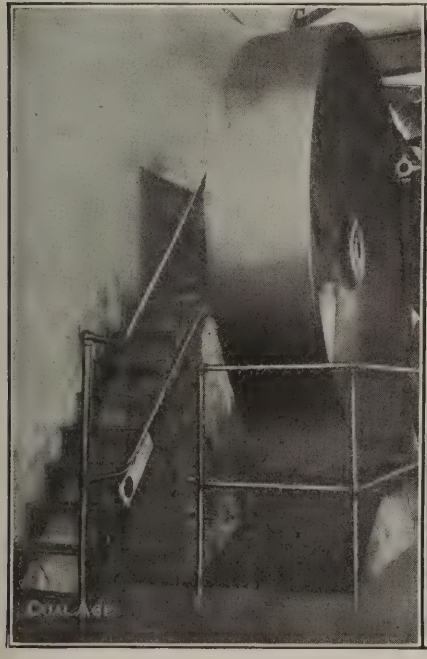


FIG. 7. RAIL AROUND FAN PULLEY AND BEARING

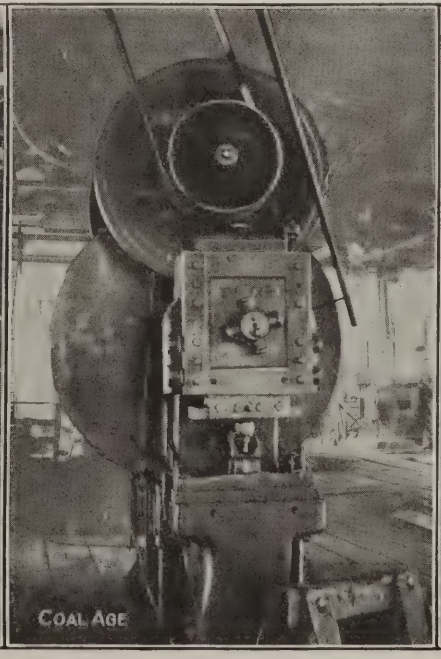


FIG. 8. GEAR GUARD ON A PUNCH AND SHEAR



FIG. 9. GUARD OVER CHANGE GEARS ON A LATHE



FIG. 10. BELT GUARD ON A RADIAL DRILL

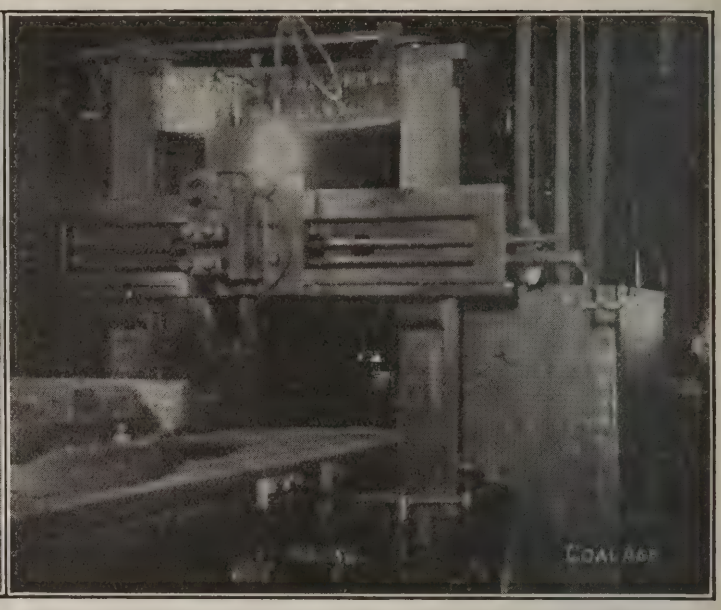


FIG. 11. SHEET-IRON BELT GUARD ON A PLANER

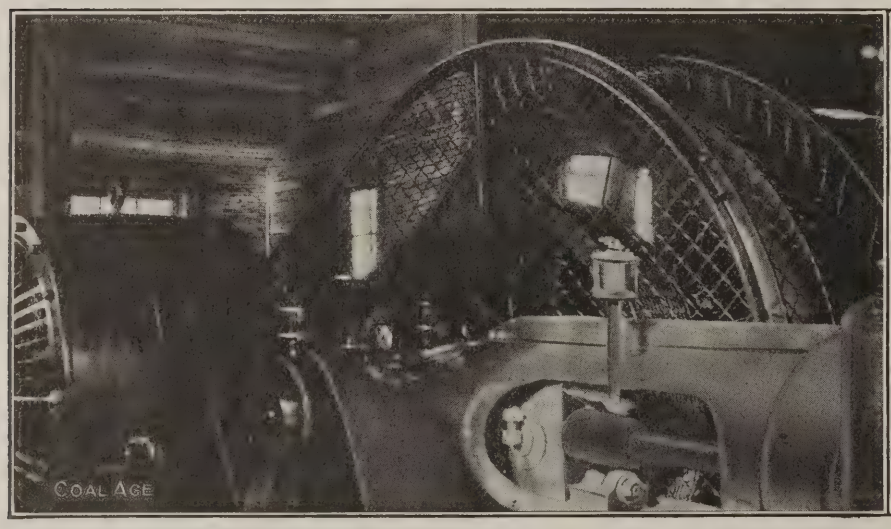


FIG. 12. NETTING GUARD OVER SILENT CHAIN DRIVE FOR AN AIR COMPRESSOR

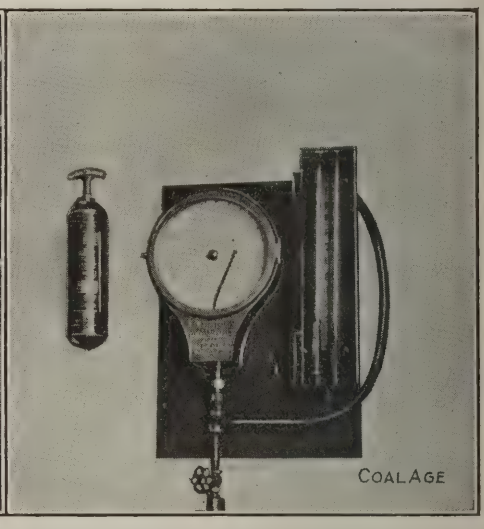


FIG. 13. INDICATING AND RECORDING WATER GAGES ON A MINE FAN

welcome precautions, as the primary intention is to prevent accidents, not to take care of their effects. It is recognized, however, that some accidents will unavoidably occur, and in such cases no expense or effort is spared to quickly and effectually alleviate the suffering of the victim and render his recovery prompt and certain.

Here as elsewhere in the plants of the Steel Corporation many valuable suggestions have been received from the workmen themselves. It is freely acknowledged that the appointment of safety and works committees has done much to avert mishaps of all kinds. One great step, perhaps the greatest, toward industrial safety, has been taken

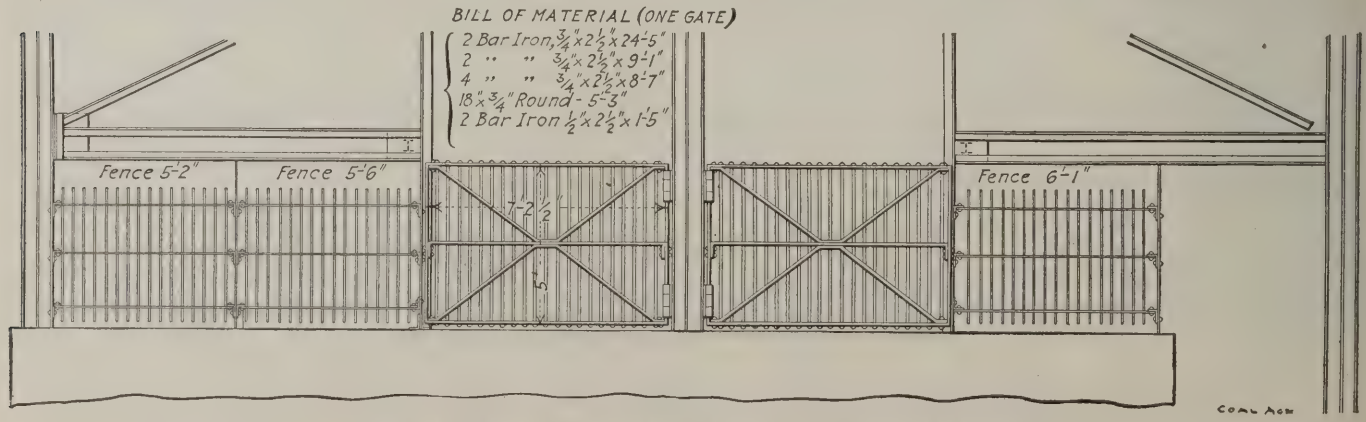


FIG. 14. IRON FENCE AND GATES AT A SHAFT MOUTH

when the workman himself becomes thoroughly alive to his own responsibility for danger and dangerous practices.

By means of danger signs, placards and illuminated safety mottoes and warnings, but still more by careful training and example, the management of the United

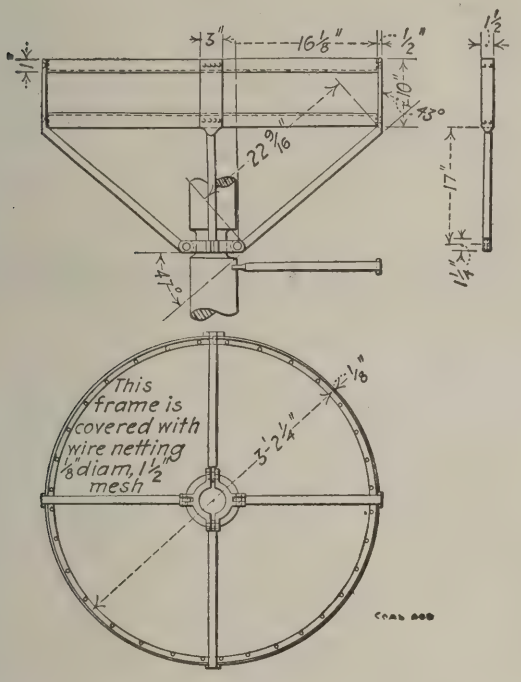


FIG. 15. GUARD FOR GOVERNOR ON CORLISS ENGINE

States Coal & Coke Co. constantly strives to bring home forcibly to every man in its employ the perils incident to his daily work, and the importance of eternal vigilance and caution in an industry as inherently dangerous as that of coal mining.

Connecting Motors to Mine Fans

BY H. J. BOOKER*

SYNOPSIS—It is frequently advantageous in mine ventilation to be able to shift the fan drive from one motor to another. Two such arrangements are here described.

The successful connection of two motors to a mine fan so that an auxiliary motor is always ready and can be brought into service without stopping ventilation is claiming the attention of a number of mine managers and mechanical engineers throughout the coal fields today. The accompanying illustrations show how the writer accomplished this result in a satisfactory manner.

Fig. 1 shows a large double-inlet reversible mine fan. The motors are so arranged that either can be disengaged when in service without shutting down. To shift from one motor to the other, it is only necessary to start the one to be used and change the clutches. This can be done without any appreciable variation in the speed of the fan.

The fan shaft is continuous; the hub of the friction-clutch pulley is fitted with brass bushings, and ample means for lubrication are provided, so that the latter may run loose on the shaft. The clutch hub is keyed to the shaft and the motors are belted to the fan as shown.

It has been found in practice that this is a much better plan than to make the fan shaft in three pieces joined together by means of clutch couplings to be thrown in or out when changing motors. The reason for this is apparent when the weight supported by the fan bearings as compared to that resting upon the clutch and pulley bearings is considered. The fan bearings naturally wear down the faster, making it impossible to keep the three segments of the shaft in line. This causes considerable bearing trouble, which necessitates frequent shutdowns.

*Monongahela, Penn.

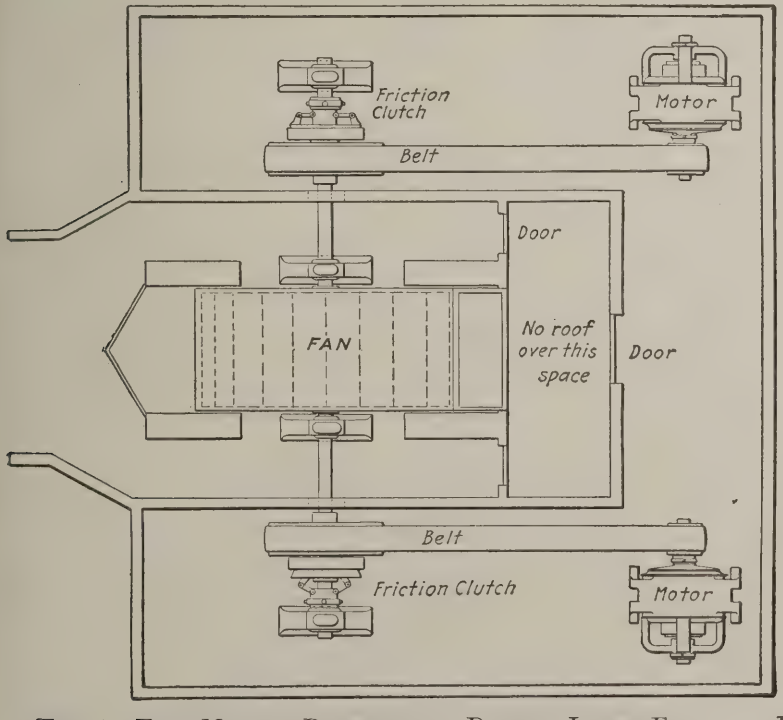


FIG. 1. TWO MOTORS BELTED TO A DOUBLE INLET FAN

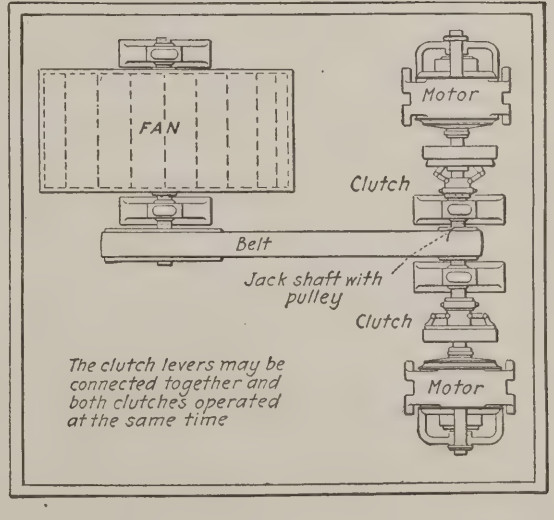


FIG. 2. MOTORS BELTED TO A SINGLE INLET FAN

Fig. 2 shows a small single-inlet mine fan to which is connected two motors, either of which is of ample power to drive it to its full capacity. In this arrangement the motors are connected to a jackshaft by friction clutches. The jackshaft carries a pulley to which the fan is belted. By this method the operator can change motors without allowing the speed of the fan to vary as both clutches may be operated simultaneously.

Method Applicable Also to Double Inlet Fan

This method may be employed to drive a double-inlet fan similar to that shown in Fig. 1, but the two-belt arrangement is preferred since if the bearings on the jackshaft give way, the fan will be out of commission and there is less danger of the large fan bearings giving trouble than those of the high-speed jackshaft.

Either of the above systems will give satisfactorily service with a reasonable amount of attention, without which no equipment can be expected to give good results.

With the arrangement of motors and shafts outlined above, three means for power transmission are available, namely, belts, ropes and silent chains. Of the three, the writer prefers a sole-leather belt, which, if properly cared for, will last several years. Ropes are satisfactory for power transmission, but do not last well. They have a way of giving out when they are most needed. One year appears to be about the average life of a rope in continuous service on a mine fan.

The Indianapolis Convention

SYNOPSIS—With only about a dollar to spend per man on a possible strike in the spring, the United Mine Workers of America was inclined to be conservative, though men were present who figured every dollar over a hundred times and found use for all. There is plenty of evidence that the direct-action element will soon replace the socialists as disturbers in the organization.

The first biennial convention of the United Mine Workers of America met at Indianapolis, Ind., on Jan. 20. In the afternoon a motion was made, but not carried, to suspend the rules so as to permit a vote to be taken on removing the convention to some other city, as a rebuke to the Chamber of Commerce and the business men for their stand in the recent teamsters' strike.

It will be remembered that Mayor S. L. Shank, of Indianapolis, was compelled to resign for his weakness during the street-car strike, and H. R. Wallace, the city comptroller succeeded him. Five hundred business men were sworn in for special service, one hundred being mounted guards. Order being restored, the strike utterly failed, and it was this strong defense of law and order which angered some of the miners' leaders.

At the morning session, Vice-President Miller of the Central Labor Union presided, and addresses of welcome were made and sergeants-at-arms and messengers appointed by President J. P. White. A resolution was passed, calling on Congress to investigate the Colorado strike, and, to present the matter more effectively, S. L. Montgomery, of Charleston, W. Va., and W. L. Farley, of Pratt City, Ala., were delegated to proceed to Washington at once with the resolution.

President White presided at the afternoon session and only business of a routine character was transacted, such as the reports of the rules committee and of the officers of the organization. The report of the president was an extremely conservative document. He has realized what a drain has been caused on the treasury by the expenditures in West Virginia, Colorado and Vancouver Island during the past year. As one has failed and the others seem about to come to a disastrous end, there is nothing to make the president buoyant. There has been continued strife and no prospect of any immediate return in dues from the sections affected.

Strike Fund Is Equal to 73c. per Union Man

Secretary-treasurer Green showed incidentally why conservatism must have the approval of the Union officials. The paid-up membership was 377,682 in December, 1913. In the past two years $2,328,167.87 has been expended for relief, and there is now a balance of $278,-032.30. This seems a fairly large war chest till it is divided by the number of members. The figure obtained by such division is 73c. When we recall the costs of the convention, and the fact that two costly strikes are underway, we can hardly anticipate a long and costly strike this spring. If such a suspension occurs, it cannot be dignified as a strike. The whole reserve fund of the organization in December, 1913, would only provide $1 for each bituminous mine-worker, for there are 277,506 of these men in the union. However, there is enough money on hand for aggressive agitation.

Craft Organization vs. Industrial Unions

The second day developed the latent struggle between industrial and craft unionism. The American Federation of Labor has been unionizing crafts. Thus, in organizing the mining industry after the Federation model, the miners would have one organization, the loaders probably another, the machine runners a fourth, and so on. But most of the unionmen today believe that this promotes strife between crafts, and certainly does not permit a united front to be presented to the mine owners. They desire to organize by industries and not by any smaller units.

The American Federation of Labor has been regarded as an aristocratic concern, anxious to uphold the craftsmen and having little interest in the unskilled workmen. The industrialist declares that when the latter is unorganized, he aids in strike-breaking whenever a dispute arises.

This accounts for Duncan McDonald, of Illinois, attacking S. P. Gompers and Thomas Kennedy, of Hazelton, Penn., declaring that almost every delegate to the Federation has been insulted. An attack on Secretary of Labor, William B. Wilson, also shows the divisions in the United Mine Workers of America.

Frank M. Ryan, of the International Association of Bridge and Structural Workers, thanked the miners for their assistance and urged that conspiracy was just as

permissible for the poor as for the rich. He did not say, however, that the conspiracy of which he was convicted was one to transport explosives illegally in connection with several bomb settings in which life was menaced.

Some Uses for That 73 Cents

On the third day the Louisville, Col., local urged that all available funds of the union be used to purchase mines, and that as funds be obtained, all the mines of the country be bought and operated by the union. Other resolutions urged that old-age pensions and a home for disabled miners be established. The Bear Creek, Mont., union wanted coöperative wholesale supply houses started under the auspices of the union. A much larger number favored the construction of an executive office for the organization and the establishment of a plant for printing the *Mine Workers' Journal.* They propose that when the strikes are at an end 50c. be collected from each member every month until $500,000 is collected.

A resolution was passed after much debate that "the time had arrived, owing to the present economic conditions and the machinations of the interests in many places, for the laboring people to come together in a political party." Several socialists were anxious to annex that approval, notably William Hynes, of Fayette City, Penn., and Preston Gunnoe, of Peytonia, W. Va., but no party was designated.

J. P. White Loses Nominating of Scale Committee

On the 23rd, the delegates took from J. P. White the nominating of the scale committee, on the ground that the officers of the organization had not "worked in the mine for a few years and did not know the working conditions like the men at the face of the coal." It was decided that the scale committee should be elected from the floor of the convention.

There followed a fierce onslaught on the making of contracts with operators. An advocate of the Industrial Workers of the World, from Virginville, W. Va., presented a resolution declaring that "fake labor leaders" with false methods were tying the miners with long-term agreements." He believed in the general strike, such as he alleged had been so successful in England.

The Opposition to Militarism

A representative from a Virginia local union located at Pocahontas was expelled from the meeting, as it was declared that the local was a spurious offshot formed by Baldwin-Felts detectives and not by real miners. Several delegates protested against the army, militia and boy scouts, and a resolution was presented opposing the enlistment of any of the members of the union in the militia and condemning the boy-scout movement.

Another resolution provided for a general strike in case of the United States engaging in war. A six-hour day so as to give work for everybody was also urged. However, the men were disposed to be conservative, and doctrines now popular in Europe received little approval.

The miners did, however, vote in favor of compelling all mine carpenters to give up their membership in the Brotherhood of Carpenters and Joiners, and W. O. Green, the secretary-treasurer, said that organization was favorable to the move.

Mostly Politics

On the 24th, the meeting passed a resolution favoring Federal mothers' pensions, old-age pensions, liability and compensation laws. The miners of East Charleroi, Penn., presented a resolution urging the discontinuance of the use of electricity underground, and the resolution was adopted in substance and referred to the different districts for settlement. Another resolution introduced importuned Congress to pass a law making it unlawful for any person, firm or corporation to import into a strike district any strike-breakers, nonunion workers, detectives, or gunmen. The same resolution called for laws prohibiting the use of state troops in strike districts.

On the 26th, the meeting settled down into the harness by passing a resolution in favor of the initiative, referendum and recall, and providing that the recall be applied to constitutional amendments and that judges be prohibited from declaring unconstitutional laws which have been passed by the people.

Much disgust was expressed that time worth $1500 was expended on solving whether the miners of Coffeen, Ill., or of Fallon in the same state should pay a doctor's bill of $74.45. James Lord was elected president of the mining department of the American Federation of Labor and put on a salary. He will be located in Washington, D. C.

Shorter Hours and Fewer Aliens

The organization passed a resolution favoring a shorter work day until all surplus labor is employed, and an enactment of law prohibiting immigration from any country till that same result is assured and a resolution requiring certificates of competency as miners of all employees who wish to work in the mine. The resolutions committee offered a resolution, which they had amended, favoring municipal employment agencies and eliminating private labor bureaus. Federal mine-safety laws were demanded in an adopted resolution.

On the 27th of January the international executive committee was empowered to appoint a committee to meet a similar body authorized by the Western Federation of Miners. These committees are to discuss amalgamation of the two unions, and if the plan is agreed on, it is to be submitted to a referendum.

The following day was wasted by Duncan McDonald, who made a severe attack on S. J. Gompers, calling him a liar, slanderer and poltroon, accusing him and the executive board of the American Federation of Labor of drunkenness. After preparing to leave, Gompers managed to reply to his critics. Later, the miners reindorsed woman suffrage, discussed a plan to reduce representation at conventions and refused to approve of the resolution excluding unionmen from the militia.

Delegation to Be Reduced

On the 31st, while alleged to be feeling quite sore at the extravagant expense ($15,000) resulting from the debate between McDonald, Moyer and Gompers, the delegates nevertheless made little progress. It was alleged that 30 interlopers had been planted by a Pittsburgh detective agency to create disorder.

The committee on resolutions advocated, however, a reduction of the delegation to conventions. They commended that one delegate be elected for every 1000 members, in all only about 383 men, instead of more than 1500 as as present. The organization voted not to permit the money of locals to be spent in aid of any strike,

unless the strike was indorsed by the American Federation of Labor, or an affiliated organization. This will bar the Industrial Workers of the World from Union support.

J. A. Holmes, director of the Bureau of Mines, and W. D. Ryan, former secretary-treasurer of the United Mine Workers, and now with the Bureau, both spoke and were well received.

On Monday, Feb. 2, the miners met at the German House, Tomlinson Hall having been previously engaged for a poultry show. The day was largely wasted over a wrangle about the auditing expenses, and the sinister causes said to be back of criticisms of the auditors.

The convention passes over to the third week without notable results. Gompers is to be credited with some judgment in saying—"Taking the newspaper reports as a criterion, the most important work this convention has done has consisted of attacks on the American Federation of Labor and its officers, and discussing whether the president's salary shall be increased $1000 a year." Nothing has been accomplished and two weeks have passed. The only things essayed are what the United Mine Workers cannot do, the regulation of street-car traffic being a case in point. It is estimated that every roll-call costs $11,000.

Decisions Expected

Apparently, there will be a demand for an increase of 10c. per ton on mine-run coal. Engineers will ask an increase of $20 a month, and firemen, blacksmiths and other topmen will demand 25c. a day more than before. A similar increase will be asked for drivers, trip riders, timbermen, track and pumpmen, motormen, trappers and other inside workers. The scale committee is also considering an increase, for all men who receive less than $2.25 a day, proportional to the raise in wage demanded by the miners. There is a proposition to advance the wage scale of all surfacemen, so as to make it equal for all employees.

The pushing of cars promises to be a vexed issue, and the workers will probably refuse to incorporate in their scale the Cleveland agreement, that nothing shall be demanded in the management of mines which will increase the cost of production.

The operators of the central competitive field, covering western Pennsylvania, Ohio, Indiana and Illinois, have been asked to meet the scale committee in joint conference at Philadelphia, Tuesday, Feb. 10. The district convention at Pittsburgh is set for the same week and must be deferred, but it is hoped that the Illinois district convention can be held on Feb. 17 as scheduled.

Proposed Law for Kentucky Coal Mines

Special Correspondence

The following proposed legislation, under the caption of House Bill No. 332, known as an Act to regulate the employment of physicians and surgeons by companies and corporations operating coal mines or lumber mills in the State of Kentucky, was introduced in the General Assembly at Frankfort, Ky., Jan. 28, by Representative W. M. Webb, of Johnson County. It reads as follows:

Section 1. That when it becomes necessary for any company or corporation owning or operating a coal mine or lumber mill in this commonwealth to employ a physician or surgeon to treat or attend the employees at said coal mine or lumber mill, in case of sickness or injury, that said physicians or surgeons shall be selected by the employees working at said coal mine or lumber mill by a majority of said employees working at said coal mine or lumber mill. That said physicians or surgeons shall be employed for a period of one year unless sooner removed or discharged by said company, upon the request of said employees, which shall be done upon petition signed by a majority of the employees employed at said coal mines or lumber mills; provided that a copy of said petition has been posted at the main entrance of each mine or at the mill of each lumber company at least ten days before it is presented to said employees for their signature. That the sum so paid each physician or surgeon shall be paid by said employees at the rate of $1 per month for married men and 50c. for single men, which amounts shall be deducted from the earnings of the employees working at said coal mines or lumber mills, and that each married man's family shall receive the services of said physicians or surgeons without any additional cost.

Section 2. Any company or corporation violating said act shall, upon conviction, be fined not less than $20 nor more than $100 for each offense.

Information Worthy of Your Most Careful Attention

During the next few weeks, the pages of Coal Age will contain the most interesting and the most valuable assortment of articles ever arranged for coal-mining men. Among other things, we will publish a paper on coke manufacture, giving a detailed comparison of beehive and byproduct ovens. Valuable figures of operating cost will be included.

Then there will be articles giving complete data on a recent mine fire, methods of measuring gob temperatures, important details in connection with the construction of colliery plants, comparison of steel and wooden tanks for coal mines, description of a new and modern mine in Alabama, design and operation of a German coal-screening plant, signaling developments in British coal mines, methods of mining in Iowa, power plants at Westphalian collieries, steel vs. wood for supporting mine roofs, approved methods of mine surveying and the syndicate system of selling coal and coke.

There are a number of other articles already on hand and of equal value to any of the foregoing. Some of Mr. Braley's best poems, alive with human interest, will be printed in early issues. Then there are the coming wage agreements which will focus the attention of mining people. Coal Age will cover all phases of this labor controversy as it has never been handled before. All the news of both factions in the contest will be published.

Errata

A. R. Tibbits, who was rightly credited with the article on the Colorado output in 1913 (Jan. 10) is not one of the inspectors of coal mines of that state, but is employed in the office of John Dalrymple, who is the chief inspector of Colorado.

In our issue of Dec. 20 we stated that the Vulcan mine, which recently was the scene of an explosion, was located at Lafayette, Boulder Co., Colorado. There are two Vulcan mines, both belonging to the Rocky Mountain Fuel Co., one at Lafayette, and one at Newcastle. The Newcastle mine was the one which exploded. This mine is operated by the Coryell Mining & Leasing Co. The confusion, therefore, was easily made as in our mining list the Rocky Mountain Fuel Co. had only one Vulcan mine, that at Lafayette. The coal at Newcastle is bituminous not lignitic.

In laying out a boiler plant attention should be given to the space left between the fronts of water-tube boilers and the boiler-house walls or opposite faces of the range so as to enable tubes to be replaced and stokers to be run out for repair and renewal.

Firedamp Reservoirs in Room-and-Pillar Work

By Frank Haas*

SYNOPSIS—Cavities above coal workings, when caving has taken place, often contain large quantities of gas which cannot be removed by ventilation; it is suggested, therefore, that holes be drilled for the purpose of tapping these reservoirs, which are a standing menace to the lives of the miners.

There is a general impression among mining men that since firedamp is found in coal seams, it evidently originated there and that the gases are continually given off by the coal. There seems to be some excuse for such an impression as many publications, and particularly those of foreign countries, tend toward this theory. Whatever may be the case elsewhere, here in West Virginia, we know that the gas occurs below the coal seams and also above the seams, and that it is encountered in all the stratifications. Also, that the gas which we encounter in the mining operations is simply natural gas, perhaps altered somewhat in composition. Such gas is met in all excavations within coal mines, clay mines or stone quarries, and the amount will vary with the permeability of the strata and their local condition.

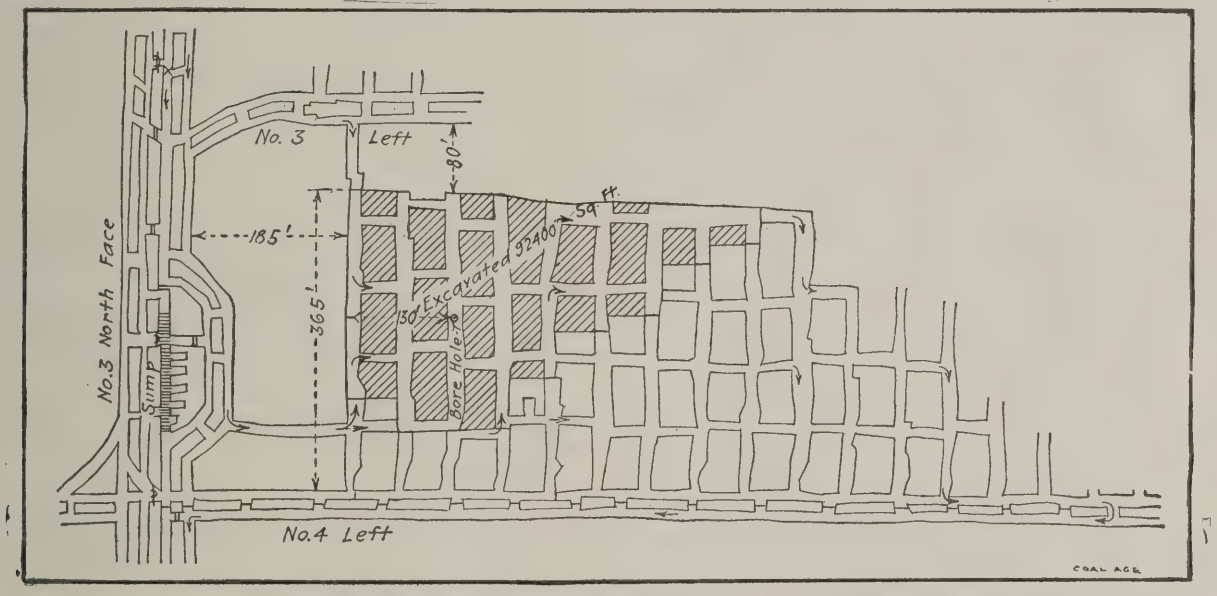
The method of mining coal in the Pittsburgh seam in the Fairmont region of West Virginia, consists in driving rooms from butt headings a distance of about 300 ft., and then removing the pillars between the rooms on a retreating system. The rooms are started successively, so that the line of advancement is at an angle of approximately 45 deg. with the butt heading and the retreating line of the pillars will be practically the same. The coal, being completely removed, leaves the roof locally unsupported, and such stratifications as are loose, break and fall into the space previously occupied by the coal or the lower roof stratifications.

The height to which such stratifications break and fall depends on the area from which the coal has been removed and also on the nature of the overlying rocks, but it cannot be depended on to follow any fixed rules. Such crumbling and falling either continue until they reach the surface of the ground or if there is not an actual breaking of the surface, the measures will subside and fill the void caused by the removal of the coal.

Ventilation Cannot Remove All the Gas

It is plain, that until there is a subsidence of the surface by either cause, that there is a volume equal to the coal excavated which must be filled with air or any gas which may leak in, and we find in certain localities that firedamp or natural gas does accumulate under such circumstances. The ventilating current of the mine when properly handled, has a tendency and does dilute and convey away in its current this gas, but the tendency is less and less as these falls increase in height and finally fails entirely, leaving a body of gas or mixture undisturbed. Such a condition is a menace and the greatest danger occurs when the final fall comes as a result of the subsidence of the surface, at which time this gas is forced out and into the mine more or less rapidly.

To drill a hole from the surface to the highest point or near the highest point in the fall was suggested as a remedy, but several features are involved which threw doubt on its practicability. In order to test out matters fully, such a hole was put down under the conditions set forth in the accompanying illustration. The hole was of such size as to take a 6-in. casing, but the casing was only carried down a slight distance. When the cavity was reached, the casing was capped until the measurements could be made. The results are shown on the accompanying diagram. The percentages of gas refer to the sum of all other gases than air; while not all explosive, they are at



Section of Mine No. 43, Consolidation Coal Co., Showing Bore Hole

*Consulting engineer, The Consolidation Coal Co., Fairmont, W. Va.

least foreign to the normal mine atmosphere. Unfortunately some minor changes were being made in the mine ventilation during the period of the observations, which would affect both water gage and velocity.

The mine is ventilated with a force fan delivering 175,000 cu.ft. per minute at a water gage of 3.4 inches.

The water gage at the hole when opened was 2.7 in., which was apparently too high, but when the specific gravity of the mixture (about 0.6) is taken into consideration, this discrepancy was explained. It was found that when the hole was first opened it delivered 154 cu.ft. per minute; as the percentage of gas fell off, the water gage became less until the normal pressure was reached (1.8 in.), the volume suffering a corresponding drop to 68 cu.ft. per minute.

At first the atmosphere that came off was nearly all gas, but this dropped rapidly in percentage till the end of the fourth day. Thereafter the percentage and quantity of gas remained constant. It would appear that as the quantity of gas no longer varies, the amount leaving the borehole would be an index to the gas actually formed, which is computed at about 12 cu.ft. per minute.

The area of the base of the gob was measured as 92,400 sq.ft., and the coal being 8 ft. high, would give a volume for the accumulation of gas about 739,200 cu.ft. The observations indicate that the hole gave off in the first four

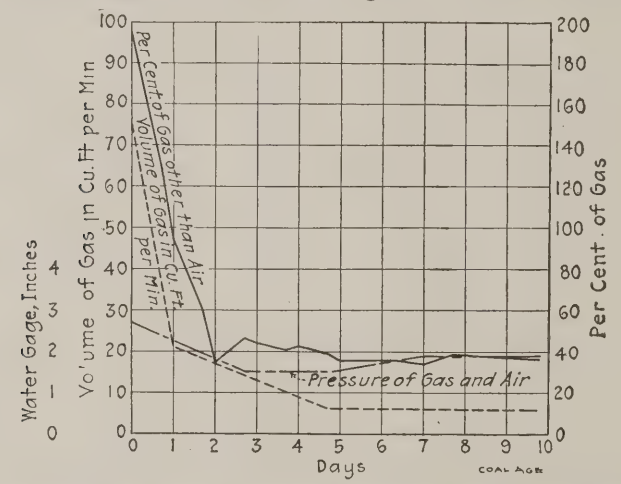


Diagram Showing Volume, Pressure and Per Cent. of Gas from Bore Hole

days approximately 245,000 cu.ft. of gas. The mixture of gas and air was not uniform, but the average of the mixture was equivalent to about 25 per cent. gas.

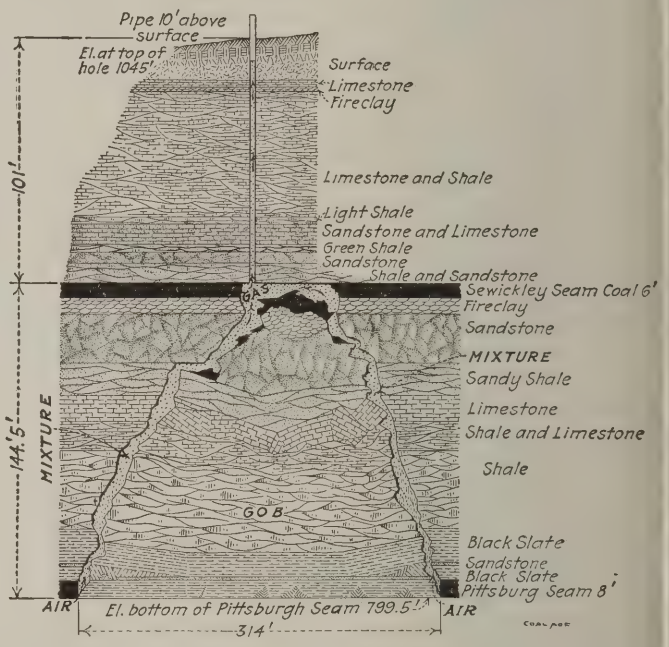
Complete analyses of the gas were not continuously made, but an analysis of the sample taken 24 hours after the hole was opened showed as follows:

CO_2	=	1.00	
O	=	11.66	Air
N	=	44.30	
N	=	10.52	
CH_4	=	32.52	
		100.00	

The peculiarities of this analysis are the low percentage of carbon dioxide (CO_2) and the large percentage of nitrogen other than that normally in air. This indicates that the "gases other than air" consisted of 27 per cent. "blackdamp" and 73 per cent. "firedamp."

Among various unknown factors was the inclination of the fracture line above the coal. The hole demonstrated that this angle was less than 45 deg., but it could not be determined how much less. It is probable that the hole is located at or very near the highest point in the cavity. The question as to what the pressure or water gage would be, could, of course, not be determined, and on this depended the success of the experiment. Pressure varying as the square of the volume, it is evident that with a very small pressure, sufficient volume could not be delivered. This again would depend on the quantity of gas given off. Fortunately, even with the unprepared and incomplete observations taken, all of these facts were sufficiently determined to give quite an accurate approximation of what will exist under other conditions.

The object to be attained in this or other cases of gas accumulation is to have a hole of sufficient size with sufficient pressure behind it, so that the mixture coming out of the hole will be below the explosive limit. In this case, we find that a pressure of 1.8 in. and a 6-in. hole accomplished this when the quantity of gas liberated did not exceed 12 cu.ft. per minute. Should a locality show that it is producing more than this amount, the problem can be solved by increasing the water gage of the fan.



Probable Condition of Roof Falls and Location of Hole in Relation to Coal Pillars

This could be done by putting a regulator in the return and then increasing the water gage until there was sufficient pressure on the hole.

In the case of a disk-type fan where the water gage is rarely over 0.6 in., there would be only one remedy and that would be to put a small ventilator on the top of the hole and exhaust the air. All this presupposes that the mining fan delivers a force current. It is probable that in the case of an exhaust fan, the scheme would not work at all. In fact, there might be a reversal of the current in the hole, due to the specific gravity of the gas.

In using this method of ventilating gobs, several precautions should be taken. There should be no fire near the hole when it is drilled in. While at first the gas would only burn at the top of the hole, later, as the mixture had more air, it would sometime come to the explosive point and the explosion would run down and ignite any explosive mixture which might be in the gob. After the hole is drilled in, the casing should be extended 10 or 15 ft. above the surface to avoid accidental ignition.

Editorials

Purchased Power

Elsewhere in this issue we print a somewhat lengthy article on the subject of "Purchased Power in Bituminous Coal Mining," which sets forth the numerous advantages, real and imaginary, of this source of power supply.

While we would be inclined to agree with much of the text and sentiment of this article, there is also much to which strong exceptions might be taken. We would call particular attention to the following statements:

Many operators know that electricity applied to their workings would increase the output. It is, however, expensive to install a generating plant and equip a mine for electrical operation.

An operation now using steam power and mule haulage can change to electric power at a minimum of expense if current is purchased from a power company. By so doing the greatest item of expense (the power plant) is eliminated.

The general situation confronting the coal producers is such that in the future many of them must take advantage of purchased power. It is the one means of meeting the condition.

If central-station power will be a means to increase the tonnage, reduce production cost, and allow extensions to be made at a minimrm of expense, surely the operators will want it.

Gasoline locomotives are being tried out for mine haulage, but so far have met with indifferent success.

It is not an uncommon thing when investigating conditions at a mine with an isolated plant to find that the power generated per ton of output is as high as 12 to 14 kw.-hr. with the corresponding cost running from 15c. to 25c. per ton. With the intelligent use of purchased power the consumption should not average higher than 2 to 5 kw.-hr. per ton, and the total cost for power should not run above 3c. to 7c. per ton of output.

From the business standpoint, what does it matter whether a man pays a certain amount from his own pocket for a power plant, or pays interest, depreciation, insurance and taxes on an equal investment made by someone else? Let no coal operator contemplating the purchase of power deceive himself or allow himself to be deluded into the belief that by buying current he escapes an investment in power-generating apparatus. For, while it may be true that he is not called upon to immediately pay down a lump sum for a power plant, yet he nevertheless pays all the overhead and operating charges—and usually a plump profit also—on somebody else's investment. These items are about as unavoidable economically as the law of gravitation is physically.

While the central power station furnishing current to coal mines undoubtedly fills an economic need in the fuel-producing industry, it is by no means a panacea for all the ills with which the industry is beset. Even though possibly many small operations may be able to buy current at a less cost than that for which they could generate it, there is no legitimate excuse for crediting purchased power with economies which, of right, belong solely to electrical distribution.

The writer of the article calls attention to the excessive cost of power in small steam-operated plants, and states that 12 to 14 kw.-hr. are often expended per ton of coal mined, with a cost of from 15 to 25 cents, which "with the intelligent use of purchased power," might be reduced to not more than 2 to 5 kw.-hr., costing not to exceed 3 to 7 cents.

When we consider that in not a few mining plants of even moderate capacity, throughout the country, current may be generated and delivered to the outgoing busbars at a cost of from 0.6 of a cent to 1 cent per kw.-hr., it might be pertinent to ask what might be accomplished at mines, such as the writer has mentioned, by the *intelligent* generation and distribution of homemade current?

The writer's remarks on the gasoline locomotive need no comment. Most of our readers are well acquainted with the status, success, possibilities and limitations of this type of motor.

The circumstance wherein the isolated mining station appears to be the most vulnerable is that not in one case in ten are the cost facts known—not one operator in ten knowing with certainty what the power he makes costs or should cost.

Had the numerous mining plants which are now giving way to central station power been properly designed, well built, efficiently maintained and operated, it is extremely doubtful if purchased current could compete with them as easily and as advantageously as is now the case.

The Ethics of Unionism

We are unwilling to believe that a union with a straightforward moral code is impossible. The majority of the workmen, we are sure, are prepared to do what conscience dictates. Consequently, we believe that if the papers of the country generally would insist that employers and employees alike should be honest in their dealings with each other a great change for the better would come over our industrial disputes.

The press has done a great deal to elevate the employer, to make him more amenable to conscience and public opinion. It is certainly time that something was done to make the employee also believe that he is not justified in doing anything and everything which the law does not forbid. A code of ethics is much needed for unionism.

The trouble in Vancouver Island is a case in point. The miners of the Cumberland and Extension collieries operated by the Canadian Collieries (Dunsmuir) Ltd., were discontented over the dismissal of two men and struck. The Industrial Disputes Investigation Act provides that, before striking, the miners or other employees shall submit their grievances to an impartial board of three members, the company and workmen each having a representative on the board. The law does not compel acceptance of the finding of this arbitration commission but it does forbid strikes and lockouts pending the inquiry.

So the miners, to evade this reasonable provision, decided to go on a "holiday" and not on a strike. This was on Sept. 16, 1912. As the United Mine Workers of America has subsidized this violation of the law by

paying strike dues to the holiday makers, the miners at the Cumberland and Extension mines are still continuing their festive idleness.

It was found necessary later to extend the strike and Frank Farrington, at Seattle, Wash., under orders, he says, of John P. White, ordered a strike, in violation of the law, at all the other mines on Vancouver Island. We quote his words because they justify the statement that President White is not sincere in trying to keep the union on a truly honorable basis.

> Therefore, using the authority given me by President White, and in order that we may combat solidarity with solidarity, I hereby instruct you to call a strike of all the men employed in and around all the mines at Nanaimo, South Wellington, and Jingle Pot, the strike to begin May 1 and to continue until a joint working agreement between the United Mine Workers of District 28, and the mine owners on Vancouver Island has been secured; said agreement to carry increased prices of labor and improved conditions of employment. You will also make a diligent effort to secure the names of all men who refuse to respond to the call to strike so that they may be published throughout Canada, Great Britain and the United States.

So these men were to be forced whether they would or not to leave their work without any ballot to express the popular will. White, of Indianapolis, says so, Farrington, of Illinois, approves, Foster, of Nanaimo, also assents and what rights have any of these miners or a majority of them in convention assembled to act counter to their declared will?

A meeting was held by the union at Nanaimo and several officers of the United Mine Workers of America addressed it. Foster, the district president, said "there was no need for a vote on the strike which was called by 2000 workers and now on." The report of the Royal Commissioner, which is the basis for these remarks, goes on to state.

> There was much dissent during the meeting, but those who urged the keeping of their existing agreements were shouted down. When the chairman was asked why the men were not allowed to vote on the question, the answer was that they should join the organization and get a vote.

Meetings were called for a ballot but all kinds of intimidation and disorder were employed. Meantime Foster issued red posters stating "Ballot or no ballot, anyone going to work at these mines will be branded as a scab." Finally the ballot was taken and out of about 2000 men only 478 were present to vote. Of these 432 voted to continue working but they ultimately decided not to go to work owing to the smallness of the vote.

Quibbling, blackmailing, intimidation and despotic methods mark the action of the union at Nanaimo. Since May 1, 1913, the strike or "holiday" has continued over the whole island though the mines are by no means idle. Meanwhile, the men denied a voice, forbidden to keep their contracts, prohibited from obeying the law are being displaced, we fear permanently, by strike breakers from everywhere, including natives of China and Japan.

Making Men

Anyone who has seen the way in which rooms without sights drift helplessly right and left, will soon realize how hopeless it is for us to do work cheaply with the miners now found in our mines. It would be comparatively easy, if our miners were trained, to lay out heading rails in an absolutely true line in plan and then angle off the first straight rails at a given angle from these by the use of a template, and keep the line thus obtained without variation. At least this could be done in a level, or nearly level mine. But instead of this we drive rooms, if sights are not used, so that they "doghole" into one another every 75 or 100 ft. Trained miners are certainly badly needed.

In the track-laying of rooms the poorest of work is usually done, and the delays in gathering and hauling largely arise from the derailments in rooms. It is idle to say that many miners do better and know better than our words indicate. It may be readily granted that this is so, but the first man to put a wrong course or kink in his room has made trouble all along the line.

The coal of the man who has used excellent discretion is taken by his neighbor whose work is bad, and the competent miner must turn to the right or left, or drive a room without a pillar, and his track must twist from side to side, if he would follow the vagaries of his room.

There is today but little pride in heading and room driving. We have seen work fifty years old which was driven without sights and which is far more perfect than some sighted work done today. No one can deny that the loss of coal is largely due to negligent and inexpert work on the part of about 50 per cent. of the miners engaged. Part is due to the obsolete methods of operators, but more is due to the inefficiency of the man at the working face.

It is time to rectify this condition. It is better, we think, to train 90 per cent. of the men in their work, that is the miners, than to expend all our efforts on about 5 per cent.—the would-be foremen.

The old miner was a proud man. He had a trade and knew he had learned it. There was a degree of satisfaction in his labors, such as an artisan always feels. But now there is no art of mining—merely a labor—and in unsighted mines the surveyor is hard put to it sometimes to tell just where he is.

The Coming Spring Agreement

The condition of the United Mine Workers of America is not remarkably flourishing. A surplus of $278,032.30 on Nov. 30 of last year, reduced by the large expenses of the recent session, is not a war fund on which much reliance can be placed. It amounts to hardly a dollar for each member in the *bituminous* regions.

The paid membership also declined noticeably since August, 1913, when it was 409,154. In November, it was 374,358. However, the membership fluctuates so widely that too much emphasis should not be placed on this fact. It is permissible, however, to call attention to the official statement that in November, 1913, the paid membership was smaller than on the same date in 1912 by 12,607 members.

These facts do not bode well for a sturdy resistance this spring. Seeing, however, that some leaders prefer a penniless union, and look upon a reserve fund as an evidence of a base concession to the power of capital, we cannot anticipate that there will not be a bitter struggle for further concessions. The bituminous mine workers cannot fight like those in the anthracite region, for they have only the earnings of 100,000 anthracite workers on which to rely. On the other hand, a strike of the anthracite miners involving only one-third as many men might receive three times as much pecuniary support as one involving all the bituminous mines.

Legal Department

Must a Contract to Sell Coal Be in Writing?

By A. L. H. Street*

SYNOPSIS—By statute in most states agreements for sale must be evidenced by signed writings, if the price exceeds a fixed amount, if no part of the price is paid, and if no part of the property sold is accepted and received by the buyer. What the courts have held in coal-trade cases.

To minimize opportunity for fraud and misunderstanding in commercial transactions, most of the states have enacted a law which provides, in effect, that no contract to sell personal property at a price of $50 or more shall be valid, unless the buyer accepts and actually receives part of the goods, or makes a payment on the price, or unless the contract or some note or memorandum thereof is reduced to writing, and signed by the person to be bound thereby. I understand that this law is not in force in Louisiana, and one or two other states may prove exceptions to it, but, otherwise, it is uniformly operative throughout the country. In a few states, however, oral contracts of sale, involving $30 or more, are governed by this law, which is technically known as the "Statute of Frauds."

To meet the requirements of the statute, it is not necessary that a formal contract be entered into; a memorandum, however, informally written, is sufficient if it discloses the terms of sale. Thus a letter, telegram or receipt may be an adequate memorandum, and a signed offer binds the person who makes it. To satisfy the law, a contract to sell coal must afford means of definitely ascertaining the quantity to be delivered and the price to be paid.

A Coal Contract Which Was Declared Void

Applying the requirement of the Virginia Statute of Frauds that the writing must be signed, the United States Circuit Court of Appeals held, in the case of Richmond Standard Steel Spike & Iron Co. vs. Chesterfield Coal Co., 160 Federal Reporter 832, that a purported contract to sell coal to which was subscribed the seller's name in typewriting, with an unfilled blank under it for the signature of the officer of the selling company who was to sign it, was insufficiently signed, although the company retained the paper after its delivery by the buyer, and although partial deliveries were made according to the terms of the writing. The court decided, however, that the typewritten signature would have been sufficient had the selling company authorized the appending of it to the writing, or adopted it as a signature.

Payment of part of the price, or an amount to bind the bargain, avoids necessity for evidencing the contract by any writing, although good business practice would seem to require the terms of every contract to be in "black and white." The payment must be actual, however, and not simulated. Delivery of a check drawn against ample funds in a bank is equivalent to payment in cash, but execution of a note is not.

To satisfy the clause of the law which avoids the necessity of a writing where the buyer accepts part of the coal contracted for, the coal must pass completely under his control. But it is not essential that, at the time of such acceptance, the coal be measured to determine the amount due on its price.

A New York Case Cited

And, according to the decision of the New York Court of Appeals, in the case of Thedford vs. Herbert, 87 Northeastern Reporter 798, a partial delivery of coal, made after the contract was entered into, renders the agreement of sale valid although the contract was verbal. In this case, it appeared that, after the terms of the sale were orally agreed upon, the seller requested the buyer to confirm the agreement in writing, which the buyer did, stating the price and other terms. Part of the coal was then delivered and paid for. The Court of Appeals rested its opinion as to the validity of the contract on the fact that a partial delivery was accepted by the buyer in recognition of the agreement.

The courts have been frequently called upon to decide that mere delivery of a commodity does not take a contract for its sale outside the Statute of Frauds. It must appear that the delivery was "accepted" by the buyer or by his authorized agent. Thus mere delivery of coal to a carrier does not constitute an acceptance by the buyer, unless he authorized the carrier to make a final acceptance for him. Nor does the fact that coal is otherwise delivered at the place for delivery fixed by the agreement show, of itself, that the coal passed under the control of the buyer.

In addition to contracts for the sale of commodities, the Statute of Frauds usually provides that no promise to discharge the obligation of a third person, and no contract which is not to be performed within a year from its making, and no agreement to grant an interest in land, excepting leases for not more than one year, shall be valid unless it is evidenced in a writing, signed by the person to be bound thereby. Accordingly, the Missouri Supreme Court decided in the case of Reigert vs. Manufacturers' Coal and Coke Co., 117 Southwestern Reporter 61, that a contract for services in working up a market for the company's products was invalid where it was not reduced to writing and was not to expire within a year.

Fraud in Performance of Public Contract—Where a prison coal contractor delivers as pea coal an inferior grade worth $1 a ton less, he renders himself liable to the state in damages on the ground of fraud, although the prison authorities may have been derelict in duty in failing to discover the deficiency in quality. (New York Court of Appeals, People vs. O'Brien, 103 Northeastern Reporter 710.)

*Attorney-at-law, St. Paul, Minn.

Sociological Department

More Club Rooms for Mine Workers

The building of five new "mess houses" at as many collieries has been authorized by the officials of the Lehigh Valley Coal Co. They will be of a standard design, based on that of the mess house built experimentally at the Prospect colliery of this company, and their size will depend upon the number of men working at the various operations.

The collieries at which these mess houses, where the men can gather to have their midday meal in comfort, instead of eating in the breaker or in the boiler and engine rooms, are the Franklin, Packer No. 5, Derringer, Park and Buck Mountain. Their construction will be started shortly.

The floors, walls and ceilings of the new mess houses will be of cement, so that they may be easily kept clean and sanitary. They will contain coat and locker rooms, a wash room with hot and cold running water and enameled basins, and a lavatory. The meeting and lunch rooms will be well lighted and heated and will contain benches, tables and simple cooking conveniences.

The mess house at the Prospect colliery has proved extremely popular, especially in the colder months. A number of the mine workers formed a "coffee club," the members of which take turns in heating coffee for the crowd on the simple appliances provided for that purpose, and some of the men bring clean clothes and take a complete bath at the mess house after finishing their work each day.

It is understood that, if these additional houses meet with the same success as that at the Prospect colliery, the system will be gradually extended to all the Lehigh Valley Coal Co.'s operations. Each house is in charge of a man employed to keep it clean and in order, and the mine workers themselves, at the Prospect colliery, have shown their appreciation by refraining from damaging the house or abusing the privileges.

Concrete Vaults in Colliery Villages

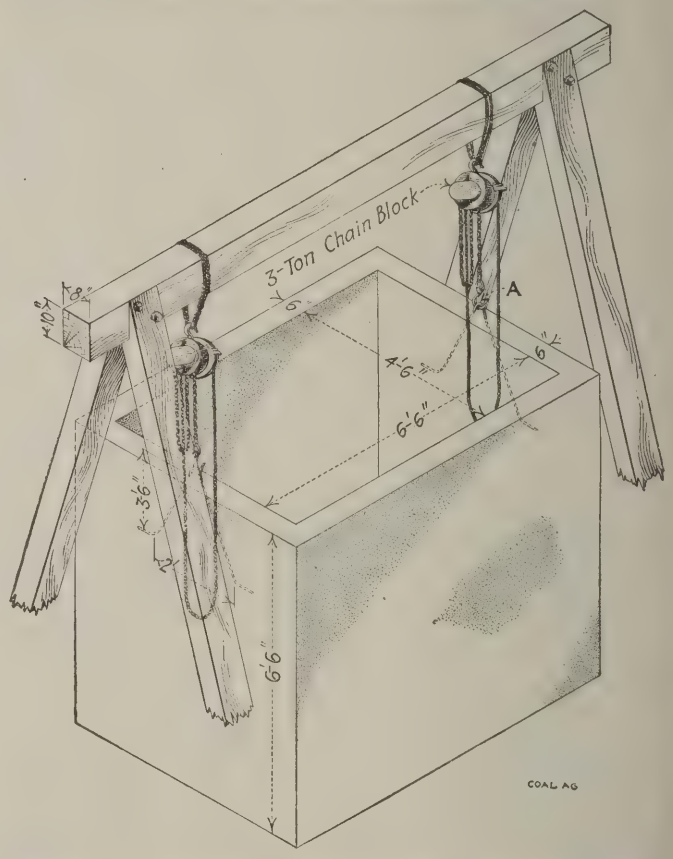
By a Pennsylvania Mining Engineer

Sanitation is as important as safety, but it is more generally neglected. One of the most important things about sanitation is the construction of closets of a character which will not serve to spread disease. Some few years ago, we used to see them located over streams and the vaults were usually constructed of rough boards of all widths, lengths and thicknesses; anything was considered good enough for a privy.

Difficulties Where Water Is Encountered

Vaults are now built of concrete and when the excavation is made in dry soil, their construction is comparatively easy. We use old boards to make an inner form and allow the excavation to serve for the outer. When we encounter soil which makes water freely, we must resort to some other method of placing it.

We excavate the pit somewhat larger on all sides than the vault we desire to construct. Substantial timbers measuring 8x12 in. make a good support and these are laid over the hole and a double form is built on them. This is built as nearly water-tight as possible. The timber used is of good quality, for forms should never be built of poor material. Concrete is deposited in these forms and allowed to set for five days. It should then receive two coats of good paint, both inside and out.



Method of Lowering Waterproofed Concrete Vault into Pit Sunk in Water-Bearing Strata

A vault of good size should be 4 ft. 6 in. wide, 6 ft. 6 in. long, and 6 ft. deep, and 6 in. of concrete on the sides and bottom will make a sufficient lining. These dimensions, therefore, fix the size of the form and the excavation.

Lowering the Vault into Place

The vault when completed should be lowered into the pit by means of a horse, which can be built of a piece of 8x10-in. timber, with four 6x8-in. legs. From this can be suspended a 2- to 3-ton chain block. Two men and a helper can easily lower the vault into place.

In order to make the vault water-tight, one quart of crude oil can be added for each sack of cement. The

mixture may be made, 1 part cement, 3 parts sand, and 5 parts stone. Good cement should be used, our practice being to use Universal Portland. Bluestone we find preferable to other stone although slag will give good results.

It will be noted on the top of the vault in the picture that there is a loop of 7/8-in. haulage rope *A* which passes down into the concrete about 3 ft. 6 in. The rope utilized, may have served its appointed time in the mines, and, if so, the grease must be thoroughly burned off it.



AN ALLEY OF A MODEL MINE VILLAGE. CONCRETE VAULT READY FOR LOWERING IN PIT PREPARED FOR ITS RECEPTION

Two loops are placed on the top of the vault and by this it is lowered into the pit.

CONSTRUCTION COSTS

A vault such as that described can be built for $36 complete, the price covering both labor and material. But to keep the price within those limits, 15 must be constructed and it does not pay to build less than ten, as the forms and horse are expensive unless used for the construction of several vaults.

Restoratives

One of the many uses of aromatic spirits of ammonia is to restore persons overcome by asphyxiation, drowning or electric or traumatic shocks. As usually applied there is a considerable doubt as to its effect. The ammonia soon loses strength when exposed to the air; on the other hand, it may be strong and be used without discretion. It is true that an unconscious man is not likely to inhale heavily on the contents of the bottle or rag with which it is administered but he may easily receive too strong a dose. Furthermore, the contents of the bottle may be spilled on the patient, burning him severely.

To avoid these difficulties the Red Cross Society is offering for sale little vials containing the right quantity of aromatic spirits hermetically sealed. The vials are completely swathed in absorbent cotton so that they can be broken in the fingers without the edges of the glass cutting the finger tips. The glass is so fragile that it will yield and break when squeezed strongly and the liquid which escapes has the requisite restorative power. The vials are made in England where the idea of using them appears to have originated. They are termed "vaporoles." The cotton itself is kept in place by a thin netting of silk which prevents the vial from escaping from its cotton coat.

While the inhalation of ammonia from "vaporoles" or otherwise undoubtedly does good, the best way to administer aromatic spirits of ammonia if the maximum effect is desired is to give it through the mouth in water. This method is, of course, impracticable with an unconscious patient. The "vaporoles" are especially serviceable in cases of threatened falling or syncope.

Vineyards and Orchards in Pocahontas Region

Several families in the Pocahontas region are setting out vineyards and orchards on plots which they have rented for a nominal sum. Some of these are three or four years old and are therefore in bearing condition. Scores of others have been set out within the past year and, of course, these will not be harvested for a couple of years yet. The majority of the white miners in this region come from Italy and Hungary and were agriculturalists in their native lands.

At Elkhorn and Crozer one can see on the sides of the hills, patches of ground fenced in, filled with neatly pruned and securely trellised grape vines. On other spots there are peach, apple, pear and other fruit trees regularly laid out. Most of the grape vines have been imported from the countries whence the miners came.

But tilling the soil is not confined to the whites. Hundreds of negro miners of the Pocahontas coal fields devote their energy to gardening. Far up on the tops of the mountain where the land is comparatively level, the negro miners raise vegetables such as they formerly grew in old Virginia, North Carolina and other Southern states. They are not much given to fruit raising. They do not even raise many watermelons, but prefer cabbages, potatoes, beans and the like. By this soil tilling, in their leisure hours, the miners in the Pocahontas field have materially reduced the cost of living and are increasing their savings accordingly.

Work of Rescue Car in Arkansas

Mine rescue car No. 4 of the U. S. Bureau of Mines was for a long time engaged in Arkansas in giving training and instruction to the miners of that field in the work of mine rescue and first aid to the injured. The work at Russellville completed the training itinerary of car No. 4 through Arkansas, which began on Oct. 15 (being interrupted for ten days by the trip to the mine disaster at Dawson, New Mexico) and on January 7 the car returned to headquarters at Pittsburg, Kansas. During this trip through Arkansas the coal camps were visited in the following order—Hackett, Midland, Hartford, Greenwood, Jenny Lind, Huntington, Paris, Denning and Russellville.

A total of 150 miners were given the full week's course of training in mine-rescue work, first aid to the injured, the use and care of safety lamps and safety appliances, and other instruction pertinent to the conservation of life in the coal mines; also 5000 miners and others attended lectures on the car. The spirit and enthusiasm with which the miners and operators entered into this training work speaks well for the future of the coal-mining industry in the state of Arkansas. State Mine Inspector Tom Shaw also worked with untiring energy to make this training work a permanent factor in furthering the safety of mining conditions in Arkansas.

H. D. Mason, Jr., in charge of the mine-rescue car has the following to say with regard to this training work, "I wish to thank the miners, operators, mine inspector, and railroads of Arkansas in behalf of the U. S. Bureau of Mines for their constant courtesies and most sincere interest in this work for the conservation of human life in the coal mines. Never has it been our pleasure to meet brighter and more clever mining men; than those with whom we have been associated during our work through Arkansas, and Doctor Chisholm and myself will leave this state feeling that the work already accomplished will be carried forward by the men at the mines."

Discussion By Readers

Rope Lubrication

Letter No. 1—I have read the query on the matter of rope lubrication, by Superintendent, asking for the records and results of scientific investigation and the practical experience of mining men, in reference to the lubrication of cables with a view to the prolongation of the life of the rope. I note that the editorial comment, in reply to this inquiry, advises, first, the application of linseed oil, COAL AGE, Jan. 17, p. 139. In this connection, I want to draw attention to a few quotations bearing on this question.

In opposition to the use of linseed oil as a lubricant, Redwood says: "Neither raw nor boiled linseed oil must be used as a lubricant, as they quickly oxidize."

Victor Schweitzer, in The Distillation of Resins, p. 155, says: "The thickening of linseed oil results from the absorption of oxygen in the air."

Another investigator of world-wide reputation, found that linseed oil in the presence of moisture and gases, in the New York subway, was converted into a soap and, in this form, served as a carrier of moisture to the metal that it was designed to protect, causing its corrosion.

In the proceedings of the tenth annual meeting of the American Society for Testing Materials, Charles B. Dudley, president of the society at that time, said, in discussing this subject: "If you can so cover your metal that you keep the oxygen out, there will be no corrosion."

I may add, the same argument applies in regard to the use of pine tar as a protective against corrosion. In its hardening process, it also absorbs oxygen from the air. The lime used in neutralizing any acid it may contain is attacked by the chemical action of gases and mine waters, the hydrogen sulphide of acid mine waters converting part of the lime into calcium hyposulphide, and the carbon dioxide of the air and mine water, converting another portion of the lime into calcium carbonate. The former lime salt, in the presence of moisture, again gives up the hydrogen sulphide, which gas attacks the metal, causing its corrosion.

Any mixture of linseed oil and pine tar would possess the combined faults of both of these constituents. The only virtue of such application lies in their great adhesiveness. A prime factor in securing immunity from corrosion in rope practice is the elimination of all oxidizing influences; but this is, in present-day knowledge, a costly operation.

A. C. STALKNECHT.

Pittsburgh, Penn.

[Our correspondent has given some valuable quotations, in connection with the lubrication of hoisting and haulage ropes. These quotations must be taken for what they are worth. The first quotation, from Redwood, undoubtedly refers to the use of boiled linseed oil for lubricating machinery. While there is no doubt of the absorption of oxygen by oils and tars, in the hardening process, there is some question of the conveyance of this oxygen to the iron or steel protected by said lubricant.

The chemical action of gases and acid mine waters on these lubricants destroys, undoubtedly, in time, their protective qualities, but, the question may properly be asked, will not these agents attack the unprotected iron or steel more rapidly than when compelled to act through the protective coverings. The present-day practice of manufacturers and users of wire ropes is as stated in the editorial comment to which reference has been made, COAL AGE, Jan. 17, p. 139. We would suggest that our correspondent, after his severe arraignment of this common practice, should give the readers of COAL AGE a substitute for the applications he condemns.—ED.]

Fan Ventilation

In reading the answer to D. J. Hopkins' question on Fan Ventilation, COAL AGE, Jan. 24, p. 180, permit me to say that I think the way this question is answered may prove to be misleading. It might cause a company to install a fan and, perhaps, fail then to obtain the necessary quantity of air, owing to certain existing conditions in the air courses, which are often very contracted in thin seams, frequently having a sectional area of only 30 sq.ft.

I would like to suggest another question: Assuming the conditions stated by Mr. Hopkins and assuming, further, that both openings have practically the same elevation and that the distance from the present fan to the back opening in the mine is 1¾ miles, suppose that a 6-ft. Stine fan is now installed at the back entrance, capable of producing 20,000 cu.ft. of air per min. against a 1-in. water gage; how much would this second fan increase the quantity of air in circulation in the mine? Assume, for example, that the present circulation of air is 80,000 cu.ft. per min. against a water gage of 3.5 in., and that this circulation is produced by a 12-ft. fan; and that the resistance of the return airway is equivalent to a 1½-in. water gage.

CONSTANT READER.

Punxsutawney, Penn.

Our correspondent has assumed conditions not involved or suggested in the previous question. Mr. Hopkins' question simply asked if the installation of a second fan, working in parallel with the first, would prove satisfactory; or, as he says, "will both of these fans work successfully."

There is no question but that, before making such installation, every effort should be made to increase the circulation in the mine by clearing up the air courses, enlarging breakthroughs and shortening the distance the air must travel wherever this is practicable. The question of the airways being driven in a thin vein and having a small sectional area, does not affect the principle involved in the answer to this question. The principle, in respect to both fans working successfully, will be the same whatever the sectional area of the airways.

Referring to the question proposed by correspondent; namely, the installation of a second fan, located at a back opening in the mine (not mentioned in Mr. Hopkins'

question), this suggestion is extremely doubtful and would only prove advantageous to the extent the distance of air travel is shortened and under certain conditions in which the air current, at some point in the mine, has virtually lost its velocity, becoming dispersed in the workings. The second fan, under such conditions, will act as a booster. We could not attempt to give an answer to the question, how much this fan would increase the present circulation of 80,000 cu.ft. of air per min., under the conditions stated, as we regard this wholly incalculable.

The Certificate Law

Letter No. 16—In the discussion of the certificate law, several correspondents seem to think that all mine foremen and firebosses should be examined every few years. While I feel that a superintendent or foreman of a mine should possess a certificate of competency, I do not concur in the opinion that these officials should pass an examination so frequently. I would ask why a mining man should be required to stand such frequent examination in order that he may follow his vocation when this is not done in other professions. Would it not be just as necessary to require that state certificates, diplomas and licenses should be subject to a reëxamination, in all callings and professions?

The ability to pass an examination does not make a man a successful mine foreman. One correspondent who favors such frequent examination, himself admits knowing a foreman of a gaseous mine, who has no knowledge of gas. If this man was required to pass another examination, would he not probably secure a certificate by the same unfair means he employed to get the first? Again, other candidates who are thoroughly posted on the theory of mining and could pass any examination without a day's preparation, lack executive ability in the handling of men so essential in the operation of a mine.

The mine foreman who is faithful and devoted to his work is learning every day by experience. He is constantly confronted by practical problems in ventilation, haulage, drainage, timbering, methods of mining, etc., that he must master. Ask one of these men who has been "on the job" for several years, how much more he knows now than when he obtained his certificate, and he will tell you that he knew nothing about mining then, in comparison with what he knows now, which shows that he has acquired a vast amount of knowledge in the school of experience.

My opinion is that every mine foreman should be progressive enough to keep abreast of the times by reading books and journals devoted to mining. It is only too true, however, that through the extra work required in the mine and the conferences with the superintendent every evening, after supper, in the office, the mine foreman has little time to himself that he can devote to study.

In the discussion of this question, it should be remembered that the mine foreman, like other men, has many duties demanding his attention a part of the time. He cannot neglect the duties he owes his family and the community in which he lives. Besides attending religious, fraternal, social and other meetings, he must have some time for recreation. When these numerous demands on his time are considered, it seems to me that, having passed one successful examination, the faithful mine foreman should be regarded as sufficiently qualified for the position he holds. I advise all whose time will permit to continue to study and read and aspire to higher things. A man should qualify himself for something better than his present position, remembering that "there is always room at the top."

BITUMINOUS.

Windber, Penn.

Letter No. 17—The discussion of this subject, in the different letters submitted, has interested me very much and leads me to express my opinion in regard to the interchange of state certificates of competency.

I may say nearly one-half of my mining experience was gained in the Clearfield region of Pennsylvania, although I have had practical experience in 37 different mines located in six different counties in this state. While I am not in favor of an interchange of certificates between the different states, I fail to understand why anyone should argue that a man who has obtained his experience in the Clearfield region and has passed successfully the examination required for first-grade mine foreman certificate is not able to successfully manage mines in West Virginia, as stated by one correspondent, Letter No. 5, Vol. 4, p. 912. There are drift, slope and shaft mines in Clearfield County, and the characteristics of the coal seams are somewhat varied, there being gaseous and nongaseous mines in that region. I think, also, that Joseph Virgin will find the same varied conditions in the mines of West Virginia as exist in the Clearfield region of Pennsylvania.

I want to say that our knowledge of mining would be limited indeed if the experience of our ancestors had not been handed down to us, either in verbal or written form. It is the combined experience of this and preceding generations that has brought mining up to its present standard.

In regard to the character of the examinations asked in different states, a simple comparison of the questions asked candidates for mine foreman and fireboss certificates in the bituminous regions of Pennsylvania, during the past several years, with the questions asked in other states will convince anyone that a man who can pass the Pennsylvania examination and has had sufficient experience in the coal mines of this country is well able to take charge of any mine in any state. Notwithstanding this, however, I am not in favor of a certificate of any state being good in another state, because of the fact that there are many men holding certificates of competency who are clearly incompetent.

Speaking of examinations, I think that any citizen of moral character and temperate habits who has had at least five years' practical experience in the coal mines of this country, immediately preceding the examination, should be allowed to sit in an examination in any state, whether or not he be a resident of that state.

In regard to the life of a certificate, since there are a large number of men who neither study nor read mining books and papers after they have obtained their certificate of competency, and others who imagine that they know it all and have nothing further to learn, I am of the opinion that no certificate issued in any state should be good for a longer period than four years. I also believe that the standard of examination should be the same in all states and sufficiently high to secure the greatest efficiency.

BENJAMIN HARTILL.

Johnstown, Penn.

Colorado Strike Investigation

I read with interest the article by A Constant Reader, COAL AGE, Jan. 3, p. 28, in which he quotes a part of the findings of the Federal Grand Jury, sitting at Pueblo, Colo., investigating the Colorado coal strike. I would like to ask, Why does he quote only that part of the findings that is favorable to the Union?

In the absence of any information to the contrary I take it for granted that this correspondent is a union man. I have no fault to find with him in this respect but would call his attention to the fact that in order to present his case in an intelligent manner to the jury of public opinion, he should state all the facts in the case, both for and against his cause.

Inasmuch as he has stated those findings of the jury that were favorable to the Union cause, I will not repeat them, but will mention those that were adverse to the Union. I will also say, in a spirit of fairness and justice, that correspondent did not state *all* of the findings of this jury that were favorable to his cause. For the benefit of those who wish to secure the entire report it may be stated that it was published in full in the *Denver Post* (Colo.), Dec. 2, 1913.

As this jury was composed of nine men holding union cards and nine men without such cards, the charge that it was a fixed or biased jury could not be sustained, as these nine union men would not have brought in the indictments against the heads of the United Mine Workers of America that they did without sufficient evidence to sustain such a finding. The parts of the report not quoted by correspondent are as follows:

"The methods employed by the United Mine Workers are an insult to law-abiding citizens and conservative labor. The miners organization has brought experienced strike agitators into the state and have armed hundreds of irresponsible aliens, who have become a menace to the peace, prosperity and lives of our citizens. The Union has created an open insurrection in southern Colorado and its methods are repudiated by all fair minded organizations. The officers admit their inability to control the miners in the tent colonies they have armed."

"A promise to pay fines," says the report, "is about all that is necessary, in order to become a member of the United Mine Workers of America"; and adds, "The dues are used to support insurrection and lawlessness and, when necessary, to force their demands by intimidation and fear whenever strikes are called, with the result of injuring other trades and the entailment of hardships and privations on the people of the entire commonwealth."

J. E. SMITH.

Sunlight, Colo.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

ADDITION OF FRACTIONS

In order to add two or more fractions together, or, in other words, to find their sum, it is necessary to reduce them to equivalent fractions having the same fractional unit. That is to say, all the fractions must have the same common denominator. The sum of the numerators will then show the total number of fractional units and this sum written over the common denominator will be the required sum of the given fractions.

Rule—If the fractions have the same denominator add the numerators together and write their sum over the common denominator.

If the fractions have different denominators reduce them to equivalent fractions having a common denominator and add together the numerators of the fractions, writing their sum over the common denominator, as before.

To Reduce Fractions to a Common Denominator—Find the least common multiple of all the denominators for a common denominator. Then divide this common denominator by the denominator of each fraction, in turn, and multiply the numerator by the quotient obtained, for a new numerator and write this over the common denominator.

Example—Reduce the following fractions to a common denominator: $\frac{1}{3}$, $\frac{5}{8}$, $\frac{7}{12}$, $\frac{13}{18}$, and find their sum.

Solution—First find the least common multiple of 3, 8, 12, 18; thus:

$$\begin{array}{r|l} 2 & 3\ \ 8\ \ 12\ \ 18 \\ 2 & 3\ \ 4\ \ 6\ \ 9 \\ 3 & 3\ \ 2\ \ 3\ \ 9 \\ & 1\ \ 2\ \ 1\ \ 3 \end{array}$$

$2 \times 2 \times 3 \times 2 \times 3 = 72$ *least common multiple*

The equivalent fractions are then found as follows:

$$\frac{1}{3} \times \frac{72}{72} = \frac{24}{72} \qquad \frac{7}{12} \times \frac{72}{72} = \frac{42}{72}$$

$$\frac{5}{8} \times \frac{72}{72} = \frac{45}{72} \qquad \frac{13}{18} \times \frac{72}{72} = \frac{52}{72}$$

The sum of these fractions is now found by adding the numerators together and writing their sum over the common denominator, thus:

$$\frac{24 + 45 + 42 + 52}{72} = \frac{163}{72} = 2\frac{19}{72}$$

Therefore, $\frac{1}{3} + \frac{5}{8} + \frac{7}{12} + \frac{13}{18} = 2\frac{19}{72}$ *Ans.*

Example—Add together the following fractions: $\frac{12}{7}$, $\frac{3}{8}$, $\frac{5}{14}$ and $\frac{24}{35}$.

Solution—The least common multiple of the denominators, 7, 8, 14, 35 is 280, which is, therefore, the common denominator of these fractions. Hence

$$\frac{480 + 105 + 100 + 192}{280} = \frac{877}{280} = 3\frac{37}{280}$$ *Ans.*

The Coal Age Pocket Book

SUBTRACTION OF FRACTIONS

In order to subtract one fraction from another, the two fractions must have the same fractional unit, as explained in addition of fractions.

Rule—If the fractions have the same denominator subtract the less numerator from the greater and write the difference over the common denominator.

If the fractions have different denominators reduce them, as before, to equivalent fractions having a common denominator and proceed as above.

Example—From $\frac{9}{7}$ subtract $\frac{5}{9}$.

Solution—Since 7 and 9 are prime to each other, the least common denominator, in this case, is $7 \times 9 = 63$; and

$$\frac{54 - 35}{63} = \frac{19}{63}$$

Therefore, $\frac{9}{7} - \frac{5}{9} = \frac{19}{63}$. *Ans.*

MULTIPLICATION OF FRACTIONS

In the multiplication of fractions, the numerators are multiplied together to form a new numerator and, likewise, the denominators to form a new denominator; and the resulting fraction is then reduced to its lowest terms. The work is much simplified, however, by the process of cancellation, according to the following:

Rule—Express the multiplication in the form of a compound fraction, by writing the numerators of the several fractions above the line and the denominators below the line. Then cancel all factors common to both numerator and denominator, and write the product of the factors remaining in the numerator for a new numerator; and, likewise, the product of those remaining in the denominator for a new denominator.

Example—Find the product of the following fractions: $\frac{14}{25}$, $\frac{10}{21}$, $\frac{5}{6}$, $\frac{3}{2}$.

Solution—

$$\frac{\cancel{7}\ \ \cancel{2}}{\cancel{14} \times \cancel{10} \times \cancel{5} \times \cancel{3}} = \frac{1}{3}$$
$$\cancel{25} \times \cancel{21} \times \cancel{6} \times \cancel{2}$$
$$\cancel{5}\ \ \ \cancel{3}\ \ \ \cancel{2}$$

Therefore, $\frac{14}{25} \times \frac{10}{21} \times \frac{5}{6} \times \frac{3}{2} = \frac{1}{3}$ *Ans.*

DIVISION OF FRACTIONS

The process of division is similar to that of multiplication.

Rule—To divide one fraction by another, invert the divisor and proceed as in multiplication of fractions.

Example—Divide $\frac{5}{6}$ by $\frac{15}{24}$.

Solution—

$$\frac{5}{\cancel{6}} \div \frac{15}{24} = \frac{\cancel{5}}{\cancel{6}} \times \frac{\overset{4}{\cancel{24}}}{\underset{3}{\cancel{15}}} = \frac{4}{3} = 1\tfrac{1}{3}$$ *Ans.*

Inquiries of General Interest

Study Questions--Regulators

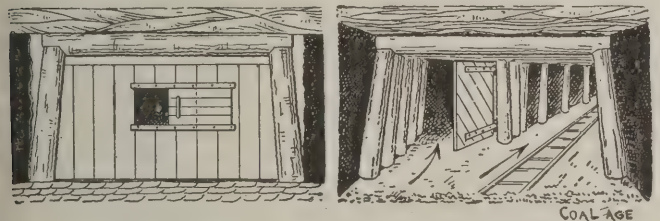
In studying some of the questions in the back numbers of COAL AGE, I find two that I would like to have further explained. One of these is in reference to calculating the necessary size of opening in regulators of different kinds.

In answer to the question, COAL AGE, Vol. 3, p. 502, asking for the size of the opening in a regulator necessary to reduce the volume of air in circulation to 15,000 cu.ft. per min., under a ventilating pressure of 6.954 lb. per sq.ft., it is assumed that the regulator is a "box regulator," and the size of the opening is found to be 5.35 sq.ft. I would like to ask how this question can be worked in the case of a door regulator.

X.

Heilwood, Penn.

The usual form of regulator is the box regulator, shown on the left of the accompanying figure. This is a brattice or partition erected in the airway and provided with an opening having a small slide door, by which the size of the opening can be increased or decreased so as to regulate the flow of air according to the requirements.



SHOWING "BOX" AND "DOOR" REGULATORS

In order to pass a given quantity of air through this regulator, under a given mine pressure, it is necessary to calculate, first, the frictional resistance of the airway and the unit pressure (lb. per sq.ft.), for the given quantity of air. Subtracting this from the given mine pressure, gives the pressure due to the regulator. This pressure is then reduced to inches of water gage and the value found substituted in the formula

$$A = \frac{0.0004\,Q}{\sqrt{w.g.}}$$

In the case mentioned by correspondent, the original circulation is given as 60,000 cu.ft. of air passing under a pressure of 6.954 lb. per sq.ft. The natural pressure or the pressure due to friction when this volume is reduced to 15,000 cu.ft. per min. may be calculated from the original circulation. Since the pressure varies as the square of the quantity, the pressure ratio is equal to the square of the quantity ratio. Thus,

$$\frac{x}{6.954} = \left(\frac{15{,}000}{60{,}000}\right)^2 = \left(\frac{1}{4}\right)^2 = \frac{1}{16} = 0.0625$$

$$x = 6.954 \times 0.0625 = 0.434$$

The pressure due to the regulator is then 6.954 — 0.434 = 6.52 lb. per sq.ft.; and the corresponding water gage is $6.52 \div 5.2 = 1.25$ in. The required opening in the regulator is therefore

$$A = \frac{0.0004 \times 15{,}000}{\sqrt{1.25}} = say\ 5.35\ sq.ft.$$

It will be noticed that this question refers to a single airway only, in which it is desired to reduce the volume of air passing by introducing a regulator, which virtually has the effect of lengthening the airway. On the other hand, the use of a door regulator, as shown on the right of the figure, always assumes the splitting of the main air current between two airways, which may be of any size or length. The regulator door is placed at the intake end of the airways where the split is made.

In the solution of a question relating to a door regulator, it is necessary to know the volume and pressure of the main current and the length and sectional dimensions of the airway or split in which a given quantity of air is desired. It is then merely a question of swinging the door to one side or the other, so as to divide the sectional area of the main airway, so that the ratio of area for the split to the total main area will be the same as the ratio of the power in the split to the total power on the air. In other words, the power ratio between the split and the main airway is the same as the area ratio for these two currents.

Suppose, for example, the main intake airway in a mine is 6x10 ft., in which a current of 100,000 cu.ft. per min. is passing under a 2-in. water gage, or a mine pressure of $2 \times 5.2 = 10.4$ lb. per sq.ft. Keeping the power constant, it is desired to split the main current so that 40,000 cu.ft. will pass in one split 5x8 ft., 1000 ft. long. Find the area of opening for this split, using a door regulator.

Solution—The power on the air, in the main airway, at the point of split is

$$u_0 = Q\,p = 100{,}000 \times 10.4 = 1{,}040{,}000\ ft.\text{-}lb.\ per\ min.$$

The sectional area of the main airway is $6 \times 10 = 60$ sq.ft. The sectional area in the split is $5 \times 8 = 40$ sq.ft. The rubbing surface in the split is $2(5 + 8)1000 = 26{,}000$ sq.ft. The velocity of the air in the split will be $40{,}000 \div 40 = 1000$ ft. per min. The power on the air absorbed in the split is then

$$u_1 = k\,s\,v^3 = 0.00000002 \times 26{,}000 \times 1000^3 = 520{,}000\ ft.\text{-}lb.\ per\ min.$$

But, at the point of split, the height of the airway being constant (6 ft.), the area ratio for the split and the main airway, is the same as the ratio of the width of the opening (x) for the split, to the entire width of the airway (10 ft.). Therefore, the width ratio is equal to the power ratio between the split and the main airway. Thus, in this case, opening leading to the split mentioned is

$$\frac{x}{10} = \frac{520{,}000}{1{,}040{,}000} = \frac{1}{2}$$

$$x = \tfrac{1}{2} \times 10 = 5\ ft.\ wide.$$

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—If you had charge of a mine ventilated by equal splits of air and the fan is running at its full capacity and providing efficient ventilation, how would you proceed to work this mine?

Ans.—If the fan is running at its full capacity and providing efficient ventilation in every section of the mine, the several air splits being equal, the further development and extension of the mine workings will depend on making some provision for an increased circulation of air, since it is impracticable to rob any of the splits and, also, impossible to increase the general circulation without increasing the capacity of the ventilating equipment.

Before doing this, however, a careful inspection of the mine should be made to see if the volume of air in circulation cannot be increased, by removing possible obstructions in the airways, or straightening the air courses, enlarging breakthroughs and reducing the distance the air must travel. The question of sinking another air shaft and changing the general plan of the circulation should also be carefully considered. If it is found impossible to increase the circulation in this manner the ventilating equipment must be improved or enlarged.

Ques.—Assuming a single entry and air course, each 4000 ft. long, ventilated under a ½-in. water gage at the entrance; calculate the water gage that would be expected when these entries are extended 2000 ft.

Ans.—Assuming the power on the air remains constant, at the mouth of the mine, the ventilating pressure (pounds per square foot), and therefore the water gage, varies inversely as the quantity of air in circulation. But, for the same sectional dimensions of the airway and a constant power, the quantity of air in circulation varies inversely as the cube root of the length of the airway. Therefore, the unit pressure or the water gage, will vary directly as the cube root of the length of the airway. In other words, in this case, the entries being extended from 4000 to 6000 ft., the water-gage ratio is equal to the cube root of the length ratio; or, calling the required water gage x

$$\frac{x}{0.5} = \sqrt[3]{\frac{6000}{4000}} = \sqrt[3]{\frac{3}{2}} = \sqrt[3]{1.5} = 1.14+$$

$$x = 0.5 \times 1.14 = 0.57 \text{ in.}$$

Ques.—Assuming a pair of entries 4000 ft. long and a water gage of ½ in. at the mouth of the entries; calculate what the water gage should be at a distance of 2000 ft. from the entrance.

Ans.—Assuming a constant power on the air at the mouth of this pair of entries, the unit of ventilating pressure or the water gage varies inversely as the quantity of air in circulation, which, under the same conditions, varies inversely as the cube root of the length of airway, the resistance of which is measured by the water-gage reading. Therefore, the unit pressure or water gage varies directly as the cube root of the length of the air travel. This, in the first case, is the double length of the heading (8000 ft.) and, in the second case, double the distance inby from the gage to the head of the entry (4000 ft.). The ratio will not be changed, however, by taking the single lengths of entries, 4000 in the first case and 2000 in the second case.

Therefore, since the water-gage ratio is equal to the cube root of the length ratio and calling the required water gage x

$$\frac{x}{0.5} = \sqrt[3]{\frac{2000}{4000}} = \sqrt[3]{\frac{1}{2}} = \sqrt[3]{0.5} = 0.79+$$

$$x = 0.5 \times 0.79 = \text{say } 0.40 \text{ in.}$$

Ques.—At a certain mine, at night, the fan running at 90 r.p.m. produces 100,000 cu.ft. of air per min. in the mine. In the morning, this fan running at the same speed produces 125,000 cu.ft. of air per min., with no change in the circulation of air throughout the mine. What is the probable cause?

Ans.—Without a further knowledge of the conditions prevailing in this mine, night and morning, the general arrangement of the circulation and other data affecting the movement of the air, it would be impossible to more than speculate as to the possible cause of this large increase in circulation, in the morning. The reverse of this condition is more generally the case. However, it is possible to assume conditions that would very much retard the circulation of air, particularly in the early hours of the evening and the later hours of the day shift.

The operations of the mine produce greater or less quantities of smoke, dust and carbon dioxide. It is, moreover, possible that the temperature of the mine is somewhat higher in the evening than in the early morning hours. The smoke of shots at the close of the day shift may, under many conditions, be difficult to remove from the mine workings.

A higher temperature in the rise workings of a mine will generally produce a rise air column that will oppose, to a greater or less extent, the circulation of air in these workings; and likewise the presence of the heavier products of combustion in dip workings retards circulation and these gases are difficult to remove. It is very possible that such conditions as these, some or all of them, may operate to retard the general circulation of air in the mine, at the close of the day shift; while they would not exist to the same extent in the early morning hours when the mine workings are cooler and the air is clearer.

Another and more probable condition, however, arises from the habit of the miners, in many mines, of leaving their loaded cars of coal standing on the entries, in such a manner as to block the air. It is the duty of the night shift to haul these cars to the bottom of the shaft or to the parting, where the trips are made up ready for the morning. In each particular case, it would be necessary to make a careful study of the situation in order to ascertain the actual causes of the condition described. In the absence of exact information this can only be surmised.

Book Reviews

THIRTY-FIRST ANNUAL COAL REPORT OF ILLINOIS, by the State Mining Board 1912, Martin Bolt, Chief Clerk, Springfield. xii+423 pp., 5¾x8¾ in. No ill. Cloth boards.

We think it is due to Martin Bolt and the Mining Board of Illinois to call attention to the excellent annual report they prepare. There are some state reports which are perfect models of "how not to do it" so we think we are justified in stating our approval of this Illinois volume. But, on the other hand, there are reports in other states, the methods of which are closely parallel those followed in this book.

The unit of this report is in general not the district, but the county. The latter division is one in which all are interested. No one knows anything about the inspectors' districts and they may have been changed once or more during the current year. They are always subject to relimitation at the will or the whim of the chief inspector or a mining board. No one will use the results for comparison, for nobody cares about an inspection district; the constant shifting of its boundaries and its purely artificial limits make it incapable of being the subject of sentimental attachment. As someone has said, "Peradventure a man might die for his home, he will never do it for his boarding house."'

Divided by counties the Illinois book does not need an index for if the county is known, the desired information can be immediately obtained by turning to the figures and annotations for that particular county. If the town only is specified Rand, McNally or Hammond will supply the political division.

But one commonwealth in particular produces a report in which there is not even a convenient table in which the names of the counties comprehended in the various inspection districts can be found grouped conveniently together. As a result, in order to be sure that a complete search has been made the reader must look through nearly 1000 pages and endeavor to discover therefrom the numbers of the inspection districts in which all parts of a certain county may lie. Two indexes are now provided in that book to which we are taking exception, but one is useless; the other, an index of companies marks a considerable improvement, but should have been added long ago.

Another feature of the Illinois report is that the front page contains a directory of inspectors and that, at the very beginning, there is a summary of the report. The annual mining records of some states are entirely unsummarized and if the figures are to be culled several pages must be scanned. When we know how intelligent the compilers of such reports are, we wonder whether it is the force of an evil precedent, or a lack of clerical help, which keeps them so closely bound to an evil system.

But we cannot indorse all we see in the Illinois report. For instance, we do not like to see mining machines and motors classed alone under makers' names. The various machine and motor makers have many different types of construction, which vary more from one another than machines of the same type made by different firms. Machines should be classed as punchers, cutter bar, breast chain, adjustable turret chain, shortwall chain, longwall chain and Hess-type machines. To this should be added a statement showing whether the machines are pneumatically or electrically actuated. Motors should be classed as air, gasoline, steam, direct-current motors, storage motors, combination storage-and-current motors, crab and reel locomotives. The makers' names could be added if desired.

We believe that when a man is injured in a machine room the type of machine in use should be given, so that some relation might be established between danger and certain types of machines requiring a large amount of free room. We hope these types may rapidly become obsolete. We also believe that the manager of every mine should specify, as in the English collieries, how much permissible powder is used, even if he is not also required to declare what amount is used of each brand.

Finally we should express regret that the fiscal year of Illinois is not the same as the calendar year and that the general rule that the country is the statistical unit is not made universal in the computation f all tables. The argument that the death rate in districts will furnish a key to the activity of mine inspectors is extremely faulty and comparisons of district death rates are, therefore, of little value.

DETAILED REPORT OF MARION, MONONGALIA AND TAYLOR COUNTIES, WEST VIRGINIA. West Virginia Geological Survey. By Ray V. Hennen and D. R. Reger, assistant geologists of the Survey. xvii + 844 pp., 6x9¼ in. 11 Fig., 33 plates.

ATLAS OF MARION, MONONGALIA AND TAYLOR COUNTIES, WEST VIRGINIA. 6¼x9⅛ in., 2 unmounted maps, 35½x41½ in., West Virginia Geological Survey, Morgantown, W. Va. Price of report and maps $2.50. Topographic map alone 50c., geologic and structural map $1 each.

These works are timely in view of the construction of the Buckhannon & Northern R.R. which opens up a large area of Pittsburgh coal described and mapped respectively in the two volumes. In addition to the detailed study and description of all the rocks, coals, limestones, clays, minerals, soils, streams and industries, with hundreds of oil- and gas-well records, coal analyses, etc., occurring within the area and given in this report, the geologic map gives the structural contours on the Pittsburgh coal, and thus is valuable to any one interested in coal, oil, or gas, as it shows the exact positions of all the anticlines, synclines and structural terraces. The suggestions of Ray V. Hennen, the author of the report, as to the location of prospective oil and gas territory are very full and complete in this report. His deductions in previous volumes relative to probable gas- and oil-bearing beds have been frequently verified.

The principal towns included in these counties are Fairmont, Morgantown, Mannington, Grafton, Farmington and Flemington.

It is interesting to note that the geologists have little hope that the Allegheny and Pottsville Series underlie the Pittsburgh formation in this section. East of the Monongahela, the wells and croppings show available coal but west of that river where, because of the depth of its horizon, there can be no surface indications of the fuel, the wells rarely record the Freeport coals and show no signs of the Mercer. Frequently round the rim of the Pittsburgh coal the lower productive measures are still found, but they thin out and disappear as the heart of the upper productive measures is reached. Before erosion occurred, this overlapping must have been more general. It is interesting to note how the coals of the Fairmont region bear out the general rule that Pottsville, Allegheny, Conemaugh and Pittsburgh coals are not found of workable thickness in the same cross-section.

GEOLOGY OF THE NORTHERN SHAN STATES. Memoirs of the Geological Survey of India. Vol. 39. Part 2. By T. H. D. La Touche, late officiating director, Geological Survey of India. vi+379+xli pp. 7¼x10¼ in., 27 plates, 11 fig., pocket with 3 geologic charts; Keegan Paul, Trench, Trübner & Co., London. Price, 4s.

The area surveyed lies around and northeast of Ava and Mandalay in British Burma. Its measures include most of the horizons from Archaean upward with the exception of Lower Tertiary and Cretaceous. The Tertiary beds contain some brown lignitic coal with a high percentage of moisture; the beds vary, one seam in the Lashio field attaining a thickness of 30 ft.

A table of analyses shows that the moisture varies from 6 to 23 per cent., volatile matter from 24 to 42 per cent., fixed carbon from 17 to 39 per cent., with ash between 1.4 and 40 per cent. As this lignite is irregular and is certainly poor in quality, and as it is located far from the coast and so situated that it must come in competition with the Burma oil fields, there is no possibility of its development.

THE COLLIERY MANAGER'S POCKET BOOK, ALMANAC AND DIARY FOR 1914. By Herbert Greenwell, joint editor, Colliery Guardian. 450 pp. +, 4x6½ in. 6 ill. 1 inset map. The Colliery Guardian Co., Ltd., 30 and 31 Furnival St., Holburn, London, E. C., Cloth 2s., Roan 3s., Calf 4s. 6d.

This useful little book appears in its 45th annual edition. We are unable to determine to what extent its contents are new, but much of the information certainly has not appeared in any earlier edition, as it is largely extracted from papers recently given before scientific bodies with some quotations from recent Bureau of Mines' bulletins. The questions set before candidates for mine manager and undermanager at the examinations held November, 1912, and May, 1913, are given in full; also the text of the new British mining act and several Home Office orders. There are many tables of value to mining engineers and much statistical information, especially relating to the mining industry.

Coal and Coke News

Washington, D. C.

On Jan. 27, the inquiry into mining conditions, which has been under consideration for some time past in the House of Representatives and in political circles generally was authorized, through the adoption of the so called "Keating" resolution introduced by Representative Keating. The resolution calls for an inquiry into the state of things in the Colorado coal fields and the Michigan copper district, the work being placed in the hands of the committee on mines and mining. Actual work will be carried on by subcommittees which are to actually visit the districts in question. They will have full authority to subpoena witnesses and require the production of all records and documents.

The investigation will be confined to the coal fields of Colorado in the counties of Las Animas, Huerfano, Fremont, Grand, Routt, Boulder and Weld, and to the copper mines of Michigan in the counties of Houghton, Keweenaw and Ontonagon.

The seven different subjects of inquiry specified in the resolution are: Whether the postal services are interfered with; violation of the immigration laws; whether citizens have been arrested and tried contrary to the Constitution or laws of the United States; whether conditions have been caused by agreements and combinations contrary to law for controlling the production, sale and transportation of coal or copper; whether arms and ammunition have been shipped into the fields for the purpose of excluding the products of the mines from competitive markets in interstate trade; and whether peonage exists or has been maintained. If any or all of these conditions exist, what causes led up to them.

The debate on the resolution was brief. Representative Keating outlined conditions in the Colorado coal fields, declaring that the "constitutional rights of citizens had been trampled upon."

Representative MacDonald, of Michigan, declared that the police power of he state of Michigan had been turned over to men imported by the copper companies. "The time has come for Federal investigation," he said. "The authorities of the state are either unable or unwilling to subdue the disorder."

Representative Kelly, of Michigan, opposed the resolution. He said that if the investigation was to be made it should be conducted by the Industrial Commission, which had ample authority to inquire into the conditions. Representatives Hardwick, of Georgia, and Garrett, of Tennessee, contended that Congress had no authority to make the investigation.

Hearings on Proposed Freight Increase

A beginning has been made in taking the testimony of shippers of bituminous coal who are opposed to the proposed increase of 5 per cent. on all railroads in official classification territory. Three days were set aside by the commission for the presentation of the case of these coal shippers, Feb. 2, 3 and 4, but during Feb. 2 only a small advance was made.

The Pittsburg Coal Co. opened the discussion through its attorney, Frank Lyon, and began by contending that the shippers should not be compelled to put in their case until the roads had finished their arguments. Furthermore, he went on to contend that to grant the proposed increase would practically annul all orders for reasonable rates on coal issued by the commission during the past few years.

Mr. Lyon, who was formerly an attorney in the employ of the Commission, then directed his arguments into technical channels, contending that the railroads operating from the Pittsburgh district to the Great Lakes were not in the habit of keeping separate accounts showing the cost of moving passenger and freight traffic. He requested that the Commission should order separate figures representing these charges to be prepared. The matter was taken under consideration, and it was stated that should it be granted a special representative of the Commission would make them up.

After Mr. Lyon had finished, Edward S. Mead, of the University of Pennsylvania was called as an expert witness for the shippers. Mr. Mead's idea is that there is no good ground for the advance demanded until there can be some general basis of adjustment between the railroads, the employees' unions and the shippers, with the Government as a party in interest overseeing the agreements and guaranteeing that an equitable arrangement is made between the differer parties.

Mr. Mead is also of the opinion that rates at the preser time are exceptionally high on soft coal and whatever done with respect to the proposed increase of rates general there should be no advance in the coal rates inasmuch as suc advance would tend to unduly burden the miners.

Present Waste of Mineral Resources

In a statement issued by the Bureau of Mines as an extra from the forthcoming annual report it is estimated that t present waste of mineral resources in the United States about $1,000,000 per day, and it is claimed that there is urge need for investigation and reform of methods. This ne applies most strongly, it is said, to oil and natural gas. T Bureau estimates that it has been able during the past ye to stop a waste of natural gas amounting to not less th $10,000,000, a sum six times in excess of the total cost of t Bureau's investigations up to date. Continuing the Bure says:

The waste in coal mining is another drain on our nation wealth, which calls for serious and extended inquiry and i vestigation. A preliminary estimate, based upon limited i quiry and examination, indicates an annual waste or loss coal in mining and handling of not less than 250,000,000 to per annum. This represents a loss from our best and mo easily mined coals and those nearest our great centers of i dustry. What is needed in connection with this loss is a tho ough underground survey and examination at certain careful selected areas in each of the important coal fields of t country, with a view to determining the exact conditions u der which mining operations take place and the possibilit of adopting less wasteful methods. With this large amount accurate information laid before the public, it will then possible to obtain the adoption of far less wasteful metho of mining. Such an investigation, thoroughly conducte would cost about $50,000 per annum for three or four yea It is confidently believed that the results of such an investig tion would mean a saving in fuel resources having a value the nation of considerably more than $50,000,000 per annu

HARRISBURG, PENN.

Whether the commodities clause of the Hepburn act effective in preventing a common carrier from transporti in interstate commerce any article or commodity in wh the carrier has an interest, and, if so, whether, the Delawa Lackawanna & Western R.R. complied with the decision the United States Supreme Court which declared the cla constitutional, were the main points to be decided in Government's suit against the Lackawanna, which was argu in the Circuit Court on Jan. 27.

The action was filed at Trenton, N. J., a year ago agai the Delaware, Lackawanna & Western R.R. and the coal co pany, and the case was transferred to this state on expediti certificate of the attorney general.

The Government asked that the railroad be enjoined fr transporting in interstate commerce any coal produced purchased by it and transferred to it before transportat by the coal company and also asked that the existing agr ments with regard to the purchase price of the coal be c celed. The grounds upon which the Government asked t relief are that the coal company is not a bona fide corporati but is "a mere cloak" for the railroad company, and that whole arrangement between the two is a violation of commodities clause and the antitrust laws.

It was contended that the organization of the coal co pany was a "sham," a lawyer's device and a subterfuge to around the law. The Lackawanna people pointed out that coal is mined by a charter right by the railroad company, a it is sold at the mine to the coal corporation and that t coal is then shipped by the railroad to market. They a brought up the question as to whether or not the coal belo to the railroad or to the coal company while in transit, a contended that it belongs to the coal company, and that coal company is an entirely separate organization, not o as to officers, but as to books in every thing that goes i the operation of the concern.

The Government referred to interlocking directorates the two companies and pointed that sons of directors of railroad had been among the incorporators of the coal co pany. The Lackawanna people claim that it is no heino crime in a man being a director in more than one corporati even if it did appear to some people that interlocking dir torates were a "badge of shame."

The Delaware, Lackawanna & Western Coal Co. was organ-ed in 1909 after the supreme court declared the commodi-es clause constitutional. The railroad company declared a ividend of 50 per cent., half of which was used by the rail-oad stockholders in organizing the coal company. It was tated that approximately 4½ tons of the coal transported y the Lackawanna R.R. goes west to one ton that goes east) tidewater.

The Government contended that "the identity of the two ompanies is the same." "The directors are practically the ame and the coal company is financed by the railroad. The tockholders are practically the same and the stock of both orporations is held by comparatively few persons. The coal ompany is not permitted to purchase coal from any other ompany, but the railroad." The Government showed the elationship of officials of the two corporatins and called ttention to E. E. Loomis, as president of the coal company, gitating himself, as vice-president of the railroad, over reight rates. The court reserved its decision.

After the conclusion of the trust suit hearing a petition vas presented by the railroad company, asking that it be xcepted from the decree canceling 6 per cent. contracts made n the suit brought by the Government against the Reading ompany and others in 1907. The ruling was made by the upreme court and affected the Delaware, Lackawanna & Western R.R. in two contracts with the People's Coal Co. at cranton and the George F. Lee Coal Co., at Plymouth. Also he contracts between the Hillside Coal & Iron Co., and the ackawanna Coal Co., Ltd., and the New York, Susquehanna Western Coal Co., and Jermyn & Co.

The attorneys for the Government informed the court that here was no desire to press for the cancellation of these con-acts, and the court instructed the lawyers to submit a de-ree under agreement for approval.

An Examiner Is Appointed

Appointment of an examiner to take testimony and the miting of time in which to submit evidence in the suit of he Government against the Reading and other coal-carrying ailroads brought in the Federal Court last October, were ncorporated in a decree filed by Judge Gray, on Jan. 28, and harles H. Guilbert, an official court stenographer was ap-ointed examiner.

The court stipulates in its decree that the Government hall conclude the presentation of testimony not later than far. 10 next, and the Reading company and others must close ll its proofs by Apr. 24. The special examiner is instructed o file with the court a transcript of the testimony taken by lay 23.

The original suit to dissolve the so called anthracite coal rust was filed in 1907. After an extended litigation in the ederal and the United States supreme courts, it was de-ided to terminate the old action and begin new proceedings. his was done in October last and these defendants were amed by the Government: The Reading company, the Phil-delphia & Reading Ry. Co., the Philadelphia & Reading Coal Iron Co., the Central R.R. of New Jersey, the Wilmington Northern Rys. Co., the Lehigh & Wilker-Barre Coal Co., the ehigh Coal & Navigation Co., and the Lehigh & New Eng-nd R.R.

A Demurrer Will Be Filed

Attorney-General Bell has announced that a demurrer ould be entered by him to the action in equity brought to st the constitutionality of the anthracite coal tax law. The emurrer will be entered in the Dauphin County court within short time, and it is probable that the question of juris-ction under the circumstances will be raised.

During the week the Lackawanna County Court refused to rant an injunction to Mine Inspector Reese of the fourth strict to have the People's Coal Co. stop mining operations the surface veins in Scranton. The court did not dismiss e injunction bill, however, the latter being retained in der to allow either the mine inspector or the coal company resort to arbitration for the purpose of deternining whether ere is any necessity for flushing the open chambers men-oned in the suit

The court declares that "No question of surface support is stake," inasmuch as no private right either of person or operty is concerned.

On Jan. 28, Judge Edwards, of the above county court, de-ined to grant an injunction to restrain the Scranton Coal o. from mining in the neighborhood of the Graff Furnace o. property. The plant of the latter was damaged by mine ve settling a year ago.

The court found that the reservation clause in the deed surface property purchased by the Furnace company, gives e Scranton Coal Co. the right to mine coal and does not ll for providing support to the surface.

This is the case which brought from the manager of the plant, a charge that Judge Newcomb was holding up de-cision in the case so that a hearing could not be had before the supreme court at the session to be held in February. The decision of Judge Edward's makes this possible.

PENNSYLVANIA

Anthracite

Upper Lehigh—The Upper Lehigh Coal Co. is sinking a new slope to tap a small vein underlying the Buck Moun-tain seam. The new vein is from three to five feet in thick-ness and underlies all of the old No. 1 workings, which up to a few years ago were considered the lower veins.

Lopez—Three locals of the United Mine Workers of America have been established in the Sullivan County min-ing section, and union organizers say that all the workers of that scction will be strongly organized within a few weeks. About 1500 men are employed in the district. The wage scale in effect is about the same as the scale of the Wyoming anthracite region.

Beaver Meadow—Discovery of a 7-ft. vein of rich an thracite coal on the Penrose tract of 600 acres, between Beaver Meadow and Weatherly is reported. H. D. Stimson, a coal prospector, has reported on the discovery to the Penn Forest Coal Co., of Philadelphia, which owns the land.

Nanticoke—Surface settlings in the vicinity of Market and Broad Sts., which have been occurring for the past few weeks, broke out again on Jan. 29, damaging several prop-erties and causing several gas pipes to break. Several large cracks are evident throughout the town.

Lansford—All men employed in the mines of the Lehigh Coal & Navigation Co. have returned to the old system of working through the dinner hour so that they can get home one hour earlier in the evening.

Bituminous

Indiana—The Penn Mary Coal Co., one of the largest operations in the state, will close down for an indefinite period. Slack orders and necessary repairs are given as the reason. The Penn Mary Coal Co. has recently had the finish-ing touches put to a number of cottages for the miners, bearing out the statement by some of the state mining offi-cials that Heilwood is the model mining town of Pennsyl-vania. The coal company operates a modern sanitary dairy, the milk being supplied to the officers and miners alike at a low cost. Another feature of the place is a 100-acre truck farm on which are raised all kinds of vegetables for the use of the company employees.

Uniontown—Urging that a central mine-rescue station similar to those proposed for Fairmont and Clarksburg, W. Va., be established in the Connellsville coke region. Isaac G. Robby, inspector for the 5th Bituminous District, recently expressed his intention of taking up the matter with coke operators of the region.

Smock—Charging that S. P. Hooper entered the Colonial mines in an intoxicated condition with the safety of all of those employed in the mine in his hands, complaint has been filed against the man by Inspector P. J. Walsh, of the 9th Bituminous district.

Connellsville—Caught in the act of stealing coal cars in the Trotter mines on Jan. 23, Pompey Fitts was arrested and placed in jail pending a hearing. Fitts has been sus-pected for a long time, and a close watch was kept. He would remove the checks from the wagons of coal dug by other liners and put his own upon them. The checks of the rightful owners of the coal were destroyed. Each wagon of coal was worth 85c. and as the result Fitts was getting about twice his regular pay.

Pittsburgh—It is reported on good authority that plans are about consummated for taking the Four States Coal Co. out of the hands of the receiver by Mar. 1. The assets of the company are said to be in excess of the liabilities. This firm, together with other Jones interests, has been man-aged by a receiver since Dec. 6 last.

WEST VIRGINIA

Bluefield—Col. Jas. S. Browning is seriously consider-ing the development of his coal property near Falls Mills, and plans are already under way whereby a mine is to be opened at the mouth of Mud Fork near the Norfolk & West-ern dam. The location is about 1¼ miles from Falls Mills station and the drift mouth will be located on the Lee Marsh property.

An effort is being made among coal operators to break up the habit prevalent at many mines of shooting from the solid. In Raleigh county, the E. E. White Coal Co. has de-clined to continue in employment any man found violating

the mining law in this respect, thus, endangering the lives of other miners as well as property.

Mt. Clare—A class in first aid work for the employees of the Hutchinson Coal Co. was recently organized here. About 40 men were enrolled, and much interest was displayed in the work. When the course of study is completed, it is the intention to organize two teams for service at the two mines of the company. These men will be kept in training and ready for any emergency that may arise.

ALABAMA

Cullman—It is expected that a reorganization of the Cullman Coal & Coke Co., which was put into the hands of receivers on Jan. 26, on account of a disagreement in the management, will be effected at an early date. Properties of the company are located near Bremen, Ala., consisting of a large tract of land and a private railroad connecting with the Louisville & Nashville at Cullman. Much money has been spent on improving and opening up the property, the most modern improvements being installed. The Cullman Coal & Coke Co., while having a few local stockholders, is composed mostly, and financed by Holland capital, Queen Wilhelmina being one of the largest stockholders.

TENNESSEE

Jellico—Seventy-five nonunion miners in the Blue Gem mines struck last week because of the discharge by the management of check-weighmen J. H. Duncan, G. J. Strunk and Grover Hickey, who entered a protest against the large size of the screens used. Manager James F. McPherson, who discharged the men, stated that the complaint was baseless, and that the screens used in the mines are of the kind authorized by the laws of Tennessee.

KENTUCKY

Madisonville—Definite announcement has been made that the Deep Water Coal & Coke Co., recently organized, with headquarters at Evansville, Ind., has acquired control of over 20 mines in the Henderson and Madisonville districts of western Kentucky. It is stated that contracts covering the transfer of these mines to the company have been closed, and that details of the deal are now being completed. The capitalization of the company is not known, but it is understood that $6,000,000 is involved in the deal. A number of the mines have not been actively operated of late, but others are now marketing coal; and the intention of the company is to place all of the properties in first-class condition, for the purpose of reaching a large production, to be handled by river to New Orleans for foreign markets. A large acreage of undeveloped coal land has also been acquired by the company, upon which new mines will be opened as soon as possible.

OHIO

Dayton—The W. P. Rice Coal Co., of Dayton, Ohio, will open a new mine at Palos, Ohio, in the Sedalia seam in the near future. A shaft has been sunk and $75,000 will be spent on equipment.

Cleveland—Ohio operators with offices in Cleveland let it be known that their delegates to the joint convention of operators and the United Mine Workers of America have positive instructions to enter negotiations with the wage-scale committee only after an agreement to abolish the check-off system of collecting union dues from the miners has been reached. They also are instructed not to make a wage contract providing for payment of miners on any basis other than the lump-coal plan now in force.

It is claimed that the screen-coal bill, if mines were operated according to its provisions, would increase the cost of coal 10 to 12c. a ton. The operators are emphatic in their statements that they cannot stand this increase and compete with West Virginia products. West Virginia coal has been the bug-bear of Ohio and Pittsburgh operators for years and the plea that West Virginia must be curbed is not a new one in a crisis.

INDIANA

Terre Haute—It is believed that the output of this field will be the smallest for January that it has been in seven years. Some operators recall that there have been seasons when hardly freezing weather prevailed until February, and then the short month gave enough zero temperature to make an average winter coal consumption. Such a February is now the only hope for the revival of the domestic coal trade. There is, however, an appreciable increase in the demand for steam coal, and the reports are for a revival in the industrial world.

Jasonville—The 200 miners who have been idle several weeks on account of a strike at the Queen Coal Co.'s mine near here went back to work on agreement that the decision by a board of arbitration should apply for all their working time.

ILLINOIS

Pana—The Pana Coal Co. has announced a suspension of operations at Mine No. 2 ordering all men to take out their tools. Three hundred miners are thrown out of employment. Falling off in business is assigned as the cause.

The Elly Coal Corporation has announced that plans have been completed for opening its 30,000 acres of coal lands in Christian, Montgomery and Macoupin counties. This comes as encouraging news to several thousand coal miners who have been thrown out of employment during the past month by the suspension of operations in many of the largest mines in this section of the state.

Girard—Three mines operated by the Superior Coal Co., at Girard, turned out 281,183 tons of coal in the month of December. This was more than the output of any single month in the previous history of the mines. For the first week in January, these operations averaged a daily output of 11,981 tons.

COLORADO

Trinidad—A parade of striking miners and sympathizers, on Jan. 23, was dispersed by state militiamen using clubbed rifles and sabres. Several arrests were made, among them being seven women.

ARKANSAS

Fort Smith—One thousand union coal miners, employed by the Central Coal & Coke Co., of Kansas City, Mo., at Hartford, Huntington and Bonanza, went on strike Jan. 29. The union alleges the company refused to abide by the decision of the district arbitrator who reinstated four unemployed men.

OKLAHOMA

Sutter—Fire in the wash house of the local coal mine on Jan. 22 destroyed the building, and the miners lost much of their clothing.

SOUTH DAKOTA

Rapid City—J. P. McElroy and associates are carrying on diamond-drill operations near Interior, in the hopes that coal deposits will be found of sufficient size to warrant working. Indications point to deposits of coal, but the extent of the same has never been determined. A company has been incorporated and will drill for oil on the ground adjoining.

UTAH

Storrs—On Jan. 26 an avalanche destroyed several houses and killed three persons. Among the dead were two Greek miners.

WYOMING

Glenrock—While drilling for water on the Higgins ranch, two miles from here, a good grade of oil was encountered at a depth of 100 ft. Preparations have nearly been completed for installing an oil rig and developing this field in different places.

FOREIGN NEWS

London, England—London's coal strike came to an end Jan. 28, when the men returned to work on the old terms, except in the case of the employees of Sir Edwin Cornwall, who granted the union's demand.

PERSONALS

Governor Tener, on Jan. 29, appointed Edwin Ludlow, vice-president and general manager of the Lehigh Coal & Navigation Co., of Lanasford, as trustee of the State Hospital at Coaldale.

John W. Johnson, a colored miner of Riverton, Ill., recently settled a $25,000 damage suit against his employers for $750. The settlement came by an agreement after the suit was called for trial.

Robert B. Maloney has been appointed general superintendent of the mine of the Davis Coal & Coke Co., with offices at Thomas, W. Va., in the place of Harry Sharp, who resigned to enter business for himself.

John Jarnigan, organizer for the United Mine Workers of America, was given a verdict of $5000 against the Pennsylvania Coal Co. by a jury in the United States court at Fort Smith, Ark., recently. Jarnigan sued for $30,000, the amount being reduced materially by the decision.

Safety Superintendent of Ohio mines, J. M. Roan held several meetings with miners recently in an effort to install better mining methods. He recently addressed two meetings, one at Martins Ferry and the other at Barton, and later a meeting of miners of the Crooksville district at Crooksville.

Edward J. Corrigan was elected to the presidency of the Kansas City Midland Coal & Mining Co. at a recent meeting of stockholders. He fills the vacancy created by the death of the late Bernard Corrigan. The new president, who formerly was secretary, has relinquished the latter office, but retains that of treasurer. Emmet Corrigan has been made secretary. The company's mines are located in the Novinger, Mo., district.

A. E. Williams, for many years lake freight agent of the North-Western Fuel Co., with offices in the Rockefeller building, resigned recently. E. P. Carey, of St. Paul, Minn., secretary of the company, and J. L. Forepaugh, of the St. Paul offices, arrived in Cleveland to take charge. Mr. Williams was immediately relieved as he had requested and Mr. Forepaugh was placed temporarily in charge. No decision has been reached as to who will succeed Mr. Williams.

OBITUARY

George W. Barager, general manager of the Pardee Bros. & Co., died on Jan. 27, at the Medico-Chi Hospital at Philadelphia. He went to the hospital for the purpose of having an operation performed for a throat affection, and while under the anaesthetic, died from heart failure. Mr. Barager was born in Hazleton, graduated from Lehigh University in mining engineering in 1900. He entered the employment of the Lehigh Valley Coal Co. as district superintendent, and succeeded A. W. Drake as general manager of the above company a short time ago. He was also a director of the Freeland Mining & Mechanical Institute, and chairman of the Board of Education of the Y. M. C. A.

CONSTRUCTION NEWS

Woodward, Ala.—The Woodward Iron Co., operator of furnaces, manufacturer of coke and miner of coal, will start immediate work on the construction of 30 modern byproduct ovens at a cost of approximately $400,000, the ovens to be located at Woodward, Ala.

Pikeville, Ky.—The Sharon Coal & Coke Co., of Newton, Penn., is beginning the initial work on a big coal-mining development on Blackberry Creek in Pike County and will build a first-class industrial coal-mining city and expend several million dollars in the work. The home office of the company is in Newton, Penn., while offices will be retained in Huntington.

Woodward, Ala.—In connection with the 30 by-product ovens to be constructed by the Woodward Iron Co. at Woodward, Ala., the American Creosoting Co. will build a creosoting plant at Woodward, utilizing the coal-tar from the by-product ovens. The plant, work on which will start immediately, will consume approximately 6,000,000 gal. of coal tar yearly. The plant will cost $250,000.

Whitesburg, Ky.—It is reported that track laying on the line of the Carolina, Clinchfield & Ohio R.R. through the "Breaks" of the Big Sandy has been started between Elkhorn City, Ky., and Dante, Va., and will be rushed to completion as soon as possible. The tunnels on the line, 40 in number in 32 miles, are completed, and the remainder of the construction work will not take long, it is believed.

Pittsburgh, Penn.—The Dravo Contracting Co. has just been awarded the contract for the complete construction of two modern concrete-lined shafts for the Ford Collieries Co. on its property between Bakerstown and Curtisville, Allegheny County, Pennsylvania. The Ford company is contemplating the construction of a plant modern in every detail and ground will be broken in February for the sinking of these shafts.

Quicksand, Ky.—The Wolf Valley Coal Co. which recently purchased 2000 acres of coal land near here will start at once the initial work on a first-class coal-mining plant—the largest in Breathitt County. The new coal operation is to be reached by a five-mile spur line of the Lexington & Eastern from Haddix, construction of which has already been started. A first-class coal-mining industrial city will spring up, its building having begun.

NEW INCORPORATIONS

Little Rock, Ark.—The Southern Coal and Land Co. has surrendered its charter.

Cleveland, Ohio—The Northern Coal & Dock Co., of Cleveland, Ohio, has filed papers with the secretary of state increasing its capital stock from $300,000 to $500,000.

Grand Junction, Colo.—The Winton Coal Co. has been organized with a capital of $50,000. The incorporators are Susie B. Fletcher, Howard G. Fletcher and Susan J. Winton.

Akron, Ohio—The North Branch Coal Co., of Akron, Ohio, has been incorporated with a capital stock of $100,000 to mine and deal in coal. The incorporators are William McConahy, F. W. Robson, H. L. Houk, M. D. Kuhlke and H. A. Hine.

Shelby, Ky.—The Shelby Coal Co. has been organized with $60,000 capital to develop the old Bartley coal tract near here on the Sandy Valley & Elkhorn R.R. Work will start within 60 days. J. W. Morrell, W. M. Smith and others are the incorporators.

Salem, Ohio—The capital stock of the Salem Mining Co. will be shortly increased from $75,000 to $150,000. The company has purchased extensive coal lands adjoining its present holdings which will be developed during the present summer. Charles Estep is president, M. C. Yoder, vice-president, while J. E. Morgrett is superintendent and purchasing agent.

INDUSTRIAL NEWS

Piedmont, W. Va.—The Elkins Coal & Coke Co. has secured a large coal contract from a New York firm. The order calls for the delivery of 10,000 tons per month for one year at New York City. Shipments have already begun.

Sandusky, Ohio—The city of Sandusky has pledged $50,000 toward the improvement of the harbor at that point. This money is to be provided on condition that plans and specifications prepared by United States engineers are approved. It is proposed to deepen the channel to a uniform depth of 23 ft., extending the Cedar Point jetty and build the pier at the end of the new lighthouse which will cost $450,000.

Washington, D. C.—Kentucky coal operators on Jan. 27 complained to the Interstate Commerce Commission that the Louisville & Nashville and other roads operating in southern, and central western territories, including central freight association territory, charge unreasonable and discriminatory rates on coal outbound and other traffic inbound, to and from all points in the territories in which these roads operate.

Columbus, Ohio—According to a report recently issued Ohio shipped 6,176,683 tons of coal via the lakes to the Northwest during the season of 1913 as against 4,676,000 in the previous season. Lake shipping was the mainstay of the coal trade in Ohio during the months of navigation. The outlook for an active lake trade in 1914 is not bright as there is a large tonnage on the docks of the upper lake ports ready for movement to the interior.

Indianapolis, Ind.—Secretary B. F. Nigh, of the Michigan-Ohio-Indiana Coal association submitted an interesting report of the work of the organization at a meeting of the officers and board of directors at Indianapolis recently. He showed the present membership to be 1716 and rapidly growing and predicted that it would not be long before practically every dealer in the three states would be united with the organization. The annual meeting of the association will be held at Indianapolis some time in June, the exact date to be fixed later by the local committee in conjunction with the president and secretary of the association. It will be only a two-days session with one evening given over to entertainment. Entertainment tickets will be given only to those who attend the business sessions of the convention. Shippers will not be asked to contribute toward the entertainment.

Coal Trade Reviews

General Review

Concessions on domestic sizes of anthracite the rule. April discount expected on individual coal by Feb. 15. Rigid curtailment in bituminous and sellers offering all kinds of inducements. Anticipated suspension still fails to start any buying movement and market continues flat.

The anthracite market is replete with signs of an abnormally depressed condition. All the large hard-coalers, without exception, are under restricted operation this week, and the curtailment is spreading even to the individuals. Moderate concessions on the regular circular for prepared sizes are readily obtainable, and conservative members of the trade expect a sharp break to the Apr. 1 discount by the middle of the current month, these prices already being quoted in some exceptional instances. Companies are eagerly seeking orders, which are promptly filled, and the situation is particularly flat at tidewater. The steam sizes are the only ones to show any strength; under the restricted production, the supply of these has become so short as to command premiums in some instances.

Bituminous agencies are instructing the mines to shut off shipments, and there is a reduction in the amount of consignment coal on the market which has had a steadying effect upon the soft-coal situation. As a result, circular prices are somewhat better maintained, although it is not yet believed that the market has touched the bottom. There are some inquiries on contracts for the new year, but nothing significant has developed as yet. Consumers are not showing any inclination to meet the high level of last year and indications point to a considerable delay in getting together. Shippers, as a rule, are offering all kinds of inducements, and consumers are getting a substantial advantage in their fuel costs.

The opinion prevails in the Pittsburgh district that an early settlement of the new wage scale will be effected, but reports from other points are of such a contradictory nature as to throw considerable doubt on this opinion. In any event, the possibility of a suspension has failed to stimulate business, and the demand continues limited with price-cutting the rule; the movement on contracts is light, and the domestic grades are the dullest for years.

A large amount of demurrage coal is reported in Ohio, and the Northwest, while the general absence of any sustained demand, together with the heavy over-supplies, has resulted in a condition bordering on demoralization. Expectations of a suspension in mining seem more prevalent here, and some buying is noted in anticipation thereof. Heavy chartering of lake vessels was the feature of interest during the week.

The January dumpings at Hampton Roads will be lower than the December figures, but in spite of the light movement, prices are well maintained, and no important cutting of the circular is anticipated, although there are large accumulations. Southern operators are curtailing production in hopes of stimulating business, but there is little change in the situation there.

A scarcely perceptible improvement in the Middlewestern market is noted, with a slightly increased demand from the Northwest. There is still considerable coal on demurrage, however, and the market is not materially changed.

EASTERN MARKET

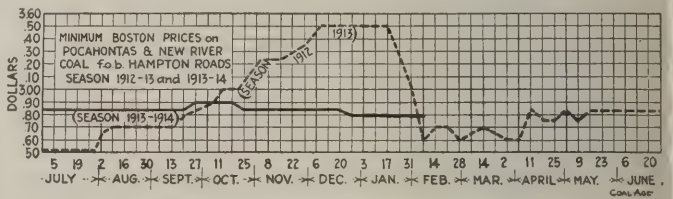
BOSTON, MASS.

A few early buyers entering the market but nothing significant so far is heard. Trade extremely dull. Inland prices slightly better now that consignment coal has been absorbed. Restriction general among operators. Anthracite moving mostly to Eastern storage depots, an unfailing sign of dull business.

Bituminous—A few of the large mills who are usually early buyers have come into the market this week for their usual supplies of Pocahontas or New River. There is therefore a mild scurrying on the part of some of the agencies to play for position but so far nothing significant has been reported. The $2.85 basis is apparently better maintained than a week ago and only a few shippers are now making concessions. Spot sales, however, are still of small tonnages and it cannot be said the market is really any firmer. It is more that the curtailment is so general that coal is not piling up at the piers to the degree it was a fortnight or so ago.

New England trade is certainly dull. Some buyers are finding that they so far over-bought last year that they are not likely to buy this year until June and such instances are more frequent than might be supposed. It is some indication of the state of things when no one of the three large cargoes that foundered in the January gale is to be replaced by other shipments, at least not for the present.

Coal for distribution inland shows a slightly better tone, due more however to the disappearance of recent "market cargoes" than to any improvement in demand. Manufacturers are still cautious and coal is not the only trade that is slow and apathetic.



All the Pennsylvania shippers are trying hard for spot business and offering all the inducements they dare, but the movement is light and confined largely to the quality grades. Georges Creek mines are also under restriction, but with no concessions from season prices.

Anthracite—The companies are keen on getting business but the weather has slumped again and retailers are still holding back. Those shippers who own storage depots in this territory are loading up their barges for these points, which is always an unfailing sign of extremely dull times in anthracite.

Current wholesale quotations on bituminous are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.55	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.80	2.92@3.02	
New York*	2.50@3.00	2.80@3.10	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.58@3.63
Providence†				3.58@3.68

*F.o.b. †On cars.

NEW YORK

Does not seem to be any market whatever for prompt soft coal. Prices moderately good and holding firm in spite of adverse conditions. Slump in the prepared sizes of anthracite to the April circular anticipated by Feb. 15. Steam grades stronger under the heavily curtailed operations.

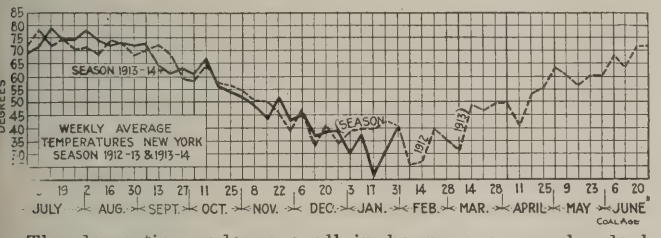
Bituminous—Conditions in the New York soft-coal market have seldom been worse in the mid-winter season than is now the case. It is simply a condition where there is no business whatever to negotiate. So far as quotations go, the true condition of the market is not adequately reflected in the prevailing price level, producers having consistently maintained a relatively profitable figure in spite of adverse conditions. It seems to be the feeling that with no buyers in the market, nothing would be gained by attempting to force the market with concessions. This applies particularly to the better grades, which are always the last to suffer in a depressed market. Only occasional reports of consignment coal on demurrage are heard, but there is probably more of this than is generally thought.

Contract business is the mainstay of the market at the moment. The larger companies in particular report a fairly good movement in this line, but others state that there are many suspensions. The possibility of labor troubles is having a tendency to increase the requisitions in order to accumulate some surplusses. However, most consumers as a rule are heavily stocked up and not many are prepared to take in more coal.

We continue to quote the New York market weak, but unchanged as follows: West Virginia steam, $2.60@2.75 good grades of Pennsylvania, $2.75@2.85; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.

Anthracite—Further adverse developments in hard-coal continue to be reported. Conservative members of the trade look for a general recession on individual coal, by the middle of the current month, down to the Apr. 1 circular. Such a slump usually occurs about Mar. 15, but it is clear to all that the circular will not be maintained that long this season.

As a result of the curtailed production, the supply of steam grades is not up to the requirements, there being a particular shortage of No. 2 buckwheat. A further curtailment in mining operations will tend to cause a relatively firm price situation in this department. The reserve supply of finer grades has all been picked up, while some of the companies are now finding it necessary to put some of the prepared sizes back into storage.



The domestic grades are all in heavy over-supply, dealers being so full up that they are unable to take any additional tonnage in spite of the attractive offers made. Concessions on the regular circular of 15 to 20c. per ton are readily obtainable on all the prepared sizes, and there are many individuals who would doubtless quote the full April circular on all-rail orders. As a rule, the independents are not as yet restricting mining but operations of the big companies have seldom been so curtailed, the Lehigh Coal & Navigation, Reading and Susquehanna collieries all closing down Wednesday for the balance of the week.

We quote the New York market for hard coal off on the domestic grades, but with the steam sizes a trifle stiffer as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	$4.60@5.00	$5.05	$4.55@4.95
Egg	5.25	5.00@5.25	5.30	4.75@5.20
Stove	5.25	5.05@5.25	5.30	5.00@5.20
Chestnut	5.50	5.25@5.50	5.55	5.20@5.45
Pea	3.50	3.50	3.50	3.45
Buckwheat	2.75	2.75@2.85	2.70@3.45	2.25@2.70
Rice	2.25	2.25@2.35	1.95@2.20	1.85@2.20
Barley	1.75	1.75@1.80	1.70	1.50@1.70

PHILADELPHIA

Hard coal outlook unfavorable. Difficult to move the production even under restricted operations. Prices on domestic quoted down to the April circular. Bottom point in soft coal not yet reached.

Coal dealers, both wholesale and retail, still regard the outlook pessimistically. The past week has been anything but propitious. Summer weather so closely follows a little lowering of the thermometer, that most of the householders take a chance, and this is reflected on the meager demand on the retailer. Curtailment of work at the mines still continues. Outside of the steam sizes, the operators are hard put to dispose of their output, even with the reduced mining; with the month of February well on its way, and predictions for continued warm weather, the prospect is not favorable. It is intimated that even some of the individuals contemplate a curtailment of production, which is something unusual.

The trade will not take coal they do not want, and with yards well stocked, even the inducement of April prices, does not always produce an order. The tidewater business is distinctly flat and the New England market is simply buying from hand to mouth, with the result that orders are coming in slowly. The dealers wait until they have enough orders in sight to dispose of a cargo, before placing a schedule, knowing that there will be little or no delay in its fulfillment.

The bituminous market is running the anthracite a close second. There is a feeling that the bottom of the market, as far as prices concerned, has not as yet been reached, and every inducement in the way of prompt deliveries and attractive prices, fails to land sufficient business to keep operations in full swing. Advances over last year's contract prices are not being considered; it will wind up the same as last year, when many of the large steam users shopped around for their supplies, rather than tying themselves up on contracts.

BALTIMORE

Improvement in business handled over the local piers. Demand light, and the general situation not promising. Warm weather still has its effect on anthracite trade.

Prices are considerably below what they were in February of last year, and the demand is not as brisk as was the case at that time. The best demand has been in the coastwise contract business. Shipments were noted both from the B. & O. piers at Curtis Bay and the Western Maryland piers at Port Covington. A large number of charters have already been announced for February loadings, in addition to the fleet of coal colliers that run regularly. Foreign business looks brighter, as not only South and Central America, but Europe, is in the market through this port.

Local demand for soft coal is light, and in fact the general state of the market is poor. Many leading industries are taking little or no fuel. Pennsylvania best grades are holding around $1.25, with lower grades at from 95c. to $1.10. West Virginia steam fuels are demanding about 90c. at the mines. The coal situation is weak, offerings of three-quarter being made in some instances as low as 75 cents.

CENTRAL STATES

PITTSBURGH, PENN.

Wage scale conference this week in Philadelphia. Difficulty in adjusting scale for two years beginning Apr. 1 may prove less than expected. Demand continues poor, with prices irregular. Connellsville coke slow, at practically unchanged prices; shipments increased.

Bituminous—The Pittsburgh district operators are sending to the wage scale conference in Philadelphia, arranged to begin Tuesday, February 3, W. K. Field, John A. Donaldson and Geo. W. Schluederberg, of the Pitttsburgh Coal Co., and W. W. Kiefer, W. A. Luce, J. H. Sanford, William Henderson and Michael Gallagher of independent coal companies. Ohio and Indiana will be represented at the conference, as usual, while Illinois will also this year be represented. The Illinois operators are understood to be less anxious than others to change the base of the scale to mine-run as they have already developed the system. Van Bittner, president of the Pittsburgh district miners' organization, will head the men in the wage conference. While for several months the opinion seems to have been that the wage settlement this year would involve a long controversy, there appears to have been a change of opinion in some quarters of late, whereby there are some predictions that only a short suspension will occur.

The local coal market has continued in an unsatisfactory condition, demand being limited and price cutting common. While it is possible that there may be some extra demand this month and next, to provide consumers with stocks against a possible cessation in mining, there is no evidence thus far of any such demand. Shipments against contracts with manufacturers are light, although there has been a slight improvement in steel mill operations, railroad consumption shows no improvement, and domestic demand is the poorest for many seasons, doubtless on account of the extremely mild weather. List prices, which are frequently cut, remain as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The coke market has been quiet, and inquiry for February is developing more slowly than was expected, from furnacemen who covered January requirements only. The prompt market continues to be quoted at $1.90, but there is ground for suspicion that consumers requiring a round tonnage can shade the figure materially for early shipment and it is possible that not much coke will be bought for the whole month. The contract market is dead, but remains quotable nominally at $1.90 to $2. Foundry coke is in fair demand, and is quotable unchanged at $2.40 to $2.65 for prompt and contract, though transactions are usually at near the lower limit.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending Jan. 24 at 291,055 tons, an increase of 22,698 tons, and shipments at 290,586 tons, an increase of 25,802 tons.

BUFFALO, N. Y.

Activity in bituminous disappeared with return of mild weather. Trade discouraged and mines are running slowly with no apparent prospect of recovery. Anthracite very quiet. Furnace coke a little better.

Bituminous—The activity resulting from the colder weather was all lost as soon as it became mild again, and the dealers

have instructed the mines to shut off. It is not denied that the apparent consumption is better than early in January, but it is not good enough to keep the mines running at anything like full capacity. So long as the output was cut down by the car shortage, prices held up, but the mines will not restrict operations, even after so much trouble from over-production. Consumers, especially the railroads, are getting a big advantage this winter in their fuel cost.

There is again complaint of coal on track unsold, though not so much as when the December slump took place; reports from the mines are to the effect that the men are grumbling over short work, viewing the situation as some sort of a combination against them. At the same time the railroads are reporting better business as a rule, and certain officials predict a steady recovery. There is a good movement of contract coal, but spot sales have run down. The prices of bituminous are weaker than they were a week ago, being based on $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.10 for slack, with Allegheny Valley coal about 25c. lower.

Coke—There is no change in the price of coke and none is looked for right away, but so many furnaces have blown in since the first of the year that furnace coke is comparatively more active now than foundry. Quotations remain on the basis of $4.50 for best 72-hr. Connellsville foundry.

Anthracite—The slump in the weather has hit the anthracite trade harder than anything else, especially as the season is now getting so late and the April reduction less than 60 days off. Consumers say they are running fires as low as possible, only burning as much coal as they commonly would in October.

All anthracite mines are running slow and there is preparation here to resume loading into vessels in order to get rid of the surplus. There are reports of big piles of coal at all upper-lake ports, which will disappear only with the return of steady winter.

TOLEDO

Domestic demand much restricted by the warm weather. Circular fairly well maintained. Colder temperatures momentarily stimulated the market.

Continued warm weather has worked havoc with the local market. The slow demand for domestic coal is most unusual for this season of the year and the dealers are feeling it, although the demand for steam coal has kept quite close to normal. This is due in the main to the possibility of a shut-down of the mines. It is known that the railroads also are acting upon this conclusion and are storing large tonnages.

Despite the short demand prices have remained fairly stationary, although most coal offices have recorded sales below the circular. There has been little speculative attitude regarding the weather among the dealers and with thir bins full even the lowest prices fail to create interest. For this reason quotations have held pretty close to list. The cold temperatures recently proved a temporary stimulus to the trade.

According to latest reports the Hocking Valley Docks will be near completion upon the re-opening of navigation this spring. This dock with a capacity of 20,000 tons in 10 hr. will be a great factor in facilitating shipping.

Prices are quotable as follows:

	Pocahontas	Hocking	Jackson	Pomeroy	Massillon	Pittston	Cambridge
Domestic lump	$2.50	$2.00	$2.50	$2.25	$2.50	$1.40	$1.40
Egg	2.50	1.35	2.50	1.50	2.50	....	....
Nut	1.75	0.80	2.00	1.75	2.50	1.35	1.20
⅔ lump	....	0.90	....	....	....	1.30	1.20
Mine-run	1.40	1.10	....	....	....	....	....
Slack	....	0.65	....	....	....	....	....

COLUMBUS, OHIO

Continued unfavorable weather has weakened the coal trade still further. Demoralization may result unless some relief appears soon. Prices unsteady and the volume of business small. Large quantity of demurrage coal on Ohio markets.

The local trade is weak and unsettled, due principally to the continued mild weather. The demand for domestic and steam grades is lacking and there is an overstock of all kinds. Consequently prices have weakened materially, although the larger operators and shippers are making every effort to maintain the market.

Dealers stocks are large and they are not inclined to buy. Unless colder weather arrives soon, stocks of some dealers will certainly have to carry over until the coming season. In fact there is practically no demand for domestic grades and as a result, there is little price cutting resorted to in order to force the market.

The steam business has been more steady than domestic but even it has been weak. Practically no stocking is being done in anticipation of a suspension Apr. 1, but some is expected in February. All contracts which expire at this time are reported as being renewed on about the same basis as last year.

One of the worst features of the trade is the large amount of demurrage coal on the markets in Toledo and the Northwest; this affects the Columbus market materially. The coal is being disposed of at extremely low prices. The indications for a good lake trade next season are not good since reports show a large amount of coal on the docks of the Northwest. Unless colder weather comes there will be considerable to carry over.

Production has been rather slow in all fields. The Hocking Valley district reported about 40% of the average with many mines shut down completely. In Pomeroy Bend district the conditions are not much better, but the domestic fields are probably the worst sufferers as there is practically no demand for the domestic sizes. In Eastern Ohio the production is estimated at 45% of normal.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50 @ 1.45	.....	$1.50 @ 1.45	$1.50 @ 1.40
3-4 inch	1.35 @ 1.30	$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.25
Nut	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.80 @ 0.75	.....	0.85 @ 0.80	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	1.00 @ 0.95	0.75 @ 0.70	0.70 @ 0.65

CLEVELAND

Bargain prices quoted to move demurrage coal on track. The lake freights to Lake Michigan reduced to 30c. a net ton. The Lake Superior freight rate has been reëstablished at 30c. a net ton.

Short time in many Cleveland manufacturing industries, combined with weather that greatly reduced the demand for domestic coal, has put the local market at the lowest point in recent years. Mine-run seems to be the heaviest, having recently sold at slack prices. Some operators have coal that has accumulated four days demurrage and is likely to pay more before it can be moved.

Youghiogheny is being quoted at circular, but because of the low prices it is not coming into this market extensively. No. 8 coal has sold the last few days as follows: 1¼-in., $1.80@1.90; mine-run, $1.75@1.85; slack, $1.60@1.75. Middle district coals are bringing the same price as No. 8.

Retail dealers are so well stocked-up, they have shut off orders. The warm weather during the week ending Saturday had the effect on the retail consumers and domestic orders were postponed. At the low prices operators and jobbers have advised their customers to dock coal. There has been some docking so far and if the market shows an improvement considerable more storing will be done. The opinion is general that the suspension Apr. 1 will be more protracted than usual. As soon as the market shows a return to normal, buyers will lay in heavier supplies.

Lake Vessel Rates—The Milwaukee-Western Fuel Co., of Milwaukee, Wis., had quietly chartered vessel capacity to transport 1,300,000 tons of soft coal from Lake Erie ports to Milwaukee during the navigation season of 1914 at 30c. a net ton. Last year this company paid 35c. a ton, having come into the market after the bulk of the chartering was done. The C. Reiss Coal Co. contracted last year for shipment to Sheboygan, Wis., at 32½c. with a reduction to 30c. if the vessels were unloaded within 48 hr. after arrival at the port of destination. Chicago, Indiana Harbor, and Waukegan also paid 35c. As the Milwaukee-Western contracts are taken by several vessel owners, the general rate to Milwaukee and other Lake Michigan ports will be 30c. The contracts are for three years.

Following this announcement it became known that the Lehigh Valley Coal Co. had chartered vessel capacity to move between 500,000 and 600,000 tons of hard coal from Buffalo to Duluth-Superior, and to Milwaukee and other Lake Michigan ports at 30c. Simultaneously announcement was made that soft-coal contracts for close to 1,000,000 tons had been placed with vessel owners for Lake Superior delivery at 30c. Since then it has developed standing contracts, with a stipulation that the going rate shall be paid, have been approved on the 30c. rate. Altogether close to 5,000,000 tons of coal have been accepted by vessel owners for 1914 at the 30c. rate. The business is so well scattered and so large that it is not likely any changes will be made to the principal ports until fall when the late rush starts about Nov. 20.

With a gross lake movement of soft coal, including bunker coal, of 28 million tons in 1913, it is apparent that not more than 25% of the business for the coming season has been closed. In the hard-coal trade, which was 5 million tons last year, 90% of the lake freighting contracts are still to be drawn.

DETROIT, MICH.

Trade continues heavy in spite of severe storm. Orders n contracts restricted. Many cars on demurrage.

Bituminous—Although Detroit experienced one of the severest storms of the season, last week, it failed to relieve he pressure incident to the adverse conditions in the market. .s a result, there has not been much of an increase in the olume of business, and although mine prices seemed to be oderately well maintained, there are many reports of price utting. Steam business is considered slack all along the ine, and expiring contracts are being renewed at the same igures as last year.

Conditions in the domestic trade remain unchanged, large tocks still being the rule. Because of the adverse weather onditions, dealers have not been able to move the coal, and re naturally not disposed to do any further buying. Reorts state that there are approximately 500 cars of coal tanding under demurrage in the local yards, and the necesity for disposing of this is of course having an adverse ffect upon the situation. Generally speaking, the January rade is considered the worst for years. Even the requisiions on contracts have been materially reduced, which have roved the most discouraging feature of the situation.

The bituminous market is now quotable on the following asis:

	W. Va. Splint	Gas	Hocking	Cambridge	No. 8 Ohio	Pocahontas	Jackson Hill
Domestic lump.	$1.25	....	$1.30	....	....	$2.25	$2.20
Egg.....	1.25	....	1.30	....	....	2.25	2.30
Nut.....	1.10	....	1.00	....	....	....	....
Steam lump....	1.05	....	....	....	....	....	....
6-in. lump.....	1.10	$1.00	0.90	$0.90	$0.90	....	....
Mine-run.....	0.85	0.90	0.80	0.80	0.80	....	1.25
Slack.....	0.90	0.90	0.75	0 85	0.85	....	....

Anthracite—The warm weather has had a still further depressing effect upon hard coal also. As with bituminous, here is considerable anthracite on demurrage, and it is stated that much of this is being offered at 50c. off the circular.

HAMPTON ROADS

Local conditions show little improvement. Demand light with ample coal on hand, but no further price cutting. Heavy losses at sea.

Owing to the dull market the movement of coal in Hampton Roads has been light during the entire week, although the arrival of bunker steamers was fair during the early part. The government has loaded two colliers at Lamberts Point, one of them taking about 12,000 tons and the other 4000 tons. Practically all of the coal moving has been run-of-mine, demand being almost entirely for this grade. Prices are the same as for several weeks, and although there may be somewhat of an accumulation in the railroad yards, the prospects are that there will be no cutting in prices.

Figures are not yet obtainable showing the dumpings for January, but these will be below the December figures. As usual the largest dumping will be made by the Norfolk & Western Ry. from Lamberts Point. This road is now operating their new pier, and while everything is not working as smooth as it is should several large vessels have been taken care of there, and good time made in their loading.

Vessels loading coal for foreign ports have cleared for Genoa and Naples, Italy; Bermuda; Barbadoes; Campana, Argentine Republic; Cristobal; Dakar, West Africa; Kingston, Jamaica, and Cerea, Brazil. Of coal shipped from Hampton Roads ports during January approximately 20,000 tons have been lost at sea.

LOUISVILLE, KY.

Some colder weather failed to relieve the market. Trade heavily loaded with coal obtained at bargain prices. Operations much restricted.

Some wintery weather has revived hope in the trade that there may yet be a demand for fuel. Following several days on which the temperature went as high as 70°, the thermometer took a sudden drop and there was a mild blizzard. But there is little chance that even this marked change in the weather will have much effect at this late stage of the season.

Even were the cold snap to last for several weeks, the more conservative dealers have little hopes of much better business, because the market is heavily loaded with coal purchased at bargain prices, and only a continued heavy demand can make much impression upon these stocks. That such a demand will be had seems unlikely, as purchasing will probably be from hand to mouth for the rest of the season. Half-time operations is the rule, while some are forced to suspend entirely, especially those having no contracts; and even these last are receiving stop orders.

The absence of any demand for domestic coal makes it almost impossible to quote prices. There has been no market, the few sales at extremely low prices being too few to establish such quotations as the market. On the other hand, the steam market has shown some signs of strengthening, the necessarily low output of the prepared grades having resulted at last in a short supply of screenings. Eastern Kentucky of the better grades is selling at 75@85c., and growing stronger, while western Kentucky can be had as low as 60c.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Practically the same conditions prevail on steam and domestic coal. Furnace and foundry coke quiet and blacksmith coal normal. Fairly good tonnage of pig iron booked. Car supply sufficient for demand.

There is little new in the coal market this week, as no change either way has been noticed, either in the volume of business or prices. Domestic coal is quiet, and many companies are curtailing their output, hoping to stimulate the price. Steam coal, while not in quite as stagnant condition as lump, is quiet, some of the large contracts specifying the minimum shipments for the time being.

The output is slightly larger at the present time than the demand, which has a tendency to weaken the market. Sales of blacksmith coal are reported in a satisfactory volume, a slightly larger tonnage being negotiated than last week. A fairly large tonnage of pig iron was booked by the furnaces, with prices about the same. The car supply seems sufficient for the present needs.

ST. LOUIS

Increased country demand resulted in slightly improved conditions, but market still heavy. Coal selling below cost. Larger shipments to West and Northwest.

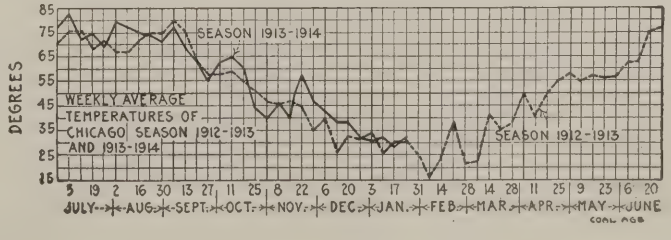
There is a slight improvement in local conditions, but the average observer would scarcely notice it. Generally speaking, however, conditions are about as they have been for several weeks past. There has been some little demand from the North and West for coal moving through the St. Louis gateway, but locally nothing of importance has happened.

The low point has been reached on Carterville coal, when lump and egg sold for about $1.05 and Franklin County for $1.20. In the Standard district lump went as low as 80c. and at the same time screenings were bringing 45c.; this coal runs 70% lump and 30% screenings, which means a net price for the mine-run coal of 69½c., and it is absolutely impossible to produce coal for anything like that. Yet there is a large tonnage of it under demurrage at East St. Louis continually. In high-grade coal 2-in. screenings are weak at about 55 to 65c., and the washed sizes have also dropped off.

Anthracite is still coming in and is a drug on the market; the same applies to coke and smokeless. At one time in the month of January there was something like 30 cars of smokeless at East St. Louis, with several dollars demurrage on each car.

The market continues unchanged as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump.....	.....	.....	.....	$0.90@1.00
3-in. lump.....	.....	.....	$1.40	.....
6-in. lump.....	$1.25 @ 1.50	$2.25	1.50	1.15@1.25
Lump and egg.....	1.85 @ 2.15	.....	.....	.....
No. 1 nut.....	1.15 @ 1.40	.....	.....	.....
Screenings.....	0.75 @ 0.80	.....	.....	.....
Mine-run.....	1.10 @ 1.20	.....	.....	.....
No. 1 washed nut.....	1.60 @ 1.75	2.25	1.60	.....
No. 2 washed nut.....	1.25 @ 1.35	.....	1.25	.....
No. 3 washed nut.....	1.15	.....	.....	.....
No. 4 washed nut.....	1.05	.....	.....	.....
No. 5 washed nut.....	0.50	.....	.....	.....



KANSAS CITY, MO.

More favorable weather has stimulated the demand and mines working good. Market is not steady, as a rule, and outlook is indeterminant and not encouraging.

The weather has been more favorable than at any time during the winter, though even yet it has failed to provide a consecutive stretch of low temperatures. In fact, the winter of 1913-14 will establish a precedent in the way of mild weather in the Southwest unless a marked change is seen in the near future. However, the operators of Kansas and Missouri have been quick to take advantage of the temporary stimulant, and are in most cases working from 70 to 80% capacity. Some others which hold railroad contracts of importance are running full time, although not producing as much coal as could be sold with more favorable weather conditions.

Demand for nut has been unusually strong recently. Lump, on the contrary, is moving slowly, and not at all in proportion to nut. Screenings, contrary to expectations, have been plentiful, the expected shortage failing to appear. The market has been steady. No change is likely in the face of the present weather, the situation not being one that can be helped by price concessions, according to operators.

OGDEN, UTAH

January was a weak month and market conditions have not improved. With exception of a few localities warm weather is prevailing throughout the territory. Surplus of nut and slack coal at the mines. Colorado mines working.

During January the operators in Wyoming and Utah were compelled to put the mines on a summer basis and large reductions in the force were made, some of the mines being shut down entirely. This condition was caused by a sluggish market, which could not be made active, although a few localities were visited by colder weather. All dealers have been carrying some stock and took advantage of the lower temperature to dispose of the surplus and consequently were receiving no shipments from the mines.

No doubt the market will not improve until all dealers have "cleaned up," at which time shipments will be resumed as the trade demands, which means on a summer basis.

Owing to small demand for lump coal, nut has been a drug on the market and most of the mines are carrying a surplus; slack coal is being unloaded with practically no demand.

Reports from Colorado show that the mines are working sufficiently to take care of the market and are having some idle days on account of the diminished demand.

Quotations remain unchanged:

	California	Nebraska	General
Lump	$3.00@3.50	$3.00	$2.75
Nut	2.50@3.00	2.00	2.25
Mine-run	1.85	1.85	1.85
Slack	1.00	1.00	1.00

PORTLAND, ORE.

Mild weather throughout Northwest cause of light demand for coal for domestic purposes. Conditions in general way unchanged.

The Pacific Northwest is enjoying an unusually mild and open winter and consequently the demand for coal for domestic purposes has been lighter than the average. There has scarcely been any freezing temperatures so far this winter in this district, and as the period for the coldest weather is past, the probability of having any is not very strong at this time. As a result, prices have not fluctuated here this winter, and there is little chance that they will advance. Keen interest is taken here in the passage of the Alaska railroad bill, as it is believed this will mean rapid development there, including coal.

PRODUCTION AND TRANSPORTATION STATISTICS

BALTIMORE & OHIO

The following is a comparative statement of the coal and coke movement over this road for December and the years ;1912 and 1913:

	December		Year	
	1913	1912	1913	1912
Coal	3,005,914	2,648,429	35,097,656	31,788,598
Coke	269,998	416,296	4,620,798	4,734,418
Total	3,275,912	3,064,725	39,718,454	36,523,016

COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during November and the first eleven months of 1913 in comparison with 1912, in short tons:

	November		Eleven Months	
Anthracite	1912	1913	1912	1913
Baltimore & Ohio[1]	166,263	171,714	1,433,485	1,398,652
Chesapeake & Ohio[1]	1,198	1,225	21,909	15,864
Erie[3]	654,757	732,726	6,857,482	8,016,552
Pennsylvania[1 3]	916,914	987,487	9,275,631	9,699,210
Virginia[2 1]	83	50	180	959
Total 5 roads	1,739,215	1,893,202	17,588,687	19,131,237
Bituminous				
Baltimore & Ohio[1]	2,899,414	3,080,093	31,331,345	33,732,240
Buffalo, Roch. & P.[1 2]	742,292	869,023	7,569,563	8,907,011
Buffalo & Susq.[1 2]	145,075	138,315	1,391,497	1,645,656
Chesapeake & Ohio[1]	1,264,490	1,528,761	15,745,385	15,716,868
Erie[3]	37,973	20,437	258,043	340,201
Hunt. & Br'd T. Mt[1 2]	114,672	107,016	1,126,409	1,242,310
New York Central	814,076	755,397	7,481,979	8,414,117
Norfolk & Western[1 2]	1,896,817	2,026,798	20,945,681	22,056,646
Pennsylvania[1 3]	3,934,876	4,509,375	42,162,485	47,171,538
Pitts. & Lake Erie[1 2]	968,615	$,$0$,622	10,496,591	11,914,029
Pitts. Shaw. & North[1 2]	196,266	227,820	1,815,537	2,535,163
Virginia[1 2]	316,504	421,971	3,266,604	4,190,394
Western Maryland	247,258	218,876	2,569,878	2,678,290
Total 13 roads	13,578,328	15,005,504	146,160,997	160,544,461
Coke				
Baltimore & Ohio[1]	435,001	343,387	4,367,525	4,011,242
Buffalo, Roch. & P[1 2]	54,755	27,509	496,975	472,671
Buffalo & Susq.[1 2]	27,534	22,621	255,198	278,124
Chesapeake & Ohio[1]	24,216	28,535	237,303	328,456
New York Central	7,648	.....	80,585	36,207
Norfolk & Western[1 2]	136,912	117,807	1,334,855	1,413,079
Pennsylvania[1 3]	1,245,500	999,500	12,128,463	13,011,863
Pitts. & Lake Erie[1 2]	559,858	488,674	5,731,593	6,239,226
Pitts. Shaw & North[1 2]	.....	.....	5,155	9,383
Western Maryland	6,800	4,430	64,424	68,545
Total 10 roads	2,498,224	2,032,463	24,702,076	25,868,796
Coal and Coke, 13 Roads				
January			16,421,839	18,936,646
February			17,787,331	17,546,496
March			19,483,025	17,631,345
April			13,429,367	16,850,696
May			15,635,568	18,986,796
June			16,702,153	18,580,363
July			16,635,448	18,704,710
August			18,396,247	19,718,856
September			17,432,358	19,046,247
October			18,712,657	20,611,176
November			17,815,767	18,931,169
December			17,929,632	.....
Total, 12 months			206,381,392	

[1] Includes coal from connecting lines.
[2] Includes company's coal.
[3] Does not include company's coal hauled free.

Note.—The Southern Railway hauled 362,439 short tons of coal during October, 1913, and 3,495,721 short tons during the 10 months ending Oct.

FOREIGN MARKETS

GREAT BRITAIN

Jan. 23—There is a little more inquiry for admiralty large coals. Collieries who are well placed as regards tonnage, are holding for higher prices, but others in need of vessels, are accepting easier terms. Quotations are approximately as follows:

Best Welsh steam	$4.50	Best Monmouthshires	$4.17
Best seconds	4.38	Seconds	4.05
Seconds	4.26	Best Cardiff smalls	2.67
Best dry coals	4.38	Seconds	2.52

COAL SECURITIES

William J. Hoey reports the market on various coal securities for the week ending Jan. 31, as follows:

Stock	Bid	Asked	Stock	Bid	Asked
American Coal	80	100	Jef. & Cle'fd. C. & I. Pfd.	70	80
American Coal Products	83	84	Kentucky Block Cannel	40	60
Amer. Coal Prod. Pfd.	104	106	Lehigh Valley Coal Sales	192	200
Big Muddy Coal & Iron	75	100	Leh. & Wilkes-Bar. C. Co.	310	360
Burns Bros.	50	53	Mahoning Coal R. R.	700	750
Burns Bros. Pfd.	94	99	Mahoning Investment	64	70
By-Products Coke	112	120	Maryland Coal of Md	3	6
Central Coal & Coke	80	86	Maryland Coal of W. Va.	7	9
Central Coal & Coke Pfd.	78	86	Maryland Coal of W. Va.		
Chicago Lumber & Coal	45	55	(5% Bonds)	54	62
Chicago Wil. & Ver. Coal	25	32	Midland Coal	80	90
Colo. Fuel & Iron Pfd.	130	140	N. Y. S. & W. C. Pfd.	15	30
Cumberland Corporation	10	14	Pocahontas Con. Collieries	92	101
Cumberland Corp. Pfd.	39	44	Pocahontas Con. Coll. Pfd.	98	105
Del. Lack. & West. Coal	260	270	Texas & Pacific Coal	97	101
Elkhorn Fuel	4	10	Unite Coal of Pittsburgh	3	10
Elkhorn Fuel Pfd.	55	70	Victoria Coal & Coke Pfd.	40	80
Hocking Valley Products	1	4			

DIVIDENDS

Lehigh Coal & Navigation Co.—Regular quarterly dividend of 2%, payable Feb. 28, to holders of record, Jan. 31.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 7
Issued Every Saturday
Hill Publishing Company

NEW YORK, FEBRUARY 14, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

An American Made Lamp
for American Mines

KOEHLER
Safety Lamp

The First American
Type with the

Approval of the Bureau of Mines



"Koehlers for Coalers"

A SAFER, Surer, Stronger, Longer Light.
Less parts, price and up-keep. Interchangeable with other Standard Lamps. Tested and adopted by leading mines.

Write us today—for circulars, price lists, etc.

Koehler Mfg. Co., Marlboro, Mass.



The First BARSTEEL Electric Mine Locomotive in the West

The illustration shows the first Baldwin-Westinghouse Barsteel Mine Locomotive in actual service in the West. After it had been given a thorough test at the mines the owner made the statement that he had been in the mining business for many years and had purchased all kinds of locomotives, but that this *Barsteel* type was the first one which entirely met his requirements.

The *Barsteel* frame on this 15-ton locomotive is exceptionally massive. It was made heavier in proportion than some of the lighter locomotives in order to bring it up to the desired weight, but the advantages of excellent ventilation for the motors, ease of inspection and accessibility of interior parts, were not sacrificed.

On this particular locomotive great strength is obtained at the journal boxes. Note how one of the massive bars passes between the bottom of the spring and the top of the journal box.

Full information about Baldwin-Westinghouse *Barsteel* Electric Mine Locomotives can be obtained by writing either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 FEBRUARY 14, 1914 NUMBER 7

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 273
The Surprise. Poem by Berton Braley.

*THE STRIPPING OF ANTHRACITE: *Pages* 274-275
A large area of the anthracite region of Pennsylvania may be successfully worked by stripping with modern steam shovels. The maximum amount of overburden which may be handled per ton of coal is about 4 cu.yd. Full revolving machines of small size may often be advantageously used for loading the coal into mine cars. E. C. Lewis. COAL AGE, Vol. 5.

*A DRAWN-OUT MINING SWITCH PILLAR: *Pages* 276-277
A switch especially designed for use underground. It is built in units of various capacities, and any number of sections may be joined together, forming a continuous board. COAL AGE, Vol. 5.

ACCIDENT INCREASE IN BITUMINOUS MINES OF PENNSYLVANIA: *Pages* 277-278

A NEW ANTHRACITE MINE INSPECTORS' BOARD: *Page* 278

DECREASE IN FATALITIES IN WEST VIRGINIA: *Pages* 278-279

*THE KOEHLER SAFETY LAMP: *Page* 279

THE VANCOUVER ISLAND STRIKE ANOMALY: *Pages* 280-281
Brief early history of alleged causes leading to a strike. Method used to force nonunion men into the union. Recognition of the union the real object of forcing the strike upon the men. COAL AGE, Vol. 5.

HOW AN EXPLOSION IS MODIFIED BY OBSTRUCTIONS: *Pages* 282-284
An explosion is created in a gallery which is obstructed more rapidly than in one which is clear, but we must not assume that the presence of these obstructions makes any difference in the ultimate force of an explosion. In a short gallery the effect of an inflammation of coal dust does not have time to reach its maximum, unless constrictions are provided to create favoring conditions. COAL AGE, Vol. 5.

THE PRICE WAR IN THE MARKETS OF THE PACIFIC: *Pages* 284-285
The Panama Canal does not furnish the shortest route from Europe to Asia and Australia, but may supply the most economical, in view of the relative cheapness of good coal along the way. Coal is carried for less than cost by ship owners who are seeking ballast for their empty bottoms. W. A. MacCorkle. COAL AGE, Vol. 5.

STUDY COURSE IN COAL MINING: *Page* 298

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 300

COAL AND COKE NEWS: *Pages* 301-304

DISCUSSION ON MIXED LIGHTS IN MINING: *Pages* 286-290
The meaning of the expression "mixed lights" explained. An illustration showing the danger of such practice in respect to a possible fall of roof in the gaseous section of the mine. Danger due to careless neglect of rules and regulations—an incident. Igniting the gas for sport, a fool trick. Practice in the Pennsylvania anthracite mines. Illinois conditions and practice. Rule adopted in the T. C. I. & R.R. mines in Alabama. Practice in New Mexico mines. COAL AGE, Vol. 5.

*A DRAWING-PAPER SUPPORT: *Page* 290

ENGINEERS SOCIETY OF NORTHEASTERN PENNSYLVANIA: *Pages* 290-291

THE ANSWER: *Page* 291
Poem by Robt. Lang.

MINE EXPLOSION SAID TO HAVE BEEN CAUSED BY ACETYLENE GAS: *Page* 291

THE CLOSE OF THE INDIANAPOLIS CONVENTION: *Page* 292
The scale committee urged a 5c. increase in miners' wages, and a 10 per cent. increase for day labor, inside and outside, and for dead work. Despite the attempts of the radical element to call for a 10c. increase, the decision of the convention was in favor of demanding only a 5c. raise in the pay of the miners. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 293-294
Should Strikes Occur?—Our Mercantile Marine—Our Foreign Trade.

A MINING TOWN IN WEST VIRGINIA: *Page* 295

RECENT LEGAL DECISIONS: *Page* 295

MINING ENGINEERS ORGANIZE ANTHRACITE SECTION: *Page* 295

DISCUSSION BY READERS: *Pages* 296-298
How to Buy Coal. Letter No. 2—The Mine-Run Problem. Letter No. 1—The Certificate Law. Letters Nos. 18, 19 and 20.

INQUIRIES OF GENERAL INTEREST: *Page* 299
*Flow of Water in a Vertical Pipe—Study Question: Timbering.

COAL TRADE REVIEWS: *Pages* 305-310

INDEX OF COAL LITERATURE: *Pages* 311-312

ADVERTISING INDEX: *Page* 20

CIRCULATION OF THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers

You Get Better Machinery—

Because the Manufacturer Advertises

The Weekly Ad-Talk Page

When a manufacturer advertises he has to come squarely out into the open and tell the public what he has.

If he does not, his advertising will not be a success.

Get out into the lime-light, yourself, and see what happens—you will begin to spruce up at once. You can't help it; it is just human nature.

Likewise the machine put into the lime-light. The manufacturer is bound to make it a better machine because he has put it into the open.

He can't advertise it successfully unless it has real merit and possesses real talking points. He cultivates the habit of selling by plain, open and above board methods. And the more he cultivates the habit, the better he makes his machine.

Then there's the competition of it. One manufacturer starts something—and tells all about it in his advertising. (And he is a wise man to do it, too. For if he tries to keep it "dark," his competitors will know all about it before it's on the market; but the buyers will know nothing of it.)

The other manufacturers refuse to give the entire market to the fellow with the improvements, so they come back with a machine to compete.

Who gets the benefit? Everybody—but *principally* you who read the ads!



We Originate the Good Features—Others Follow

In Jeffrey *ARMORPLATE* Locomotives

you will find all the *Distinctive* Features in Design and Construction.

Points of Service:

Safety First
Reliability
Accessibility
Maximum Capacity
Minimum Upkeep

Construction Points:

Armorplate Frame.

Allows the greatest per cent. of weight to be used for motor equipment for a given weight of locomotive.
Gives absolute protection to motorman and equipment.
Surface of frame is plain and smooth.
Cost of upkeep is a minimum.

Large Capacity Ball Bearing Motors.

Of ample power to slip the wheels continuously without overload to any part.

Eliminate bearing wear on armatures (the most troublesome and expensive factor in locomotive maintenance.)

Complete details in our Interesting Mine Locomotive Bulletin No. 117. Better write for a copy.

The Jeffrey Mfg. Co., Columbus, Ohio

New York Boston | Philadelphia Pittsburgh | Cleveland Charleston, W. Va. | Chicago Birmingham | Denver Montreal | 2-14-14



WHY COAL MINING COMPANIES USE THE SMITH HAND BATCH MIXER

Economy Because it mixes perfect concrete quickly and economically. With a Smith Hand Mixer you can cut the cost of shovel-mixed concrete in half and secure an A-1 mix which will pass the most rigid inspection.

Portability Because it is a light, compact *batch* mixer. Weighs only 1000 lbs. It can be used either above ground or run into the mine cage and lowered down into the mine itself. Concrete repairs in the different workings should be made permanent with a Smith Hand Mixer.

Capacity Because of its large capacity. Three slow easy turns of the drum mixes a batch of $2\frac{1}{2}$ to 3 cu. ft. of concrete. Four men and a Smith Hand Mixer will easily turn out 30 to 35 cu. yds. of concrete per day.

Coupon Because they secured our special Smith Hand Mixer Booklet No. 20-R, and proved to their own satisfaction that this machine would prove a profitable investment. Will gladly refer you to a number of Coal Mines where the Smith Hand Mixer is being used. FILL OUT COUPON and get a copy of our BOOKLET No. 20-R.

MAILING COUPON

I am the man who wants a Smith Hand Mixer Booklet No. 20-R.

Name.....

Address.....

....



THE T. L. SMITH COMPANY

1147 32nd Street
Milwaukee,
Wis.

COAL AGE

Vol. 5 NEW YORK, FEBRUARY 14, 1914 No. 7

The Surprise

By Berton Braley

Written expressly for Coal Age

"That pit-boss gets my goat for fair,
I hate his face an' his auburn hair
An' the way he looks an' the way he walks
An' the kind of bunk that he always talks;
If he slips me much of his funny gab
I'll poke him quick with an awful jab!"

The miner paused in his talk a bit,
While his pipe he filled and packed and lit,
"There's some," he said, "that's workin' here
Who holds the boss in deadly fear,
An 'Yessir' an' 'Nossir' is all they say
When his nibs comes flockin' around their way:
But say—if he ever gets fresh with ME
I'll show him the kind of a guy I be,
He can't get flossy with me, that's flat,
I'll show him the place to head in at,
For I knows my work an' I does it good,
As good as a pit-boss ever could,
An' if one of them guys gives me a call
I reads him the riot act, that's all,"

"Hey you!" said the Boss as he came along,
"You're drillin' them holes of yours all wrong,
You're a blankety fool of a blankety blank
With nuthin' but mud in your thinkin' tank!
If you had the sense of a ring-tailed ape
You'd have that job in decent shape
But—"a hairy fist with a vicious clout
Came hurtling over and put him out,
And the miner said, with a pleasant smile,
"You get me, Stephen?—well, that's my style,
You can't get funny with me, because
I'm just as tough as I said I was!
I handed his to that loud-voiced slob,
An' now it's me for another job!"

That's not the way you thought 'twould end?
I'm sorry, but truth is truth, my friend!

The Stripping of Anthracite

By E. G. Lewis*

SYNOPSIS—A large area of the anthracite region of Pennsylvania may be successfully worked by stripping with modern steam shovels. The maximum amount of overburden which may be handled per ton of coal is about 4 cu.yd. Full revolving machines of small size may often be advantageously used for loading the coal into mine cars.

Although most of the coal from the anthracite region has been in the past, and doubtless will be in the future, secured by underground working, there are certain places where, by the use of suitable machinery, open strip pit mining may be carried on to advantage. The introduction of the modern steam shovel into this class of work has made it possible to strip from 40 ft. to 200 ft. of overburden in order to uncover from 4 ft. to 30 ft. of coal, the maximum ratio being about 4 cu.yd. of stripping to 1 ton of coal.

By no means all of the anthracite district is within the limit of stripping possibilities, the coal in most places being too far below the surface. This is true of the district in and around Wilkes-Barre and Scranton and north of Carbondale. However, the region included in the area from Hazleton west to Shenandoah, Mahanoy City, Centralia and Mount Carmel, southeast to Pottsville, Tamaqua and Lansford, and north to Drifton and Jeddo, is largely a stripping proposition.

At the present time, most of the stripping is done on contract for the coal companies. Among the larger stripping operations are those of N. J. Cuyle & Son, of Hazleton, who strip for the Lehigh Valley Coal Co., the Central Penn Quarry & Stripping Co., of Harleigh, Penn., employed by G. B. Markle, and the A. E. Dick Construction Co., of Mount Carmel, stripping for the Philadelphia & Reading Coal & Iron Co.

A Typical Stripping Operation

A description of the last named job may be of interest, since it is typical of all the others. The coal lies in a saucer-shaped basin, as indicated by the accompanying drawing. The shovel is started in on about a 10-ft. cut which allows of loading into dump cars on a track laid along the original surface of the ground. This cut is taken all the way through the work, which, in the above case, is a distance of about two miles. The second through cut is taken at a depth of about 20 ft., the loading track being shifted to the bottom of the first lift taken out.



Fig. 1. A Strip Pit near Mt. Carmel

It should be here added by way of explanation that it is only possible to take a cut of about 10 ft. and load into the standard dump car stationed on the bank alongside. On the second through cut, however, as may be seen in the sketch, loading is being done upon the same level as the shovel track and the depth of the cut is limited only by the depth at which it is possible to drill and shoot advantageously.

The second cut is carried all the way across the work, which, in this case, is about 1000 ft. This level is maintained for reasons of getting good drainage and securing a low grade for the track to the dump. It is usually possible to get to the dump from the first cut on a grade of about one-half per cent. This increases as the shovel works down deeper, the maximum sometimes being 10 and 12 per cent., in which case an incline and engine are used to haul the whole train, including locomotive, to the dumping ground.

The standard equipment on the above stripping job includes a 70-C Bucyrus shovel weighing about 85 tons

*50 Church St., New York City.



FIG. 2. A SMALL FULL-REVOLVING SHOVEL LOADING COAL



FIG. 4. A SMALL SHOVEL MOUNTED ON WIDE-TIRED WHEELS

and provided with a dipper of 2½ cu.yd. capacity. This is mounted on railroad trucks and is self-propelling, which allows the machine to move ahead as rapidly as the material is taken out. Shovels of this type handle from 20,000 to 35,000 cu.yd. per month. The dirt train equipment is made up of 4-cu.yd. Western dump cars hauled by an 18-ton Vulcan locomotive. From 6 to 12 cars make up a train until the steep grades are encountered, when it is found necessary to diminish the number of cars in a trip considerably.

The accompanying photograph, Fig. 1, shows a portion of the A. E. Dick contract at Mt. Carmel, as described above. This picture gives a good idea of the work and its magnitude, as well as the method of procedure. The

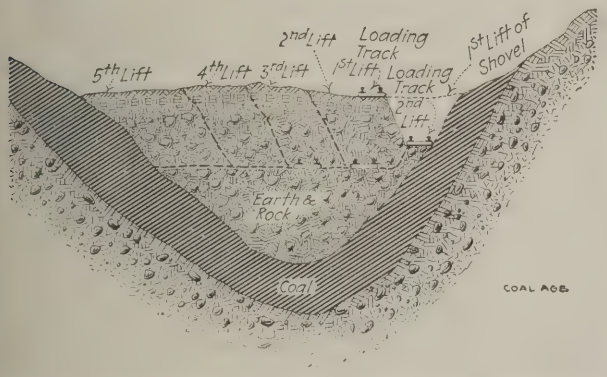


FIG. 3. CROSS-SECTION OF A STRIPPING OPERATION

shovel can be seen taking its third cut on the second lift, shown in the line drawing, Fig. 3, as lift No. 4.

SMALL SHOVELS LOAD COAL

The small revolving steam shovel has also been successfully introduced into the coal regions for the purpose of loading the stripped coal, working in culm and slate banks, ditching, etc. In coal loading, these machines have been found to decrease the cost about one-half. They also give a much better product, inasmuch as it is not necessary to break the coal up to sizes which a man can lift, as is the case in hand loading. Furthermore, it is possible to top off the cars, thereby adding about 20 per cent. to their capacity.

These shovels are full revolving and mounted on railroad trucks, of the same gage as the mine tracks. This makes it possible to shift the machine from one part of the work to another at little cost, it being self-propelling. Shovels of this type weigh about 25 tons, and carry ⅞-cu.yd. dippers.

One of the interesting operations wherein this type of machine is employed is that of the Lehigh & Wilkes-Barre Coal Co., at Green Mountain. This is shown in Fig. 2. Here the coal-loading track is maintained alongside of the shovel, while a third track is laid up to the rear of the machine, upon which an empty car is kept. Into this is loaded any rock or slate encountered during the work, thus preventing its going to the breaker or necessitating the process of picking from the car by hand. The shovel runner soon becomes quite expert in

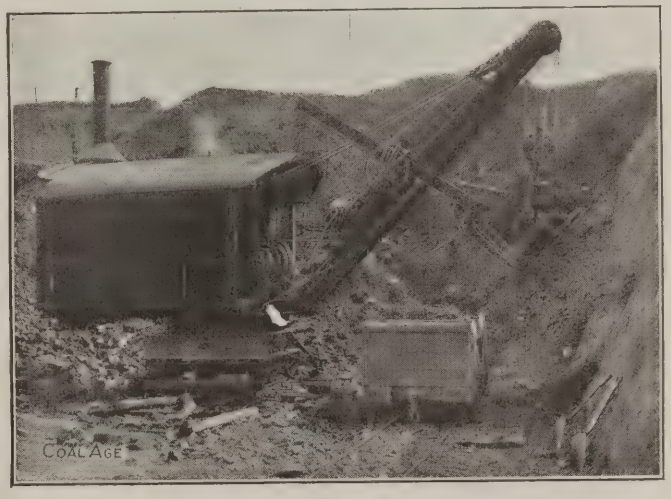


FIG. 5. A SMALL SHOVEL AT WORK NEAR HAZLEBROOK

the matter of segregating the slate from the coal.

In this work some extremely good records have been made. One report of a 9-hr. day shows that 96 cars of coal and 45 cars of slate were handled. These cars held 102 cu.ft. each, making a total for the nine hours of about 423 tons of 2240 lb.

Anthracite Production in Seventeenth Pennsylvania District

The total output of hard coal in the seventeenth district of Pennsylvania for 1913 amounted to 4,324,561 tons. The total number of men employed was 8540. The greater part of this coal was produced by the Lehigh Coal & Navigation Co., operating mines in Carbon and Schuylkill counties. The average number of days worked was 263. Of the total production, 521,495 tons was used at collieries and 132,060 tons sold to local trade.

A Draw-Out Mining Switch Pillar

Special Correspondence

SYNOPSIS—A switch especially designed for use underground. It is built in units of various capacities and any number of sections may be joined together, forming a continuous board.

One of the most frequent causes of accident from electrical apparatus in mines is due to the improper handling of switch gear, in spite of good design. With the class of electrical installation which is usual in collieries, it is by no means an easy matter to be sure that a cable is thoroughly and effectually free from potential. It will be easily seen that where the supply voltage is fairly high, accidents may easily arise through workmen handling conductors under the impression that they are free from potential, when such is not the case.

Mining work necessarily involves certain special conditions, to meet which great care in design and construction is necessary. In order to meet the special circumstances surrounding underground operations, Messrs. Switchgear & Cowans, Ltd., of Manchester, England, have installed a new type of switch pillar in some important collieries. The chief principles upon which this switch gear is constructed will be noted from the photographic illustration of a single unit, shown in Fig. 1, a switchboard seen from the back, made up of several units, shown in Fig. 2, and a cross-sectional elevation of the typical arrangement illustrated in Fig. 3.

The switch itself is inclosed in a strong cast-iron case built up in three sections. The middle section supports the whole of the mechanism, and is the portion which travels on steel rollers carried in runways which support the switch and faciliate the movement either inward or outward. The upper section consists of two parts, and is made in two styles. In a simple case, for which no isolating switches are required, this top portion is in one piece, and forms a cover which is bolted to the middle section. In the case of a true mining switch, however, namely, one with isolating plugs interlocked, the upper section consists of two castings, one being a back plate containing the necessary switch plugs, and the other the cover, which is bolted both to the back plate and to the middle section.

The back plate also carries on the side remote from the cover a cast-iron trunk, which slides within a second trunk attached to the busbar chamber. The object of these two trunks, the one sliding within the other, is to protect the plugs during withdrawal. The lower section consists of a tank, which is of cast iron, strengthened by external ribs. The middle, top and lower sections are bolted together through wide machined flanges, fitting sufficiently tight to make them practically dustproof.

It has been found by experiment that the rise in pressure due to an explosion of gas within the cast-iron box is in the neighborhood of 60 to 80 lb. per square inch.

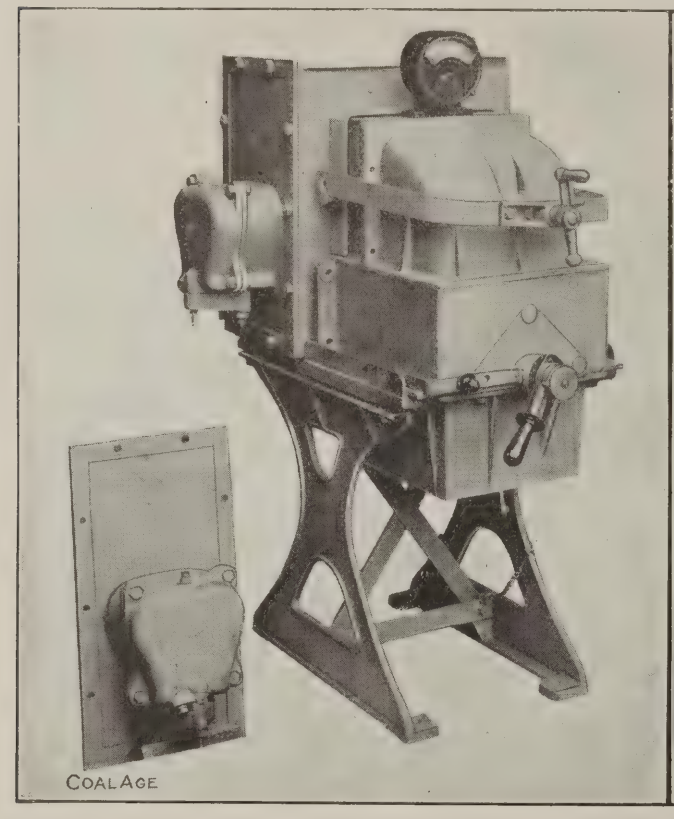


Fig. 1. Rear View of a Single Unit

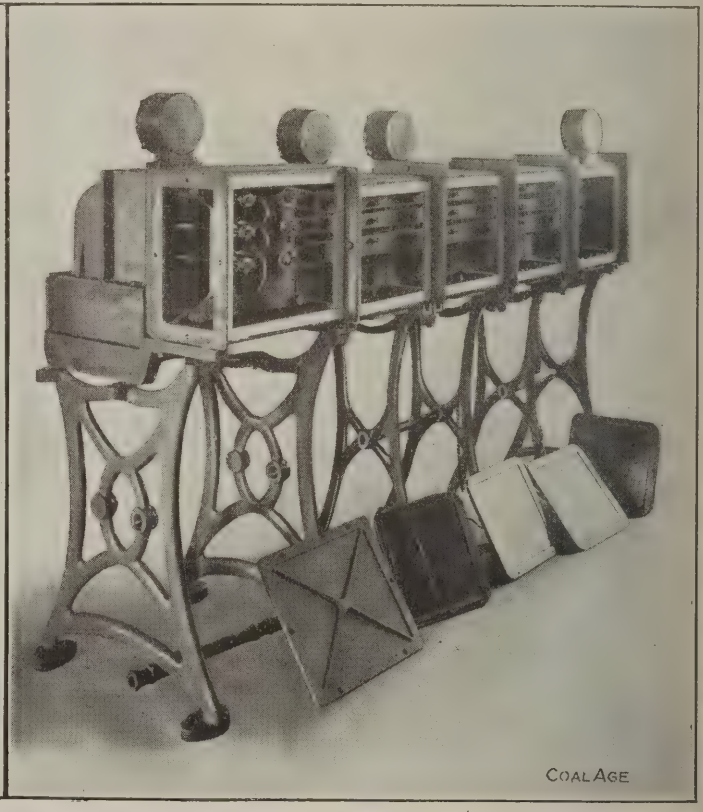


Fig. 2. Several Units Joined Together, Forming a Switchboard

The cases of these mining switches are therefore constructed to safely withstand a pressure of 160 lb. per square inch, giving a sufficient factor of safety.

The joints are, as stated above, machined. This does not mean that they are gastight, but it has again been determined by experiment that the gases from an explosion are sufficiently cooled in passing between flanges of considerable width to prevent the possibility of their firing other gases outside the case. The principle adopted, therefore, is that gases may accumulate within the case, and may be exploded without igniting explosive gases existing in the neighborhood of the switch.

The voltages in use in Great Britain are classified in two main ranges, one up to 500 volts, and the other up to 3000 volts, the lower being termed medium-pressure and the latter high-pressume transmission systems. Above 300 volts potential the manufacturers mentioned prefer to go to the cabinet type of drawout switch, which does not lie within the range of the present article.

Confining ourselves for the moment to the drawout pillars, as shown in the illustrations, the medium-pressure type is made in three sizes; namely, 100, 300, and 750 amperes capacity, while a smaller size for 70 amperes is now in process of standardization.

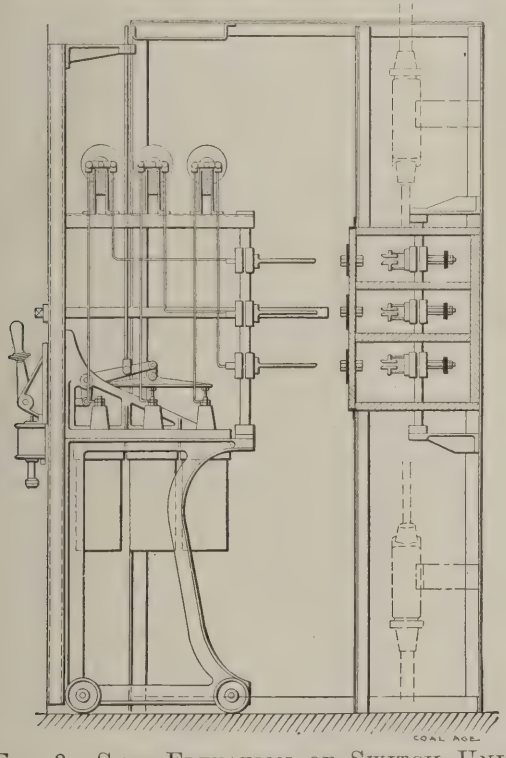


FIG. 3. SIDE ELEVATION OF SWITCH UNIT

Turning to the construction of the switch itself, each has three laminated bow-shaped brushes with an ample head of oil above them. These contacts are controlled by both overload and no-load trips. It is also impossible to forcibly hold the switch in when an overload is passing. An indicator is provided to show the position of the switch independent of the handle, and interlocks are furnished so that it is impossible to push the switch into its socket when closed, and equally impossible to withdraw it from the socket when it is in a similar position.

All the various sizes have been so designed that they bolt up to one another to form a switchboard. The busbars, as will be seen in Fig. 2, are contained in a rectangular case, running behind the plugging gear. Both inlets and outlets enter the busbar chamber direct, and hence any disconnecting has to be done when the switch is removed for inspection or repair.

It will be seen that the busbars are arranged at the top of the busbar trunk, the bottom half being therefore available for connecting the cables and sockets direct. With a feeder switch, for example, the upper sockets are connected direct to the three busbars and the lower sockets to the three cables. With the switch plug a complete control is exercised both by hand and automatically.

Fig. 2 shows a number of units arranged in the form of a switchboard, the cast-iron legs being so proportioned as to allow of uniform grouping irrespective of the size of individual units of which the group is composed. In such a board a spare busbar section may at any time be included for the purpose of mounting instruments, such as a synchronizer, voltmeters, power-factor indicators, wattmeters, and similar instruments. The best location for a section of this kind is usually about the middle of the assembled board.

A large number of these switches have been installed in the South Wales coal field, where the conditions of operation are severe. Other localities in England and Scotland have also utilized this switch. It, therefore, forms a useful example of the way in which some of the difficulties attendant upon the electrical operation of collieries have been overcome.

Accident Increase in Bituminous Mines of Pennsylvania

The following letter has been sent to all the bituminous mine inspectors in the State of Pennsylvania by the chief of the department of mines:

I beg to submit to you and to all the other inspectors comparative statistics of accidents in the bituminous mines for the years 1912 and 1913. The results in many of the districts are disappointing. The number of inspectors having been increased and the number of mines allotted to several of them having thereby been considerably decreased, it was reasonable to look for a better record for 1913, but instead of that, there has been a large increase in fatalities.

I shall expect an explanation as to the cause for the great increase in accidents from falls, cars and electricity. Some districts show a creditable record, but it is not necessary to name either those whose records are bad or good; the statistics herewith will show each inspector where he stands.

Serious disasters such as the explosion at the Cincinnati mine will occur occasionally, but why the accidents from falls should increase from 249 in 1912 to 313 in 1913, a difference of 25 per cent., and the accidents from electricity from 18 to 23, a difference of 27 per cent., is hard to understand.

I desire in this connection to impress upon you the necessity of keeping constantly on the alert to see that all the mine officials as well as the mine workers observe the provisions of the law relating to safety. Not only must dangers from gas and dust be avoided and guarded against, but the workers must be impressed more forcibly with the necessity for greater care in standing timber and in taking down the roof and coal and in riding on or being about the mine cars, and they must be particularly cautioned to avoid contact with electric wires or other mediums through which fatal shocks may be conveyed. If you can lessen accidents from these causes, much will be accomplished.

It is scarcely possible for many districts to make as good a showing as the 3d, 4th, 8th, 10th, 18th, 27th and 28th districts were fortunate enough to make during 1913, as these, owing to favorable conditions, always make good records; but in the other districts the inside accidents should be greatly reduced. The statement herewith shows that several of the acknowledged dangerous districts had but comparatively few accidents.

Kindly acknowledge receipt of this letter.

Very truly yours,

JAMES E. RODERICK,
Chief of Department of Mines.

ACCIDENTS, BY DISTRICTS, IN THE BITUMINOUS MINES OF PENNSYLVANIA, 1912 AND 1913

First District—A decrease of 50 per cent. in accidents by falls, 33 per cent. by cars and 50 per cent. by electricity.
1912—By falls, 14; by cars, 6; by electricity, 2.
1913—By falls, 7; by cars, 4; by electricity, 1.

Second District—An increase of 33 per cent. in accidents by falls and 25 per cent. by cars. No accidents by electricity.
1912—By falls, 22; by cars, 4; by electricity, 1.
1913—By falls, 28; by cars, 5; by electricity, 0.

Third District—A decrease of 14 per cent. in accidents by falls. No accidents by cars.
1912—By falls, 7; by cars, 3.
1913—By falls, 6; by cars, 0.

Fourth District—An increase of 300 per cent. in accidents by falls.
1912—By falls, 2; by cars, 2.
1913—By falls, 8; by cars, 2.

Fifth District—A decrease of 40 per cent. in accidents by falls and 60 per cent. by cars.
1912—By falls, 10; by cars, 5.
1913—By falls, 6; by cars, 2.

Sixth District—A decrease of 7 per cent. in accidents by falls and 80 per cent. by cars. Two accidents by electricity.
1912—By falls, 14; by cars, 7.
1913—By falls, 13; by cars, 1; by electricity, 2.

Seventh District—An increase of 16 per cent. in accidents by falls and 50 per cent. by electricity.
1912—By falls, 6; by cars, 6; by electricity, 2.
1913—By falls, 7; by cars, 6; by electricity, 3.

Eighth District—A decrease of 25 per cent. in accidents by falls.
1913—By falls, 3; by cars, 0.
1912—By falls, 4; by cars, 0.

Ninth District—A decrease of 10 per cent. in accidents by falls. An increase of 100 per cent. by cars. No accidents by electricity.
1912—By falls, 10; by cars, 3; by electricity, 1.
1913—By falls, 9; by cars, 6; by electricity, 0.

Tenth District—A decrease of 57 per cent. in accidents by falls and 50 per cent. by cars. One accident by electricity.
1912—By falls, 7; by cars, 2; by electricity, 0.
1913—By falls, 3; by cars, 1; by electricity, 1.

Eleventh District—An increase of 33 per cent. in accidents by falls and 150 per cent. by cars. No accidents by electricity.
1912—By falls, 9; by cars, 2; by electricity, 1.
1913—By falls, 12; by cars, 5; by electricity, 0.

Twelfth District—An increase of 44 per cent. in accidents by falls. Two accidents by cars.
1912—By falls, 9; by cars, 0; by electricity, 1.
1913—By falls, 13; by cars, 2; by electricity, 1.

Thirteenth District—An increase of 40 per cent. in accidents by falls. A decrease of 50 per cent. by cars. No accidents by electricity.
1912—By falls, 5; by cars, 6; by electicity, 2.
1913—By falls, 7; by cars, 3; by electricity, 0.

Fourteenth District—An increase of 66 per cent. in accidents by falls and 100 per cent. by cars. One accident by electricity.
1912—By falls, 6; by cars, 3; by electricity, 0.
1913—By falls, 10; by cars, 6; by electricity, 1.

Fifteenth District—An increase of 20 per cent. in accidents by falls and 50 per cent. by cars.
1912—By falls, 10; by cars, 4.
1913—By falls, 12; by cars, 6.

Sixteenth District—An increase of 90 per cent. in accidents by falls. A decrease of 33 per cent. by cars.
1912—By falls, 10; by cars, 12.
1913—By falls, 19; by cars, 8.

Seventeenth District—An increase of 70 per cent. in accidents by falls and 100 per cent. by cars.
1912—By falls, 7; by cars, 2.
1913—By falls, 12; by cars, 4.

Eighteenth District—A decrease of 25 per cent. in accidents by falls. Two accidents by electricity.
1912—By falls, 8; by cars, 0; by electricity, 0.
1913—By falls, 6; by cars, 0; by electricity, 2.

Nineteenth District—A decrease of 28 per cent. in accidents by falls. An increase of 100 per cent. by cars and two accidents by electricity.
1912—By falls, 21; by cars, 3; by electricity, 0.
1913—By falls, 15; by cars, 6; by electricity, 2.

Twentieth District—An increase of 80 per cent. in accidents by falls and 100 per cent. by cars.
1912—By falls, 10; by cars, 2.
1913—By falls, 18; by cars, 4.

Twenty-first District—An increase of 110 per cent. in accidents by falls and 50 per cent. by cars. A decrease of 66 per cent. by electricity.
1912—By falls, 9; by cars, 8; by electricity, 3.
1913—By falls, 19; by cars, 12; by electricity, 1.

Twenty-second District—An increase of 100 per cent. in accidents by falls and 100 per cent. by cars. No accidents by electricity.
1912—By falls, 5; by cars, 1; by electricity, 3.
1913—By falls, 10; by cars, 2; by electricity, 0.

Twenty-third District—An increase in accidents by falls of 14 per cent. A decrease of 44 per cent. by cars. One accident by electricity.
1912—By falls, 7; by cars, 9; by electricity, 0.
1913—By falls, 8; by cars, 5; by electricity, 1.

Twenty-fourth District—An increase of 23 per cent. in accidents by falls. A decrease of 33 per cent. by cars. Three accidents by electricity.
1912—By falls, 13; by cars, 6; by electricity, 0.
1913—By falls, 16; by cars, 4; by electricity, 3.

Twenty-fifth District—An increase of 40 per cent. in accidents by falls and 100 per cent. by electricity.
1912—By falls, 15; by cars, 4; by electricity, 1.
1913—By falls, 21; by cars, 4; by electricity, 2.

Twenty-sixth District—An increase of 44 per cent. in accidents by falls. A decrease of 66 per cent. by cars. An increase of 200 per cent. by electricity.
1912—By falls, 9; by cars, 6; by electricity, 1.
1913—By falls, 13; by cars, 2; by electricity, 3.

Twenty-seventh District—This is a new district. Seven lives were lost by falls and 1 by cars.

Twenty-eighth District—This is a new district. Five lives were lost by falls and 1 by cars.

A New Anthracite Mine Inspectors' Board

The appointment of a new board of mine inspectors' examiners by the court of Luzerne County is thought by mine workers to purpose the end of the alleged system of former boards. It was charged that they passed just enough men to fill the vacancies existing, in order to settle who should fill the positions without the necessity of an election. There have been various candidates for the office of Inspector of Mines in past examinations, but at each election it has developed that there were just the necessary number of eligibles to fill the ballot. The claim was made that this system showed favoritism, and so many complaints were made that the court appointed an entirely new board. This board is composed of George P. Gallagher, of West Pittston, assistant division superintendent for the Lehigh Valley Coal Co.; Charles S. Miles, of Wilkes-Barre, consulting engineer; Benjamin McEnany, of Exeter; Thomas J. Evans, of Nanticoke; and Patrick Dougherty, of Lansford, practical miners.

Decrease in Fatalities in West Virginia

The Department of Mines, of West Virginia, has completed its compilation of the fatality record for 1913. The record shows a decrease of about seven per cent. in spite of an increase of seven per cent. in the number of men employed. The total number of fatal accidents was 335 as against 359 in 1912, a decrease of 24. The miners employed now number 73,251 as against 68,248 in 1912, an increase of 5273.

The months of March and August lead in the death list with 34 each, while April, with 22, makes the best showing. The monthly record is:

FATALITIES BY MONTHS IN WEST VIRGINIA 1913

January	29	July	28
February	33	August	34
March	34	September	26
April	22	October	25
May	28	November	26
June	24	December	26

It is interesting to note that 109 of the 335 fatalities, or almost one-third, were due to the carelessness of the

victims, themselves, and should have been avoided. If they had not occurred, the fatality count would have been 226, the lowest since 1905, when it was 212.

A recapitulation of the fatalities, when classified as to causes, shows that 204 of the 335 were due to falls of roof and coal; 87 were the result of transportation mishaps; only 8 were caused by explosions, this number being a new record for the state; 8 were due to machinery; 16 to electrocutions, and 12 had miscellaneous causes, such as falling down shafts, kicks by mules and the like.

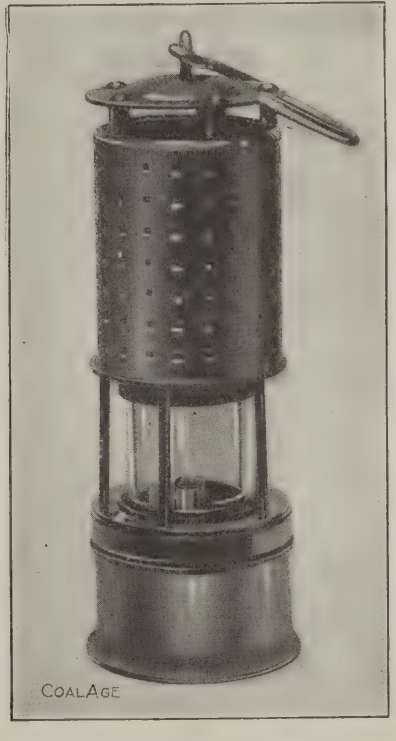
The death rate for each thousand men, employed in 1913, was 4.55, a decrease of 0.61 from 1912, when it was 5.26. This is the best rate since 1905. The rate from 1905 to 1913, inclusive, follows:

MINING DEATH RATE IN WEST VIRGINIA, 1905-1913

1905	4.38	1910	4.79
1906	5.44	1911	5.24
1907	12.43	1912	5.26
1908	5.43	1913	4.55
1909	6.06		

The Koehler Safety Lamp

This lamp is designed after the pattern of the well known Wolf lamp, the patents of which have expired. The design of the lamp is a general improvement on the former type. It is claimed that nothing short of deliberate carelessness on the part of the lampman or the user of the lamp can make the same unsafe.

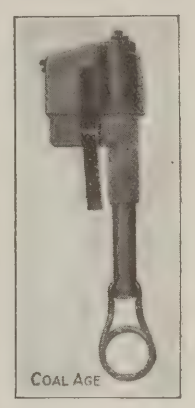


THE KOEHLER NAPHTHA SAFETY LAMP

One of its chief features is the simplicity of its construction, embodying also the features of strength durability and security. The lamp consists of but 12 parts, counting all the separate pieces of the lamp, chimney and igniter. These parts are well fitted together, and the general workmanship of the lamp is as nearly perfect as it is possible to make it.

The lamp is designed to burn naphtha, which is absorbed and held in the cotton, within the oil vessel of the lamp. The oil vessel is of compressed steel, with a brass top, securely brazed thereto. The chimney consists of a 2¼x2¼-in. Macbeth glass, surmounted by a double-gauze chimney, provided with a steel spring washer to hold the gauzes tight against the glass. In the upper portion of the chimney, the gauzes are further protected by a pressed-steel bonnet, which is secured to the lamp ring below the glass by five brass standards. The lamp vessel is secured in the lamp ring by a screw-plug lock or an electric magnetic lock, as desired. Also, when desired, the steel bonnet of the lamp is omitted. The lamp complete weighs 2 lb. 15 oz. to 3 lb. 4 oz., according to its fittings. The height of the lamp is 10 in.

The Koehler lamp is manufactured by the Koehler Manufacturing Co., Marlboro, Mass., at a price less than that previously paid for lamps of a similar type. The lamp has already been adopted by 48 companies and is designed for use as a lamp for general mine work, as well as a lamp for testing for gas. There are different models or styles adapted to these different uses. Model No. 7, with a 3¼-in. glass, has a height of 12 in., and is adapted for use in ship holds, coal bunkers, oil refineries, and as a lamp for night watchmen in factories and mills. The "pyro" igniter, used in this lamp is one of the best designs. The cartridge is easily replaceable and throws a spark horizontally that never fails to ignite the wick. The lamp gives a steady light of 1.6 cp. for 18 hr., which, it is claimed, is 70 per cent. greater than that of any other safety lamp of a similar type.



THE KOEHLER PYRO IGNITER

The Koehler Manufacturing Co. also supply electromagnets for opening the Koehler and the Wolf lamps, lamp-filling apparatus, lamp-cleaning machines and complete outfits for lamp cabins; and carry, besides, a large stock of safety-lamp glasses for all types of lamps.

Pennsylvania Mine Foremen's Examinations

At a conference of nine anthracite-mine inspectors, with superintendents and expert miners, 32 in all, representing the collieries and washeries in Schuylkill, Carbon, Dauphin, Northumberland and Columbia Counties, held at Pottsville, it was decided to hold the annual examination for elegibility as mine foreman and assistant mine foreman, at Pottsville, on April 3. It is expected that there will be about 200 applicants to take the examinations.

BY THE WAY

A mine mule don't kick accordin' to no rule.

It takes a heap of licks to drive a nail in the dark.

Nothing is so new as what has long been forgotten.

No man should think to cast a shadow like an elephant.

It frequently happens that one murder makes a villain, millions a hero.

You may be a hammer today, but perhaps tomorrow, you may be the anvil.

It is not easy to straighten in the oak the crook that grew in the sapling.

The Vancouver Island Strike Anomaly

Special Correspondence

SYNOPSIS—Brief early history of alleged causes leading to a strike. Method used to force nonunion men into the Union. Recognition of the Union, the real object of forcing the strike upon the men.

The United Mine Workers of America claim to have paid, to this date, over $700,000 in relief money to the striking miners on Vancouver Island. If this amount were multiplied by ten it would, approximately, represent the loss inflicted upon the island by the payment of this amount of relief money. The United Mine Workers may boast of having expended this sum of $700,000, but their boasting only means that the island community has probably suffered a loss of seven millions.

Early History of the Strike

The strike on Vancouver Island began at the mines of the Canadian collieries, Ltd., located at Cumberland and Extension, September, 1912. Six months later it was extended to the mines of the Western Fuel Co., at Nanaimo, and those of the Pacific Coast Coal Co., at South Wellington. So far as the United Mine Workers are concerned the strike at these places still continues. During the whole of these sixteen months payrolls have either been stopped or very considerably diminished, while general trade and all the manifold businesses connected with the coal industry have been seriously affected. In Nanaimo alone, for the eight months and a half the strike has continued, the Western Fuel Co. would have paid out in wages only, approximately, $1,500,000.

The only cause of all this trouble, financial loss and the crippling of the island's coal trade at a time when it was enjoying an era of unprecedent activity, is the attempt of the United Mine Workers of America to force itself upon the operators on the island. Other causes for the strike have been alleged by the Union bosses, but they are mere pretexts used to conceal from the men the real object of the strike. Had it been understood by the miners, at the beginning, that they were striking for the recognition of the United Mine Workers of America, in the island, there never would have been a strike. For months and months paid emissaries of the organization had worked the various camps on the island without success. They picked up a few adherents in each of the camps but that was all and these were a negligible minority.

Methods Employed to Enlist Men

One of the reasons given by the leaders of the strike was that discrimination had been made against some of the union men and one, a man named Mottishaw, employed by the Canadian Collieries, Ltd., at Cumberland, it was claimed, had been discharged or refused further work when his place was finished, owing to his affiliations. The majority of mine employees, of course, knew nothing of the true particulars. The discharged man while an employee of the same company at Extension mine had served as a member of a gas committee and the officers of the United Mine Workers declared he had been discharged for reporting dangerous conditions in the Extension mine, as he was compelled to do by the Mine Regulation Act, while serving as a member of a gas committee. Reference was even made to the explosion at Extension, in 1909, before the present company took over the property.

As a result of these extraordinary efforts and pretexts, however, the paid officers of the Mine Workers failed to get a strike vote, at a mass meeting held Sunday morning, Sept. 15, 1912, and another meeting was called, for the same evening, which was attended by about one hundred and twenty-five men. To get over the general objection to a strike it was decided to take a holiday the following day, Monday. Pickets were sent out to stop all men from going to work. The management refused to meet a Mine Workers' committee, and the holiday became a strike. Like action was taken at Ladysmith, two days later and all the mines of the company were thus closed down.

This account of the origin of the strike is still being used by the Union bosses to enlist public sympathy. It was magnified into a charge of criminal discrimination by the company, and of criminal negligence by the provincial government in not enforcing the Coal Mines Regulation Act. These charges are absolutely without foundation. The discharged man Mottishaw was connected with only one gas committee and signed only one report in which there is no hint of dangerous conditions existing in the mine. All the reports, both of mine inspectors and gas committees, are on file in the Provincial Mine Department, and neither in June nor July, 1912, do they contain a hint of dangerous conditions. In fact, the June report, on account of which the man Mottishaw is alleged to have been discharged, states positively that the mine was in a "fair condition."

The "Gas Committee" Argument

These facts altogether dispose of the allegations that Mottishaw was discriminated against by the company for reporting the Extension mine unsafe, after an examination of the workings as a member of the gas committee. If other evidence were needed there is a statement of Frank Farrington, in a letter to the Hon. T. W. Crothers, Minister of Labor, Dec. 15, 1913, which states, "the mines were as safe as human hands could make them," and adds, "With experienced miners employed, the mines are still as safe as ever." The fact remains that the strike was undertaken solely to force men into the Union, and so enable the Mine Workers to demand recognition from the operators.

Relief money was paid to all men alike, whether or not they belonged to the Union; but the average man did not like the idea of drawing relief money without enrolling as a member of the Union; and, the more relief money a man drew, the greater he felt his obligation to the Union, and, consequently, the more reluctant he was to return to work. In this way, hundreds of men who had no sympathy with the strike, and strongly objected to the manner in which it was brought about, were yet bound to the Union.

The operation of this principle can be seen more plainly in what happened at Nanaimo and South Wellington. As soon as the Canadian Collieries Company realized the issue that had been forced upon it, it took steps to reopen the mines. In six months' time, the mines at Cumberland were almost back to their normal output, and over three hundred men were again working at Extension. The union bosses realized that they were facing defeat, and saw nothing for it but to get the men out at Nanaimo and South Wellington. They had tried already to do this by every artifice in their power; but, at these collieries, there were living agreements between the men and the operators and there was no complaint, either as to wages or working conditions. They could not break into the men, who even remained indifferent to the taunt that they were indirectly "scabbing" against their fellow-workers at Cumberland and Extension. As a matter of fact, the Union organizers had been able to make no headway at Nanaimo, and out of a camp of 1500 men there were not 200 members of the Mine Workers. A big coup was necessary.

The Call for a Strike Issued

The first day of May was to be observed as a labor holiday, in and around Nanaimo. Seeing that there had been a strike at Ladysmith for six months, it was arranged to hold a big demonstration there on the holiday. On the 30th of April, Frank Farrington, the chief officer of the Mine Workers, on the Pacific Coast, issued a strike call from Seattle. It was addressed to R. Foster, the local president of the U. M. W. of A., and instructed him to "call a strike of all the men employed in and around the mines at Nanaimo, South Wellington and Jingle Pot; the strike to begin May 1, and to continue until a joint working agreement between the United Mine Workers of District 28, and the mine owners on Vancouver Island was secured." It will be noted that the object of the strike is here definitely stated as recognition of the Mine Workers, and it should be borne in mind that at that time there were not 15 per cent. of the miners of Nanaimo members of the organization.

The first feeling among the miners, as well as the general public, was to regard the strike decree as a joke. This feeling soon changed to anger and consternation. The union organizers made the most of their opportunity with the men attending the demonstration at Ladysmith. They had also arranged for a mass meeting, at Nanaimo the same night, at which meeting all opposition was ruthlessly silenced. Those of the men who advocated living up to their agreements with the operators were shouted down, while others who asked for a ballot were told there was no need for one. Ervine, one of the leading organizers, declared that the man who went to work would be a "scab." In view of these circumstances, the men opposed to the strike called a meeting for the next night, but it was broken up by rowdyism. They then decided to make one more effort to secure a ballot; but, while they went through with their proposal, it was rendered nugatory by the strike-makers. President Foster got out a dodger, which was circulated and posted all over town, in which it was declared that "a strike had been called and ballot or no ballot, any man who went to work would be branded as a "scab." In the face of this intimidation, and the presence of a large and threatening crowd around the ballot station, less than five hundred votes were cast on the question of striking. Of this number, less than forty voted to strike. It was by these methods that the strike was made general on the island; and, as at Cumberland, the men opposed to the strike felt obliged to join the union.

Not a Free Ballot

It will be noticed that, in neither case was a free ballot taken. It must also be recorded that during all the time the strike has lasted, a period of 16 months, such a ballot has never been taken. It will again be observed that, on the basis of membership, the officers of the Mine Workers had neither right nor justification in calling a strike. It must also be concluded that even after the majority of the men joined the organization, its officers have always been afraid to refer the issue to a ballot. The Western Fuel Co. has made three separate overtures for a settlement. On one occasion it offered to meet a committee composed of seven of its employees, to be elected at a mass meeting, to discuss and arrange an agreement. This agreement would again be referred to the men for ratification by secret ballot. The committee thus elected, if agreeable to the men, could act as a standing committee, for a period of time to be agreed upon, for the purpose of taking up any grievances that might arise in the daily operation of the mine; and the company would meet the committee, at least once a month or oftener if required, and also pay the wages of the men while attending these meetings. The offer was turned down without reference to the men; and thus it happens that, while in the beginning the miners were ordered out on strike without a vote, so in the end they are committed to a game of "freeze-out" without a vote.

It is also true that the men who have thus been jockeyed out of their employment enjoyed unusually favorable conditions of work. It is important that the miners in the States who have contributed over seven hundred thousand dollars to the support of the miners on the Island of Vancouver should know and realize this fact. The province has one of the most complete and uptodate Mines Regulation Acts in the world.

All the mines are equipped with a Draeger Rescue station, and all the mine workings must be examined by provincial mine inspectors at least once a month. There must also be a monthly inspection by a gas committee appointed by and representing the men. The working day is fixed by statute, as eight hours from bank to bank. As for wages, the average wage for the year preceding the strike, in the mines of the Western Fuel Co., was $4.86 a day for contract diggers and $3.20 a day for company miners. For April, the last month the mine worked before the strike, the average daily wage of diggers was $5.11 and of loaders, also on contract, $4.34.

Taking conditions right through, it is extremely doubtful if there is a colliery on the American continent that will compare with the Nanaimo mines of the Western Fuel Co. and the situation today is that every mine on the island is operating. Over five hundred men have returned to work in Nanaimo, and as fast as places can be made ready, men are offering themselves. The strike is hopelessly beaten, but at an immense cost to the coal operators, miners, and the general community of the Island, as well as to the miners of the States who have been mulcted in behalf of men enjoying better conditions then themselves.

How an Explosion Is Modified by Obstructions

SYNOPSIS—An explosion is created in a gallery which is obstructed, more rapidly than in one which is clear but we must not assume that the presence of these obstructions makes any difference to the ultimate force of an explosion. In a short gallery the effect of an inflammation of coal dust does not have time to reach its maximum unless constrictions are provided to create favoring conditions.

Many experiments, of which that described (No. 119) in a previous article is an example, were made with the gallery perfectly clear, so that the inflammation was free to travel from one end to the other without encountering any obstruction which might cause irregularity in its development.

Previous to the commencement of a systematic study of the manner of development of the explosions, however, the gallery had been used for demonstrating the fact that coal dust was capable of forming an explosive mixture with air. In these demonstrations, the inside of the gallery was furnished with props and timber set to represent the manner in which the roof of the roads in coal mines is supported.

The timbering consisted of pairs of wooden props, 6 in. in diameter, fixed on either side of the gallery with a tightly-wedged bar at the top holding them in position. These pairs of props with bars were fixed every 9 ft. throughout the gallery; the force of the explosion usually dislodged all of them, projecting some of them 300 or 400 ft. out of the open end of the tube and giving an effective proof of the power of an explosion of coal dust and air to do damage. See "Record" of the Mining Association, p. 91, and following pages.

Obstructions Increase Side Pressures

The pressures recorded during these demonstrations sometimes amounted to as much as 50 lb. per square inch for a distance of travel of the explosion of only 225 ft. In contrast to this, it has already been shown that when the gallery was clear a pressure of only 16 lb. per square inch was developed after a distance of travel of 450 ft.

Several series of experiments were therefore made with a view to determining the influence of constrictions in the gallery on the propagating of an inflammation. These experiments bring out very clearly the salient difference between "inflammation" and "explosive combustion," and show that the change from the one type of propagation to the other is susceptible of control.

Inasmuch as a large number of constrictions, such as were represented by the props and bars in the demonstrations, so complicated the phenomena as to render the pressure-curves obtained hardly intelligible, the effect was tried of introducing one constriction at a time.

Note—Third part of the fourth report of the British Explosions in Mines Committee. The two previous parts are "Concussion as a Cause of Explosions," Jan. 3, 1914, Vol. 5, pp. 19-21, and "The Transition from Inflammation to Explosion of Coal Dust," Jan. 31, 1914, Vol. 5, pp. 207-210.

Constriction Only a 6-in. Ring

The constriction was obtained by bolting on to the inside of the gallery an angle-iron ring having a 6-in. flange which reduced the diameter of the gallery at the point where the ring was fixed from 7 ft. 6 in. to 6 ft. 6 in., the amount of surface exposed at right angles to the direction of movement of the explosion being 11 square feet.

In the series of experiments to be described, the point of ignition was 400 ft. from the open end. The method of performing the experiments was in each case exactly the same as in experiment No. 119, of which details have been given.

Explosion Produced 2 lb. Pressure in a Smooth-Sided Gallery

The first experiment of the series (No. 123, June 22, 1910) was made with the gallery clear of all constrictions. A slowly-moving inflammation was all that was produced. The pressure-curve traced by the manometer most distant from the point of ignition, 350 ft. (No. 6, Fig. 1), showed a maximum pressure of only 2 lb. per square inch, and that pressure was attained but slowly. Moreover, the curve shows no sign of any sudden rise of pressure such as accompanies "explosive combustion."

The effect of introducing a single constriction at a point 200 ft. from the point of ignition (experiment No. 142, Aug. 26, 1910), was to raise the maximum pressure produced to 105 lb. per square inch for the same distance of travel. This maximum pressure was attained about one second after ignition, as against 1½ sec. required when no constriction was present. The pressure curves, which are described later, indicated the beginning of "explosive combustion" at a point about 350 ft. from the point of ignition.

Pressure Rises Faster, the Rougher the Gallery Lining

A single, constriction, therefore, shortens in a remarkable degree the distance that has to be traveled before "explosive combustion" begins.

A second similar constriction was now introduced at a point 250 ft. distant from the point of ignition, (experiment No. 144, Aug. 30, 1910). The maximum pressure, which was attained about three-quarters of a second after ignition, now reached 21 lb. per square inch, and the curves traced by the manometers both at 350 and 300 ft. from the point of ignition, showed the abrupt increase in pressure that we regard as indicative of explosive combustion.

When a third constriction was made, at a point 300 ft. from the point of ignition, (experiment No. 139, Aug. 23, 1910), the maximum pressure produced was 55 lb. per square inch, attained about two-thirds of a second after ignition

In order to bring out the important features of these experiments, it is not necessary to reproduce all, or the whole of any one, of the pressure-curves traced during each experiment. We have already shown that for a considerable period after the time of ignition, the pressure-

curve traced, is merely that due to the igniting-cannon and is of no particular interest from the point of view of the development of coal-dust explosions.

To avoid confusing diagrams, therefore, those portions of the curves that were due to the igniter pressure are omitted in Fig. 1. Further, although in each experiment records were obtained of six manometers (fixed 100, 150, 200, 250, 300 and 350 ft., respectively, from the point of ignition), the curves of chief interest are, as can readily be understood, those traced at the points most distant from the point of ignition, after explosive combustion had been attained. Therefore, these curves only, are reproduced.

Explanation of Diagrams

Examination of these curves show the effect of constrictions very clearly. The curve at the top, Fig. 1, shows the pressure recorded at the manometer most distant from the point of ignition—350 ft.—when the gallery was clear of all obstructions. It is obvious that the result was merely a slow inflammation.

The diagram below this curve reproduces two curves traced during experiment No. 142, in which one angle-iron constriction was fixed at a point 200 ft. distant from the point of ignition. No. 5 curve is that obtained at a point 300 ft. from the point of ignition and No. 6 that at 350 ft. distance; this latter curve, therefore, corresponds with No. 6 curve in experiment No. 123, when the gallery was clear. It will be seen that there are distinct signs in No. 6 curve of experiment No. 142, of the sudden rise of pressure, indicative of the beginning of "explosive combustion"; this occurs after an interval of 97 hundredths of a second from the time of ignition.

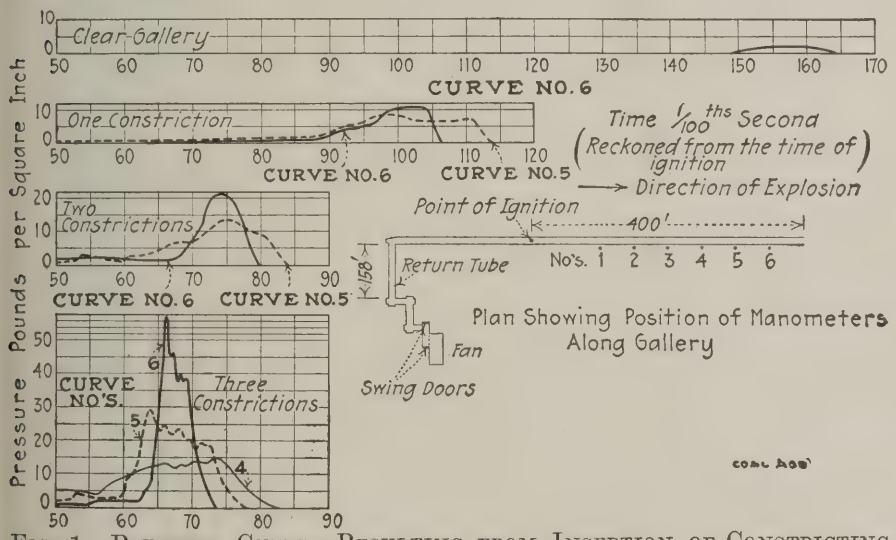


Fig. 1. Pressure Curves Resulting from Insertion of Constricting Obstructions in Exploson Gallery as Measured by Manometers 4, 5 and 6

The next two curves, No. 5 and 6, of experiment No. 144, show the result of introducing a second constriction at a point 50 ft. distant from the first. In this case, there are indications of the beginning of "explosive combustion" in curve No. 5, at a distance of only 300 ft. from the point of ignition.

Lastly, the two curves, No. 5 and 6, of experiment No. 139, (in which three constrictions had been introduced) both show the sudden rise of pressure, due to "explosive combustion" which has apparently begun to be developed (as shown by curve No. 4) within 250 ft. of distance from the point of ignition.

Summarising: The influence of constrictions on the development of the explosion as shown by this series of experiments, was as follows:

Number of Constrictions	Maximum Pressure Developed, Lb. per Sq.In.	Interval of time Between Ignition and Attainment of Maximum Pressure. Hundredths of a Second
None	2.0	155
One, 200 feet from the point of ignition	10.5	103
Two, 200 and 250 feet from the point of ignition	21.5	74
Three, 200, 250, and 300 feet from the point of ignition	57.0	66

The most striking comparison is perhaps obtained from experiment No. 119, already described, and No. 137

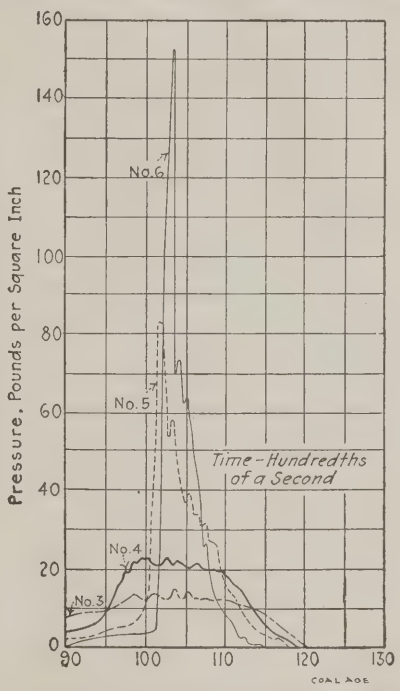


Fig. 2. The High Pressures in This Figure, Showing Experiment No. 137, Exhibit Effect of Constrictions in Path of Explosion

July 28, 1910). In the former, it will be remembered, the point of ignition was 500 ft. from the open end of the gallery, and the gallery contained no constrictions. In the latter, three constrictions were introduced at points 300, 350 and 400 ft. from the point of ignition. Except for the presence of these constrictions, the experimental conditions in experiment No. 137, were the same as in No. 119.

The pressures recorded by the manometers along the gallery were as follows:

Distance of Manometer from Point of Ignition, Ft.	Experiment No. 119 (Clear Gallery) Pressure Lb. per Sq.In.	Experiment No. 137 (Three Constrictions). Pressure Lb. per Sq.In.
300	4.5	23.0
400	6.5	83.0
450	16.0	152.0

Assumption That Constrictions Increase Ultimate Violence Is Not Warranted

The essential parts of the four curves recorded by the manometers most distant from the point of ignition, in experiment No. 137, are reproduced in Fig. 2. If these

curves are compared with the corresponding curves of experiment No. 119, which are reproduced in the previous article, the remarkable effect produced by offering a slight obstruction to the passage of the explosion at, but three points along its path, 50 ft. apart, will be appreciated. We do not propose at this stage to discuss the theory of constrictions in augmenting the intensity of explosions of gas and coal dusts; but we would point out that the effect of such constrictions in the gallery and, presumably, of obstructions in the roadway of a mine is not necessarily to increase the *ultimate* violence of which a coal-dust explosion is capable, but to enable it to obtain violent proportions at a much earlier period than in a smooth gallery.

Experiments which are now being carried out at Eskmeals illustrate and confirm many of the experimental conclusions above set forth. We hope shortly to give an account of them.

The Price War in the Markets of the Pacific

By W. A. MacCorkle*

SYNOPSIS—The Panama Canal does not furnish the shortest route from Europe to Asia and Australia but may supply the most economical, in view of the relative cheapness of good coal along the way. Coal is carried for less than cost by ship owners who are seeking ballast for their empty bottoms but this practice is declining. The author expects the coal of West Virginia to dominate at least at the Panama Canal and along the nearer coast of the Pacific.

The Suez and Panama Canal routes, respectively, control the great international trade lines of the world. Which of the rival routes will receive the bulk of the traffic will not be decided solely by the relative distances of travel, which using one or the other will entail. After a somewhat careful investigation of these great trade routes, it seems that the shipowner will use one route or the other, actuated not only by mere distance but also by the price and quality of the fuel he can purchase along the line.

Panama, the Greatest Coal-Distributing Point in the World

If the route through the Panama Canal becomes that most generally used by the ocean-going ships of the world, the isthmus will in itself become the greatest coal-distributing point upon which the sun shines and this fact will make the fuel of West Virginia one of the preponderating influences in the world of trade.

The great markets of the North Atlantic, from which come the life of commerce, are already taken and firmly held. Today, the great market for competition is the mighty Pacific and upon the shores encircling its bosom are the unoccupied markets for which the world will join in deadly competition. Its shores are the longest, its seas are the quietest, its populations are the most teeming and many of the essentials of life are the products of the lands encircling this great ocean.

Gold, silver, precious stones, splendid woods, dyes, rubber, silks and all things necessary to life are here produced. Nations, yellow, brown and white, filled with the desires of new commerce, fired with new hope by the touch of the West, thrilled with new ideas of government and religion, are all mingled in one tremendous combat for the mightiest markets vouchsafed to man since the stars sang together. If the nations of the world approach this empire of commerce through our canal, it means millions of tons of production for West Virginia, and a gold stream pouring in our beautiful valleys and amidst our people, which will be as unending as time.

The eternity of this possession is appreciated when we understand that of the 150 billions of West Virginia workable coal, only two billions have been mined, leaving within our state 148 billions yet untouched. It is generally understood that the canal shortens the distance between Europe and the East, and places the advantage of the distance with us. But let us look at the plain facts.

Panama Canal Route Not as Short as the Suez between Europe and Eastern Asia

All of Asia and Australia and the East generally are nearer Europe by the Suez Canal than by the Panama route. This is not popularly understood. The distance from Liverpool to Adelaide by the Suez route is 11,142 miles. Via the Panama route, the journey is 13,478 miles, the Suez Canal being the shorter by 2336 miles. To Manila from Liverpool via the Suez Canal, the distance is 9701 miles, by the Panama route 14,122 miles. Thus the Suez route is 4421 miles shorter than the other. To Hong Kong from Liverpool by the Suez Canal is 9785 miles, by the Panama Canal 13,957 miles. Thus the Suez Canal has an advantage of 4172 miles. To Yokohama from Liverpool by the Suez Canal is 11,678 miles, and by the Panama Canal 12,372 miles. Here, also, the Suez Canal is the shorter, this time by 694 miles. I give these distances at length to show that it will be cheap fuel and not distance which will largely control the great bunker trade of the world, if Europe uses the Panama rather than the Suez Canal.

The United States Coal to Dominate Pacific

The use of the Panama Canal will give New York 4138 miles advantage over Liverpool on the journey to Wellington, New Zealand, and the distances will be about equalized, relatively speaking, on the journey from New York and Liverpool to the countries I have mentioned.

The canal should allow this country largely to dominate by distance the coast of South and Central America.

One enormous advantage today, possessed by the Suez Canal, is the fact that coaling stations are located along

*Ex-governor of West Virginia, Charleston, W. Va.

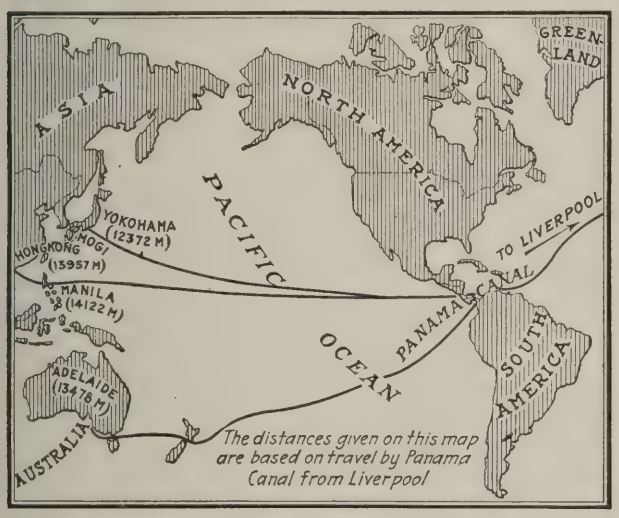
Note—Abstract of first part of an address entitled "The Relation of West Virginia Coals to the Panama Canal" read before the West Virginia Coal Mining Institute, Charleston, W. Va., Dec. 8, 1913. The author acknowledges the assistance of Neil Robinson, president of the association in furnishing material for the address.

the great English trade routes, so as to give the greatest accommodation to the trade of the world. If this country proposes to take any part of the steaming demand of the world from the English nation, it must provide ample coaling stations for international commerce.

It is the province of the government of the United States to provide at the Panama Canal a great coaling station where the ships of the world may obtain their fuel at a cost affording a fair profit to the producer and to the shipowner. This is now being done, and at both ends of the canal our government is constructing the most modern coaling stations ever used in the trade.

Need for an American Marine

If these markets become as important in American commerce as they should be, America must control the ships necessary for her trade. Let me illustrate my argument by showing that length of voyage and cheapness of fuel do not always settle the cost of transportation. The marvelous ability of the Englishman to ship his coal to every part of the world and sail his ship in every sea, despite the competition of the nations, is well exemplified





Maps Illustrating the Relative Distances from Europe to Pacific Ports

on the coast of South America. At Valparaiso, Iquique, Antofagasta and other points on the western coast of South America, the coal is largely Welsh and Australian, because of the low freight rates on vessels bound for Chili to secure nitrates. On the eastern coast of South America the same condition exists; British ships control the markets and are able to take coal cheaply to different coasts, as they can obtain the return traffic.

In other words, American coals cannot obtain the markets to which they are entitled, unless American ships are more plentiful upon the seas and American trade is more diversified under new laws and new conditions. Only then may we send our products into every country and among every people.

Cost of Coal at Panama, $5.09

To test the accuracy of the statement as to the possibility of coal being sufficiently cheap at the Panama Canal to affect the route taken by the world's trade, let us consider the facts as they stand today.

The prices now paid by the Government at Panama have been fixed for two and one-half years, and the coal which is used there comes from West Virginia, which was determined to be better for all purposes at the Isthmus than any other coal. This conclusion was reached after the Government had considered all the coals in the market. It is paying $2.70 at Norfolk for this coal and $1.29 for its transportation to the Isthmus. The contract provides that if the commercial price of coal declines, the contract price is to be reduced to $2.65 per ton. If this price prevails the cost of coal at Colon will be $4.09½. With all the lighterage, depreciation and overhead charges added, West Virginia coal will cost $5.09½ at Panama, or if the price at Norfolk should be reduced during the contract it will be $5.04½. It will also be possible for coal to be sold by the canal authorities at $5.54½ on the Pacific side of the Canal.

Welsh Coal at Port Said Costs $6.33 per Ton

In 1912, the contract price of Welsh coal at Port Said was $6.33 per ton, and it seems beyond question that coal can be profitably sold by our government at Christobal for $1.20 to $1.25 less than the prices charged at Port Said. The cost of Welsh coal is necessarily increasing year by year.

In a careful calculation made by the Government, a ship of 4640 tons, gross register, operated at a speed of ten and a quarter knots on a round trip made in 1911, between New York and Manila, by way of the Suez Canal, consumed 4475 tons of coal, at a cost of $20,868.75.

Careful calculation made by this Government upon the prevailing prices for the same ship, leaving New York, coaling at Newport News, Colon, San Francisco and the Japanese ports and back again, coaling at Mogi, San Francisco and Colon, would only use $18,222.50 worth of coal for the whole trip, the cost of fuel being in favor of Panama by $2,646.25. Upon the prevailing prices for 1912, the same ship making the same voyage by the Panama route would expend for coal $18,567, but by the Suez route it would be $22,608.75, or a difference in favor of the Panama route of $4,041.75.

In other words, it is fairly established in the trade of the world that prices for coal will be less by the Panama Canal than by the Suez route. If this is so it seems as if the Panama route while longer often times than the Suez route, will be largely used for the reason that the price of coal will lessen the cost of the voyage.

Discussion on Mixed Lights in Mining

SYNOPSIS—The meaning of the expression "mixed lights" explained. An illustration showing the danger of such practice in respect to a possible fall of roof in the gaseous section of the mine. Danger due to careless neglect of rules and regulations—an incident. Igniting the gas for sport, a fool trick. Practice in the Pennsylvania anthracite mines. Illinois conditions and practice. Rule adopted in the T. C. I. mines in Alabama. Ordered the use of safety lamps in mine drawing pillars, in Illinois. Practice in New Mexico mines. Experience in gassy mines in Pennsylvania.

President Adams, in opening the session, announced that he believed Mr. Beard was greatly interested in the question of the use of mixed lights and he would ask him to kindly start the discussion of the evening.

Mr. Beard (*New York*)—We understand by the expression "mixed lights" in gaseous mines the use of both open lights and safety lamps, in any portion of a mine where certain sections of that same mine are required to be operated by safety lamps only. I believe there are many gentlemen here who are better able to discuss this question than I am, for the reason that they have had much practical experience along these lines. I will give you a few illustrations that certainly convince me that the use of mixed lights is an unsafe practice.

Danger from Heavy Roof Falls

Suppose, for example, we are operating a large mine one section of which is gaseous and the rest of the mine is known to be free from gas. We install a lighting station at the entrance to the gaseous section, assuming that that makes a satisfactory and safe arrangement. There is a man put in charge of the lamp station and no one is permitted to enter that section of the mine without a safety lamp. The other section is worked on open lamps. Under the general mining practice, that has been and is still considered safe. Suppose now a heavy fall of roof occurs in the gaseous section, what is to prevent the gas from being driven out in large quantities from some of the abandoned portions in that section into the places where open lights are used and a serious explosion taking place? That is one instance that, to my mind, condemns the use of open lamps and safety lamps in the same mine.

Careless Neglect of Rules and Regulations

Again, when open lights are allowed in many gaseous mines, safety lamps are only used at the working face. I have known a number of cases where we were required to leave our torches and take a safety lamp when entering a chamber or approaching the working face. Under those conditions you know that many miners will take their open lights up to the face unless they are closely watched; and as is frequently the case, in these workings, the open lights will be used when the boss is not around. If they are caught the boss would, of course, tell them not to do that again and threaten them; but he probably would not discharge a man, because good miners are hard to get. A foreman, if asked, will give the excuse for not calling down any violation, that he cannot afford to discharge a good man for a little matter like that.

I remember a few years ago I was in a gaseous section of the Marvin shaft, at Scranton, Penn.; it was in the evening. The mine foreman, two firebosses and myself were going in, and about 100 yd. from the head of the entry there was a board marked plainly "Gas," and laid across the track so that we had to step over it. Now, in that mine, no open lights were allowed at the face. We had gone, however, but a short distance further when we could see the glimmer of lamps that were evidently open lamps or torches, up the entry. The mine foreman said to us, "Wait a bit," and went quickly ahead to where the men were and made them extinguish their lights at once. We followed directly and found the foreman giving the men a calling down for taking their open lights beyond the board. Later, I said to the foreman, "Is that all you are going to do to those men?" His reply was "We cannot afford to discharge good men, at this time; good men are hard to get. I know it is a violation of the law, but we cannot help that; we are not going to let a good man go for a little matter of that kind." Proceeding a short distance further, at the inby corner of the last breakthrough, holding a lamp just inside of the corner, we could get a lamp full of flame. We could not get into the head of the entry on account of its being full of gas and therefore unsafe to enter. It was only good luck that no accident occurred at that time. A small fall of roof in the head of the entry would have driven the gas out on those men and the explosion that would be sure to follow would have blown them to pieces and endangered the life of every man in the pit.

But I would rather listen to you. These are only suggestions that come to me; there are many others; but I know that you can give many incidents and arguments for and against the use of mixed lights. I can only say that the excuse for the use of open lamps in mines generating gas is, as we all know, that the miner can see to mine coal better, and for that reason they do not care to use a safety lamp. My opinion is that we ought never to use a safety lamp where it can be avoided, that is to say, where the mine can be made safe to work with open lamps; but this must be done by having ample ventilation.

Lighting the Gas a Fool Trick

The practice of using open lights beneath a layer of gas at the roof, where we are cautioned not to raise the lamps and where the boys will light the gas, just to see how it affects you or some greenhorn in the mine, such fool practice is to be condemned by every true miner. I was in one of the mines, I forget which one, at Scranton, some years ago, and there was a layer of gas at the roof of every chamber in one portion of the mine, at least. The gas was being given off at the coal face to that extent that it just maintained a thin layer continuously, close to the roof, at the face, and we were cautioned to keep our lamps down and did so. I had with me, at that time, a

Note—From the published Proceedings of the sixth annual meeting of the Mine Inspector's Institute, U. S. A., held at Birmingham, Ala., June 10-13, 1913.

commercial man who had never been in a coal mine before. He came there to get a little idea of what a coal mine was like. On retiring from the chamber we had not gone more than probably 75 or 100 ft. from the face when the boys for a joke, laid down and raised their lamp into the gas and lit it. The flame rolled down toward us and came within 20 ft. of us. I ducked and pulled my friend down. When he saw the flame had fallen back again and we were out of danger, he said, "What did you duck for?" But the mine foreman answered him very promptly, "A good miner always knows when to duck," which is very true. It must be remembered that an explosion does not develop immediately on the ignition of the gas, which will burn a certain distance and then recede and again advance and fall back a second or third time; but that action of the gas, in many cases, develops energy enough presently to burst into an explosion that extends more or less throughout the mine.

MR. MCALLISTER (*Illinois*)—How many years ago was that?

MR. BEARD—That was in 1905.

MR. MCALLISTER—I don't think you will find those conditions existing today in the mines.

MR. BEARD—Around Scranton? That is the condition today, in some of the mines near Scranton.

MR. RODERICK (*Pennsylvania*)—Was that in the face of the workings?

MR. BEARD—It was right in the face of one of the chambers.

MR. RODERICK—Some of the inside chambers?

MR. BEARD—Yes.

ANTHRACITE (PENN.) PRACTICE

MR. RODERICK—I will state, for the benefit of Mr. McAllister, that that is a frequent occurrence in the anthracite region. Of course, the veins are higher than in most of the bituminous workings; and, in the rooms of a gaseous mine, even a wing brattice would not keep it back. Then they use nothing but batteries to fire the shots. The mines of the anthracite region that are gaseous give off an enormous volume of gas. You can catch it from the sides, coming from the roof, bubbling up in the ditches. It takes a strong current of air, and unless the air is kept up to the face all the time, there is liable to be a thin layer near the roof. Now, as a rule, the men work with their lights on the bottom, or else use safety lamps altogether. But conditions are improving and I don't think you will find many places today in that condition.

MR. MCALLISTER—It is a fact, is it not, that the miners never see the roof in those mines?

MR. RODERICK—The Mammoth vein in the Hazelwood district and in the Schuylkill district runs from 30 to 35 ft. in thickness, and the miner with his small light hardly ever sees the top in those thick seams. On the pitch, of course, they get back to the top, by cutting the coal back, and leaving it under their feet.

PRACTICE UNDER ILLINOIS CONDITIONS

MR. BACK (*Illinois*)—In my district, in Illinois, there are some gaseous mines; but the conditions are not such as to require the use of safety lamps. In my opinion, if there were places or sections in a mine that should be worked with safeties, I would put the whole mine on safety lamps. I think it is a wrong idea to use open lights in one section when other sections require safety lamps. I believe the use of mixed lights is dangerous, because it is always possible for some one of the miners to slip through and carry an open light into the gas; and there is the danger.

MR. ADAMS—You are supposed to put a policeman at the entrance of that section and not allow a man to enter it with an open lamp.

MR. RODERICK—I don't consider there is much danger in a mine that is giving off gas only; but if there is dust it might increase the danger. You can generally arrange a mine so that a large portion can be worked with naked lamps while the live workings should be put on safety lamps. It may entail the extra expense of keeping somebody there to see that no naked lamps are taken into the gassy section.

As an illustration, let me say I had charge of a mine at one time and the conditions were like what Mr. McAllister has described. The seam had a heavy pitch; the coal was very free and would run of its own accord after being opened out to the proper width. It would come to the battery as fast as you could load it out; but, at times, a place would stop running, and that would cause an accumulation of gas in the chute, above the battery, for the coal was making much gas. Although a good current of air was passing on the level, yet for fear of a fall in some of the breasts bringing the gas down on the gangway. I put that section on safety lamps and put a man there in charge. If a driver came in carrying an open lamp, it was taken away from him and he was given a safety lamp. That was the only section that they had to put on safety lamps, as I thought it was not right or just that the whole mine should be put on safeties because that one lift was dangerous, and I did not do it.

MR. FLYNN (*Alabama*)—If I understand this subject, it is not a question of what would be safe at one mine or two or three mines; but what would be a safe rule for all mines. Of course, there are exceptions to all rules and there are varying conditions in coal mines; but this question should be discussed from a general standpoint and a general practice. The question should be discussed in a manner to bring out the points as to whether it is advisable to lay down a principle that both open and safety lamps could be used in the same mine, at one time. I do not mean in any one particular mine in Pennsylvania or in Alabama, but in all mines; because in discussing this question, I suppose it is with a view of discovering whether it is advisable to have laws enacted prohibiting the use of mixed lights in coal mines.

I, for one, would never consent to the use of open lights and safety lamps in the same mine. While I have seen conditions where it would be considered safe, I have seen other conditions where it would be dangerous. But, if it is safe to work them in *ten* mines and dangerous to use them in *one* mine, then I say the danger in that one outweighs the safety in the ten, and it would not be a good practice to pursue.

THE T. C. I. MINES IN ALABAMA

I am going to give a little of my experience with the use of mixed lights in coal mines. When I accepted the position with the Tennessee Coal, Iron & Railroad Co., I found they were using safety lamps in the advance work-

ing places that were generating gas. I found on investigation that there was no law to stop it. I talked against it and advised against it; but the opinions of other mining men were opposed to mine. However, having accepted the position with the company, I had some authority and immediately recommended that no safety lamps be used in any of our mines. Most of our mines are making a little gas. Formerly, the rooms were turned and worked before the entry breakthrough was cut; and if those places were generating a little gas, it was the custom to give them a safety lamp until the breakthough was made. We were continually having men burned under that system; some seriously, others not as seriously, but some fatally.

The question was asked: What are you going to do if you stop working safety lamps in those places? I replied: We are going to put the air in there; we will carry a line of canvas brattice from the crosscut to the face and conduct the air right to the face. In every room there will be a line of brattice from the heading to carry the air to the face. After some argument on the question the general superintendent agreed with me that that would be the best policy and immediately issued orders that safety lamps should not be used. If it was found that a place was not safe, work would be stopped until it was made safe.

No man in the mines of the T. C. I. Co. is now allowed to have safety lamps, except the firebosses and the bratticemen. The firebosses use safety lamps exclusively. We do not even allow a fireboss to wear a cap with a tin. The reason we made that rule was because one of our firebosses was burned and investigation showed that he had a cap with a light on it unbeknown to anyone. This man would go in the mine about 3 o'clock. No one would see him going in and when coming out he always hid his cap with the open lamp and no one knew he had it. He would come out, eat his breakfast and then finish his shift with a safety lamp. His open light, however, set fire to some gas and he was burned and died five days later. A man holding a lamp in his hand is not so apt to forget about it as one with a lamp on his head.

Results of Excluding Safety Lamps

Since we have adopted this system, I am glad to say that all last year (1912) we only had two men burned in all the gaseous mines we operate. This was caused by two miners, who came out of their room leaving the canvas torn down; and while they waited for another car there was a little accumulation of gas, which they ignited with their lamps, on returning to the face. All of our mines are operated now with open lights. We require our firebosses to examine every working place in the mines, each day before the men enter for work. He must mark the day of the month near the face of the coal. We do that to insure that he has gone up to the face; then he marks the date on the timbers as a reference mark. After he has done that he comes out and meets the men before they enter the mine and every man has got to pass that fireboss and ask as to the condition of his place. If the fireboss reports gas in a certain working place, the man is stopped and not allowed to proceed until the day fireboss and bratticeman have gone there and made the place safe. In my opinion, it is bad practice to allow open lights and safeties in the same mine.

Mr. Williams (*Pennsylvania*)—I want to ask Mr. Flynn a question or two. In the first place, would you penalize the nine mines because the tenth, in your opinion, was dangerous? And, another question: Do you have gob gas in Alabama?

Mr. Flynn—In answer to the first question I will say yes, I would penalize the nine, if by so doing I can render the tenth mine safe for operation, and for the protection of the man in that mine. This is as it should be, and who would not do the same thing? In answer to the second question, I will say, we have some gob gas in Alabama; but not, perhaps, to the extent you have it in Pennsylvania. We have gas accumulate over the falls, where the ventilating current cannot reach. But in Alabama, especially in the T. C. I. Co.'s plants, with which I am most familiar, the old works are examined every two weeks by the firebosses. They must go into every abandoned and worked-out place and examine them for gas and if they find any, the mine foreman must immediately start to remove that gas.

Mr. Williams—Does the T. C. I. allow men to work on the return side of the falls and only examine worked-out places once every two weeks?

Mr. Flynn—As a general proposition the air travels in a separate split in one or two rooms, and then joins the current. Where this is the case no gas has ever been detected in the old workings, or over the falls, or anywhere else.

The Fireboss and the Alabama Law

Mr. McAllister—Does the law in Alabama require the date of the month to be put on the face of the workings?

Mr. Flynn—No, it is not in the law. The law provides that if the fireboss finds gas he must put a danger board across the entrance to those places. The law also requires that the fireboss must notify each man as to the condition of his place and each man must pass the fireboss station and see the fireboss before he is allowed to enter the mine for work.

Mr. Roderick—Does not the law require them to put the date of the month on the face of the working places?

Mr. Flynn—It does not.

Mr. Roderick—Why does he put it there?

Mr. Flynn—It is a rule laid down by the inspector that the fireboss must put the date on the face of each working place, but it is not the law.

Mr. Roderick—Then you require the fireboss to examine all working places whether they give off any gas or not?

Mr. Flynn—We do.

Mr. Kelso (*Alabama*)—May I ask, why you are opposed to safety lamps in any one entry?

Mr. Flynn—Because it is a dangerous practice, for the reason that you give a man a safety lamp to work with and the drivers, watermen, tracklayers and other employees are constantly passing on the gangway and may enter the place with an open lamp.

Mr. Kelso—I agree with Mr. Flynn on the wing-brattice proposition but not in respect to working with safety lamps. I believe he stated he had two men burned on account of their breaking down the wing-brattice. I think the men in the entry should also have safety lamps and if for any cause they have to leave their place for any length of time, they should examine it again before returning to work.

Mr. Flynn—It was the custom in the past, as Mr. Kelso well knows, that the fireboss on finding gas in a working place, in the morning, would take a piece of canvas and brush it out. Now, in a number of instances, the miner himself does not understand the operation of the safety lamp; does not know how to use it; or could not tell when the place was clear of gas. He would come in and put his lamp down and start to brushing out the gas, which would fire on his lamp. I can recall three or four instances that occurred that way when that was the common custom.

Mr. Roderick—When a place is generating gas, what is the standard shot?

Mr. Flynn—The maximum charge is two sticks of dynamite.

Mr. Roderick—Then I will say that is a very dangerous habit not to require safety lamps to be used in entry work. Take a mine generating any quantity of explosive gas, and suppose you strike a strong blower with a shot that a man might fire. Suppose he goes back to a place of safety and waits a certain length of time and the brattice was blown down by the shot so that the air does not reach the face of the entry. The man returns with open lamp on his head and lights the gas in the face of the gangway. I see no harm in using safety lamps in an entry or breast, after firing a shot and believe this should be done if the heading is giving off much gas.

Mr. Flynn—When a man shoots under these conditions, we have a day fireboss, and the man is not allowed to go back until the fireboss has been there and thoroughly examined the place for gas.

Ordered Mine Put on Safety Lamps

Mr. Dunlop (*Illinois*)—We in Illinois are not troubled with mines that generate explosive gas to any extent, although I believe the time is coming when we will meet the very conditions that you are speaking of. I want to relate an experience, however, that I had in Illinois. As inspector, I was familiar with the conditions at the mine, which was located at Cardiff. They were working two seams; the lower one was 12 ft. in thickness and worked on the room-and-pillar system, while the other was worked longwall, the coal being about 36 in. thick. In the longwall workings we never found any gas; but in the lower thick seam we were troubled with a good deal of gas. The longwall seam was worked from one side and the other thicker vein from the other side of the property.

When driving the rooms in the thick lower seam we could do exactly as Mr. Flynn has said and brattice the air to the face of the rooms; but when we started to draw pillars, falls would take place, and gas would accumulate in the hole above the fall and in the thin seam above the 12-ft. seam. I had to order the use of safety lamps where they were drawing pillars, as we could not direct the air current so as to keep the pillar workings clear.

I ordered them to use safety lamps entirely when drawing pillars. I was still afraid and the men who worked in the longwall mine, a mile away, were afraid of a gas explosion and they kept me in hot water for weeks there; and, for that reason, I required them, also, to put in safety lamps. If we could have done as Mr. Flynn stated and used a wing-brattice to clear out the gas from the top of those falls, it would have been the best thing to do, but that was not possible. I was always afraid of a fall bringing the gas down on the men.

Mr. Flynn—How thick was the cover or what was the depth below the surface?

Mr. Dunlop—The depth to the lower seam was 258 feet.

Mr. Flynn—Would it not have been better to have drilled a hole from the top and let the gas escape?

Mr. Dunlop—It would be impracticable to drill holes over all that section.

Mr. Flynn—Don't they do that in Pennsylvania?

Mr. Dunlop—It would require a great many holes.

Mr. Roderick—Is there any law in Illinois by which you can compel the operator to put holes down to drain off the gas?

Mr. Dunlop—No.

Mr. Flynn—You have a law compelling them to remove gas, haven't you?

Mr. Dunlop—Yes, from the working places only. If there is an accumulation of gas any where that is dangerous we are required by law to make it safe.

Mr. Burris (*Illinois*)—Did you require the men working in the longwall seam to use safety lamps?

Mr. Dunlop—Yes sir.

Mr. Bolt (*Illinois*)—I want to ask whether or not as inspector you do not have the power to insist that all gas be removed from mines where it is dangerous, in Illinois. Suppose a mine in your district generated gas and the accumulation became dangerous, would you not have the authority to compel the operator to remove the gas?

Mr. Dunlop—I have just answered that question; the law requires that the mine be made safe.

Conditions in New Mexico Mines

Mr. Beddow (*New Mexico*)—I just wish to state that we have a similar condition at Dorsey, N. M., to that described by Mr. Dunlop. We have a mine that generates gas, and when they commence pulling pillars the gas begins to accumulate. They are now removing that gas by the air current. The system they use there is a kind of block or panel system. They turn seven rooms in each panel, leaving pillars between the rooms and barrier pillars 150 ft. thick between the blocks or panels. They only pull six pillars in each block; the pillar in the first room on the intake side is left standing. After drawing the pillars back a certain distance and the gas shows up, they put up a brattice. There is a crosscut in the face of each room, and they have always managed to have plenty of air to keep the rooms free from gas. I have been over there many times and have never found any gas on any of my visits.

Experience in Very Gassy Mines

Mr. Williams—I possibly may have as much experience with safety lamps, mixed lights and real gassy mines as any man here; and as each one must express his opinion from his own standpoint, I might venture to say we have conditions in Pennsylvania where it would be impracticable and dangerous to work certain sections of the mines with open lights. In one mine that I superintended, we carried the brattice within 10 ft. of the face, and still, at the face, we could get an explosion in the lamp in either of the two corners of the chambers. That

was with the same company that Mr. Flynn is working for now. You could get a cap on the return air; a cap ½ in. high, with 200,000 cu.ft. of air passing in the mine. We had blowers that we could hear 300 ft. away.

During my term as inspector of the Connellsville region, I have seen large volumes of gas on falls, and it could not be removed without sinking boreholes from the surface. The method of mining is possibly 80 per cent. on the retreating system. They drive the entries to the boundary, leaving 84-ft. barrier pillars and with room pillars 10 ft. wide. Then they start back and draw the pillars on a regular fracture line. The first fall is not very high, but the second is higher and so on until the falls are so high they cannot get air over them and the only thing to do is to sink boreholes from the surface, to the top of the fall. In my present district, I have about 14 or 15 gassy mines; some are very gaseous and we could not work the entries, even if a brattice was carried to the face of the entry, without safety lamps. A current of 235,000 cu.ft. of air passes under a 6-in. water gage. The seam is not thick and we cannot get enough air to keep the faces clear of gas without the boreholes. The entries are driven wide, and the rooms are about 15 to 18 ft. in width, but in the lower corners we can get an explosion, at any time, in the lamp.

The law requires that, in all mines where safety lamps are used, men working on the return current must use safety lamps. It is strictly against the law to work with an open light, on the return side of any section of the mine where the safety lamps are used. I can realize the stand most of the members present are taking. They are basing their opinions on conditions at home, which is the best guide after all. Our firebosses examine every working place, without exception, all roadways and all falls adjacent to working places, twice each day. The mine foreman or his assistant also examines these places. When we find gas on the gob or the falls we take out everybody on the return side of the gob, as there is danger of the gas being ignited by a flaming shot or other cause.

Mr. Flynn—Is it not a fact that the H. C. Frick Coke Co. will not permit, under any circumstances, now, the use of open lights and safety lamps in the same mine?

Mr. Williams—That is the policy.

Mr. Dunlop—You have mentioned gaseous mines. Have you any mines where they can use mixed lights at all?

Mr. Williams—Yes. We have mines that are slope mines. A portion will be under light cover and on advancing into the mines the cover becomes heavier, and the conditions change. We are not requiring the use of safety lamps in those sections where we have never found gas or where the cover is light. We keep those air splits separate from the other sections of the mine and from the return air, and where we use safety lamps we keep a man to prevent an open light from going into those sections.

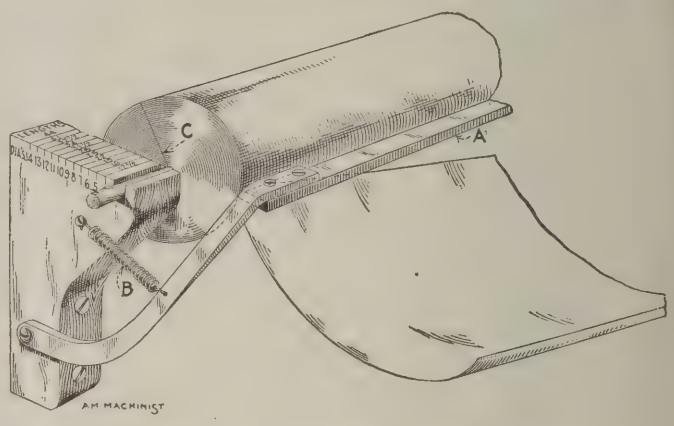
This closed the discussion.

In regard to the use of feed water which contains scale-forming ingredients, one principle should always be observed, and this is to precipitate as much as possible of the scale-forming matter before the water enters the boiler. It is a barbarous practice to reduce the thermal efficiency of boilers and run the risk of pitting and corrosion by the introduction of alkaline reagents into the boiler itself. Such an outofdate method is entirely unnecessary and should be avoided.

A Drawing-Paper Support

Rolls of drawing paper are usually mounted on brackets as shown in the illustration, and to avoid the irregular cutting and unnecessary waste usually present in the drafting room, the following device was adopted with good results.

The steel bar *A* across the front of the roll presents an edge against which the paper may be torn straight; this bar is held tight against the roll by means of the springs *B*. One end of a new roll is marked radially with a rough pencil mark as *C*. The readings on the bracket from the



Sketch of a Drawing-Paper Support

center out, are the lengths of circumferences corresponding to the existing diameter of the roll.

Observing first the position of the radial mark, any length required is approximated with little waste by means of the scales on the brackets, halving, adding, or doubling, as the case requires.—*American Machinist.*

Engineers' Society of Northeastern Pennsylvania

The Engineers' Society of Northeastern Pennsylvania held its 17th annual meeting in the banqueting hall of the Hotel Jermyn, Scranton, Penn., on the evening of Feb. 5. There were about 325 members present. President H. M. Warren remarked that the attendance at Scranton was larger than the record gathering at Wilkes-Barre, the year before.

The Scranton Engineers' Society a short while ago changed its name to that given above and about the same time it took on new life. As Mr. Warren declared, it has doubled its dues from $5 to $10 and has concurrently increased its membership from about 300 members to 409, despite all the prognostications of those who opposed the increase in annual charges.

It has also purchased a large dwelling, just back of the Y. M. C. A. building, and has fitted it for a club house. The charges of $25,000 for the building and $5000 for the remodeling have entailed a considerable burden on the society, and committees have been formed to wipe out both these debts.

E. R. Pettebone, the incoming president, regards his office as much a burden as an honor, a sure earnest of activity on his part and an evidence that he believes that much responsibility rests on him to perform diligently the duties of his office. The mayor, E. B. Jermyn, might cheerfully anticipate a membership of 1409, but E. R.

Pettebone set himself no standards for fear of disappointment.

Judging by the roster of speakers, one would not think that coal-mining engineers form the bulk of the membership. The toastmaster was W. D. B. Ainey, a member of the Federal House of Representatives and a delegate to the Hague Peace Congress. The principal speakers of the evening were: N. P. Lewis, chief engineer, Board of Estimate and Apportionment, New York City, who spoke on city planning, and Hudson Maxim, the inventor of explosives, who addressed the audience on "The Truth about our Peace and War Problems."

E. A. Jones, second deputy state highway commissioner, stationed at Scranton, spoke in place of E. M. Bigelow, and deplored the fact that the funds of the department did not permit of adequate support being given to the township officials in the repair of roads. In place of J. A. Holmes, the director of the Bureau of Mines, H. C. Reynolds addressed the society on the "Engineer as an Expert Witness." The speech-making ended at about 12:30 p.m.

The Answer

By Robert Lang*

A reply to Mr. Braley's poem "The Question," which appeared in "Coal Age," Jan. 31, 1914.

What has been done with our aged men,
Is a theme that has ever been sung.
But a question of greater moment is—
What has been done with the young?

When the fires of youth are all aglow,
And the world is moving fast,
Does the young man ever pause to think
That age will come at last?

That the hand of time gets a strangle grip
On the over-impulsive heart,
And the ardor of youth burns low and dies
Ere the body and spirit part?

Think not of age, my miner friend,
Or what will become of the old.
If you spend your years in a search of truth
You will safely enter the fold.

Mine Explosion Said to Have Been Caused by Acetylene Gas

Deputy Mine Inspector Gaffney of Ohio is reported as saying that the mysterious explosion in the Wheeling Creek mine, near Bridgeport, Ohio, was caused by the ignition of accumulated acetylene gas. After a careful investigation, Mr. Gaffney eliminated both firedamp and powder as causes of the accident.

It was discovered that two powder cans filled with refuse carbide from the lamps of miners previously employed in that part of the mine had been placed in this same chamber nearly two months before. By actual test, when the cans were taken out of the mine, the refuse carbide, under the same conditions that prevailed underground, gave off enough gas to ignite and cause a flame. It is believed that the unfortunate miner was killed by crawling into a chamber filled with the acetylene gas, which he ignited with the naked light he carried on his cap.

Chief Mine Inspector Davies was on the scene after the accident occurred, and stated that the case was one of the most remarkable he had ever experienced.

Ohio Anti-Screen Law Passed

The Green mine-run bill, which provides that miners shall be paid for all coal produced, and not permitting a screen to be used, was passed last week. The vote in the House of Representatives was 103 to 8, which shows the hopelessness of the contention of the operator against the measure. Only one amendment was embodied in the bill as it came from the Senate, and that was to make it effective in 90 days, instead of Oct. 1, 1914, as provided in the original draft of the bill.

Just what action will be taken by the Ohio operators is still a matter of conjecture. There are several courses open and the operators are considering the best one to follow. There is the referendum which can be used if sufficient signatures to a petition can be secured, but that is a long fight and then the voters of the state may decide to uphold the action of the legislature.

Another course is to violate the law and have the matter in the courts, where the constitutionality of the measure can be tested. This appears to be the most feasible course to follow.

The cost of changing the tipples in Ohio to conform to the requirements of the new law will be almost $1,000,000, it is believed.

Bosses To Be Nonunion

Eriton shaft, an operation of the Northwestern Mining & Exchange Co., an affiliation of the Erie R.R., went on strike Dec. 1, 1913, to compel a boss fireman to join the United Mine Workers of America. The following proposition was submitted by the company to the workmen and was adopted by them on Jan. 22, after the men had been idle eight weeks.

To All Employees at Eriton Mine—We are ready to resume work at Eriton mine, just as soon as it can be gotten in shape for resumption of work, with the distinct understanding, however, that you restore our rights and conditions to the same basis as they were when you suspended work and closed our mines, and with the further distinct understanding that the following positions and the men filling the same, now or hereafter, shall be exempt from membership in the United Mine Workers of America.

The positions referred to are as follows: Superintendents, mine foremen, assistant mine foremen, firebosses, motor bosses, machine bosses, boss firemen, weigh bosses and master mechanics.

We agree, however, that the boss fireman who is now a member of your organization, may, if he so desires, retain his membership therein until Apr. 1, 1914. We agree further, that neither the members of the United Mine Workers of America nor our officials will hold any personal prejudice against any man employed at Eriton mine.

If the above proposition is accepted by the men at Eriton, those whose places are in condition for immediate resumption, can begin work just as soon as arrangements can be made for proper day forces to take care of same, which arrangements will be rushed with all possible haste.

JOHN H. FULFORD,
General Superintendent.

Du Bois, Penn.

This proposition was accepted with but four dissenting voices in a meeting where 500 were present.

*Superintendent, Galloway Coal Co., Garnsey, Ala.

The Close of the Indianapolis Convention

EDITORIAL CORRESPONDENCE

SYNOPSIS—The scale committee urged a 5c. increase in miners' wages, and a 10 per cent. increase for day labor, inside and outside, and for dead work. Despite the attempts of the radical element to call for a 10c. increase, the decision of the convention was in favor of demanding only a 5c. raise in the pay of the miners.

We confess to a sense of increased confidence in the United Mine Workers of America as a result of the Indianapolis convention. In every large body, it is a foregone conclusion that some men will be found with peculiar views, anarchistic, socialistic and syndicalistic, but the convention in its closing hours sailed quietly into port under the steady hand of John P. White. He has winked and connived at the radical element and so has been deserving at times of the severest censure, but at heart he really *believes* in being fair in his dealings, even when his acts belie his statements. When he does what is wrong, he does it as subordinate to the rough-and-tumble element and not as leader of his organization.

THE SCALE ADOPTED

The "scale," which was adopted as read, is as follows:

1. That all coal be weighed before being screened, and be paid for on a mine-run basis.
2. That we demand a flat 5c. a ton increase at the basing point.
3. A 10 per cent. increase on all dead work, yardage and day labor.
4. A uniform workday and wage scale for all classes of outside and inside day labor.
5. A proper adjustment of all machine differentials at the basing point.
6. That we demand a complete check-off for the miners' organization through the company's office.
7. That we demand that all the local inequalities and internal differences be referred to the various districts affected for settlement.
8. We demand that where the price or regulation of powder is made a contract provision that union-made powder shall be furnished.
9. That the miners work only one-half day on Saturday.
10. That the company shall pay drivers for time from taking charge of stock until the company receives the same.
11. We demand that our contract shall be in effect for two years.

THE MINE-RUN PROVISION

That part of the scale which will arouse strong opposition is the first section: That all coal be weighed before being screened and be paid for on the mine-run basis. As Illinois operators and many in Pennsylvania now run their plants under contracts of this kind, and as Ohio mine owners are about to be compelled to adopt this method by legislation, it is probable that they will use strong pressure to make the operators in other states accept the new arrangement of their affairs.

The almost universal use of machines favors the miners' contention. There is little call for excessive use of powder after the coal has been undercut to the requisite depth, and lumps of coal can be just as easily lifted, and thrown or built up on the car as they can be shoveled in as slack. The objection will partly come from the smaller operator, who has no money to buy machinery and hesitates to accept the risk of adding to his indebtedness. Much opposition will come from those operators who are unable to remove pillars by machinery.

The main difficulty will arise in determining the true equivalent between a mine-run scale and one based on lump coal only. The fear that the miners intend to be unreasonable in the making of this change, and the idea that the miners want to obtain pay for their slack equal to that now paid for lump coal, makes the change in scale rating exceedingly unpopular among the operators, and with good reason.

The scale committee consisted of the following members: Van Bittner, District 5, chairman; Joseph Pope, District 12; John Moore, District 6; William H. Houston, District 11; Lawrence Garrigus, District 8; John T. Dempsey, District 1; Patrick Gilday, District 2; Thomas Kennedy, District 7; James Matthews, District 9; Martin Flyzick, District 10; W. H. Rodgers, District 13; Alex Howatt, District 14; John McLennon, District 15; Thomas Cairns, District 17; J. E. Smith, District 18; Pat Cary, District 19; J. R. Kennamer, District 20; P. R. Stewart, District 21; A. G. Morgan, District 22; L. B. Walker, District 23; Joseph Smith, District 24; George Manuel, District 25; Henry Drennan, District 27; L. C. Rodgers, District 29.

Casdrole, of the Pittsburgh district, moved to amend the second demand so as to increase the miners' wages 10c. instead of 5c., but J. W. Jarrard, of Johnson City, Ill., came to the defense of the scale committee's report. President White spoke for a demand which would not disturb industrial peace. He did not believe in trading back and forth, and thought the convention should ask for what it wanted and expected to get.

THE KENTUCKY MINERS WANT THEIR WAGES RAISED

The Kentucky miners, through George Baker, wanted the convention to assist the miners of his district, No. 23, which was surrounded by nonunion fields. He said: "We are working for 16⅔c. a ton less than the miners in adjoining states, and the rate for dead work and day labor is 35 to 60c. a day less." Eventually a resolution was passed pledging the miners in southwestern Kentucky that the union would use every endeavor to unionize nearby and competitive coal fields.

President White strongly opposed a suspension pending an agreement with the operators. He placed the blame on them for the report that such a suspension would occur. He said they urged it only because they wished to rid themselves of surplus stocks.

INDIANAPOLIS DISCIPLINED FOR FAVORING OPEN SHOP

The vote to choose a convention city favored St. Louis. Indianapolis received only 19 votes, but Kansas City was a strong competitor, being only beaten by 80 votes. It is thought that as a result of a referendum, the number of delegates will be considerably reduced by the next convention. Each district will elect as many delegates as there are thousands of members, and the delegation will not be elected by the local unions. But there seems no sense in arranging to meet at St. Louis and waste by travel what is economized by reduction in numbers.

The president's salary was raised from $3000 to $4000 per annum, and the secretary-treasurer received at the close of the meeting an increase in salary from $2500 to $3300. The stipend of the editor of the *Mine Workers' Journal* was also raised from $1500 to $2000 per annum. The international board members' pay when employed was raised from $4 per day to $125 per month.

Editorials

Should Strikes Occur?

Speaking at the last winter session of the Coal Mining Institute of America, Harrington Emerson, the well known efficiency advocate said:

A strike seems to me not only a preventable, but a ridiculous, stupid thing like the sinking of the "Titanic" or the wrecks on the New York, New Haven & Hartford R.R.

Adverse comment on this bold and perhaps largely untrue statement was made by several of those who discussed the paper. We reproduce it, however, because it is so confident that it focuses one's attention and makes one question just how much truth there is in it.

We cannot overlook the fact that the United Mine Workers of America is organized for strife and to a degree its continuance depends on its discovering wrongs, real and fancied, for which it can demand a remedy. On the whole, however, a more enlightened spirit would demand that the union be kept like a modern army as an insurance against oppression rather than for aggressive purposes. There are men who irk at paying life and fire insurance, because the need of either is so rare. Men tire of paying union dues for the same reason, but nevertheless a prudent man will consider the best union one which protects its members without a strike, without even a suspension. The army fulfills its purpose most successfully when it does not fire a shot.

We must also remember that the object of the direct-action advocates is to foment perpetual strife and arrange for a strike whenever the operator is least desirous of such an annoyance. Such people, we believe, will soon tire of the strenuous course they have marked out. In fact, there is even now a lull which seems to indicate that syndicalism has exhausted its advocates, physically, mentally and morally.

The toll of hate is heavy on its followers, deranging their digestive organs, preventing restful nights and overthrowing the reason. Economically also, it impoverishes at least the rank and file. It cannot continue forever. Orgies of hate have arisen again and again in history and after a period, longer or shorter, died away, not without, however, leaving grievous scars.

As for the coal operators we must say that to some extent they are to blame for the frequency of strikes. They do not, it is true, meet and willfully decide to risk a reduction of wages every year or two. If the miners would show signs of being willing to continue at work at the old figures there would be no desire on the part of the operators to seek a reduction. An attempt to change the scale downward is such an unsettling factor in business that the operators as a whole are almost always opposed to it.

They do, however, frequently ask for a reduction, in order to countervail a demand for an increase. It is a foolish practice, and to be deplored. It brands the operator as seeking something which is unreasonable. With the cost of living going up, can any operator anticipate that a strike will end with a reduction of wages, without creating the most bitter of feelings and the maledictions of the public?

We have previously advocated that wage increases be based on the index of increased cost of living. We would suggest that contracts be made for five years on that basis, increases being made year by year proportional to any increase in the cost of living, plus a certain percentage, say a half per cent. per annum, justifiable on the ground that the workingman should receive not only the power of purchase of similar goods year by year, but should be able to buy more products as the labor of producing them decreases with the introduction of machinery.

Let the operators rest their wage scales on science, let them advertise in the press their method of basing those wages, and the people will be obliged to admit that they have an extremely plausible case. But asking for reductions at every readjustment puts them on a level with an Arabian peddler, and is unworthy of the one-price merchandizing of this present century.

Will the time ever come that the operators will be able to celebrate like the United States and Great Britain, a centenary of peace? Some individual companies there are, which have never had a strike, and perhaps a time may come when the hand and the head in the industrial being will never enter into conflict.

Our Mercantile Marine

Ex-Governor McCorkle pleads for a mercantile marine in the article we publish today, and says it would materially increase the foreign coal trade of the United States. The foreign mercantile shipping is a favorite matter for discourse in the halls of Congress and in daily journalism. We cannot blame Mr. McCorkle for humming a tune he has heard played so often and so alluringly.

But as a matter of plain fact the British and Scandinavian marines have been denationalized for years. They would carry American coal with just as good grace as British, so long as they could earn a liberal profit. The only argument for building a national mercantile marine we can see is that it will be a help to our navy in time of war.

In peace we can hire foreign ships to carry our coal if there is money in the traffic; if there is none, let us compel the representatives, senators and newspaper men to undertake that obligation without any bounty. The argument for the mercantile marine is purely naval and its validity stands or falls on that score alone.

During the British coal strike of March, 1912, business in Europe sank to an extremely low ebb and a number of steaming vessels were without cargoes. They came over to America and loaded up with coal for the Mediterranean and they were willing to accept almost any figure for the service.

Conditions in Europe improved as the strike ended; the price of coal fell in the Mediterranean ports and only with difficulty could American coal continue to pay the freight charges existing. But to make matters worse, ships were attracted to Europe to engage in their old

trade and the shipping rates to the Mediterranean went up to their former level. Immediately the cry was raised that the Briton was at his perfidious tricks and was raising rates on cargoes in order to keep the coal of this country from proving its worth in the market.

It is the old story and should we subsidize a mercantile marine, we can well write its sequel. Just as soon as such an organization is formed, it will engage in the trade most profitable to it; some ships will carry alien products to foreign ports and the jealous metropolitan dailies will say the ship owners have been bribed or coerced into neglecting the needs of the nation and favoring foreign coal.

Our Foreign Trade

We commence to publish today a remarkable address delivered by W. A. McCorkle, an ex-governor of West Virginia, before the West Virginia Mining Institute. We have read many articles on the foreign trade, and found quite frequently that they did not seem to confront the main difficulty, which may be thus stated: Any country which will not *buy* quantities of bulky foreign articles cannot expect to *sell* abroad a hold-filling product like coal, which is mined on every continent and in nearly every country.

It seems strange to the man on the street that America can supply Europe, Asia and Africa with grain, meat and machinery and cannot sell coal, though the greater part of the three continents have inferior fuel and in some parts none at all. It seems stranger to him to hear that because we ship so many products to Europe is the reason why our coal is excluded and stranger yet it seems that our large export trade with Europe is the cause for coal being shipped from Europe to America in times of industrial conflict in this country.

But it is clear that in order to transport coal to Europe cheaply, we must have a return cargo for the vessel and that the lading on the return voyage must be capable of standing a heavy freight charge or the transportation rate will be unduly heavy. The British coals find the return traffic good; the American fuels discover it almost entirely lacking and so despite the lower price at the coast, the coal of the United States remains without transatlantic and Pacific demand.

Ex-Governor McCorkle realizes some of these facts and it is a wonder he does not see that conditions are similar all over the world except in North America and the eastern littoral of South America. We have a big commerce with the Caribbean Sea; from Cuba, iron ore; from Honduras, mahogany and other woods; from Guatemala, bananas; from the Bermudas, potatoes and onions; from Venezuela and Porto Rico, coffee. So there is no difficulty in the carriage of coal to these ports or others near-by, such as Colon, especially as boats can safely go light to that port over waters that are still. What is true of Panama is therefore no indication of conditions beyond it.

It is a wonder that Mr. McCorkle does not realize that nearly all the Pacific is more a prospective purchaser than a probable seller to the United States and as its freights will always be larger west than east, coal will find no opportunity for carriage. We must compliment him, however, on knowing that the direction of transportation will depend not so much on the relative distances but on the cost of coal along the route.

But disagreeing with Mr. McCorkle, we must advise West Virginia against too great a faith in Panama as a market. It is further away, it is true, from the center of ocean freightage in Europe than Suez and may, therefore, sell more coal to European ships as soon as its traffic is as large as that of the Egyptian canal. But for many years its tonnage will be much smaller than that of Suez.

And it is significant that Egypt imported from Great Britain during 1911, the last prosperous year of which we have record, only 3,476,780 short tons. The following year probably as a result of the strike in the British coal fields only 3,276,924 short tons were purchased. Malta and Gibraltar took together 860,754 short tons in 1911 and 916,410 short tons in 1912.

The tonnage sold to Gibraltar, Malta and Egypt per year is less than the increase in output of the state of West Virginia in 1913 by about 1½ million tons. If West Virginia is hoping for a rapid growth on the basis of actual Panama trade, we are afraid a disappointment is in store. The foreign trade of Great Britain is a prize worth seeking. It absorbed 85,889,710 tons of coal in 1913, some of it being shipped in manufactured forms such as coke and coalite. This is equal to the output of West Virginia and Indiana in the same year. If all this foreign trade could be absorbed by the United States it would add 15% to its business, as large an increase as would normally be added by five years of domestic advance.

However, it begins to look less significant when we state that three counties in Pennsylvania, Fayette, Westmoreland and Luzerne, produced in aggregate 10,000,000 more tons in 1912 than Great Britain exported in 1913. Eventually, the British miners with their notions of restriction of hours, limitation of output, minimum wage and a hundred other crippling demands will give us all the foreign trade of Great Britain. In this they will be aided by the natural conditions, greater mining depth, irregularity of coal beds and depletion of coal resources. But we may be sure, on the other hand, that Great Britain will not lose this trade for many years.

We do not think that the Panama canal will have a great effect in stimulating the coal trade. Certainly a liberal discount can be made on the rosy anticipations of our would-be exporters. Meanwhile, it is amusing to read the alternate hopes and fears of the British technical press. Now they expect to keep the eastern coast of America supplied with their "incomparable coals" and then the trade balance shifts and the Yankee peril looms up like the Genie of the bottle.

The arguments, if such they may be called, for a rearrangement of the balance of coal trade in the world have been made mainly by visionaries and pessimists and we do not look for any sudden readjustment at the present time.

The United Mine Workers of America, at Indianapolis, adopted a new section to the constitution providing that sick, accident and death benefits may be established in any district, sub-district or local union, whenever a majority of the members of the respective bodies so determine. This aroused much opposition from Delegate Summerville, of Ohio, who said that had a benefit fund in his local lasted another six months, all the members would have been sick.

A Model Town in West Virginia

The Lackawanna Coal & Lumber Co., which owns, in fee simple, about 30,000 acres in one tract in Boone County, will begin an extensive coal operation there in the late spring or early summer.

This new development will be on Hopkins Fork, a branch of the Laurel Creek, the latter being a tributary of the Coal River. It is about nine miles from Seth, which is on the Coal River division of the Chesapeake & Ohio R.R. The new town will be called Griffith, being so named for the vice-president of the company. The new town of Griffith will approach the model village as nearly as possible. The plans for town and tipple have already been completed.

In laying out the town, the company has followed newly approved ideas in sanitation and hygiene and has sought the advice of sociological experts. It is expected that there will be about 300 houses for the miners. These will be erected on plots large enough to give each family a fair-size lawn and adequate garden space. They will be roomy and all of them will have running water in them and will be lit with electricity or gas.

Due attention will be paid to living conditions. Near the tipple there will be a large bathhouse for the miners, and each miner will have his own locker. There will also be two club houses. A hotel will be provided for the accommodation of travelers. A skating rink will also be built and, near it, a moving-picture theater. Here the company officials expect to show many pictures that will illustrate the latest methods in mining and will also help to teach the miners how accidents may be prevented. But films of a purely entertaining nature will not be forgotten.

The railroad from Seth to Griffith, about nine miles, has been completed about a year and the company has been using it in its lumber operations. It is estimated that there are 300,000,000 tons of coal in this tract. The officers of the company are W. L. Connell, of Scranton, Penn., president; J. K. Griffith, of Pittston, Penn., vice-president; T. J. Foster, of Scranton, treasurer, and David Connell, of Scranton, secretary.

Recent Legal Decisions

Right of Individual Bondholder to Sue—Provision in a mortgage or deed of trust securing bond, prohibiting individual bondholders from bringing foreclosure suit on default, does not prevent suit by them to recover defaulted interest, without foreclosure, unless such provision extends to such suits, as well as suits to foreclose, by virtue of its express terms. (St. Louis Court of Appeals, Muren vs. Southern Coal & Mining Co., 160 Southwestern Reporter 835.)

Mine Operator's Responsibility for Co-Employee's Negligence—Under the laws of Missouri, a coal-mine owner is liable for injury to a mine resulting from a defective condition negligently created by a fellow miner, as where the latter leaves a dumped empty car so near a track that another miner is injured, without fault on his own part, in driving by it. (Kansas City Court of Appeals, Martin vs. Farmers' Coal Co., 160 Southwestern Reporter 816.)

Mine Operator's Duty to Furnish Props—Duty to Warn Minor Employee—The requirement of the laws of Kentucky that mine operators shall furnish props to secure the roofs of their working places extends to the supporting of draw slate, as well as permanent mine roofs. This duty is not affected by the fact that a miner is employed under contract to remove coal at a fixed rate the ton. It is actionable negligence to permit an inexperienced boy miner to work under dangerous conditions against which he is not warned. (Kentucky Court of Appeals, Interstate Coal Co. vs. Trivett, 160 Southwestern Reporter 728.)

American Institute of Mining Engineers Organize Anthracite Section

A subdivision of the American Institute of Mining Engineers, to be known as the Pennsylvania Anthracite Section, was organized at the Sterling Hotel, in Wilkes-Barre, Saturday evening, Jan. 31. Among those present at this initial gathering were Charles F. Rand, president, and Bradley Stoughton, secretary of the national organization. About 50 other engineers and company officers of the different anthracite corporations attended the meeting, and signified their intention of joining this new section of the Mining Engineers' Institute. R. V. Norris, of Wilkes-Barre, was chairman of the evening. Among those who spoke were H. M. Chance, chairman of the Coal and Coke Committee; Prof. J. W. Richards, Lehigh University; W. J. Richards, vice-president of P. & R. C. & I. Co.; R. J. Foster, Scranton; J. D. Davis, Kingston; and C. F. Huber, Wilkes-Barre. An executive committee was elected and is composed of the following members: R. V. Norris, chairman; W. J. Richards, R. J. Foster, Edwin Ludlow, C. F. Huber, Douglas Bunting, F. A. Hill, Chas. Enzian and J. M. Humphrey.

Those present were:

Thos. Thomas, E. R. Pettebone, H. G. Davis, H. M. Crankshaw, J. B. Warriner, H. W. Montz, Chas. F. Rand, Bradley Stoughton, H. M. Chance, Geo. P. Gallagher, Wm. Griffith, S. J. Jennings, E. C. Lee, W. D. Owens, Frank A. Hill, W. J. Richards, G. W. Engel, Rufus J. Foster, F. A. Gleason, Jos. W. Richards, W. R. Crane, Alfred G. White, H. H. Ashley, Douglas Bunting, Wayne Caruthers, E. M. Chance, F. M. Chase, W. F. Dodge, Chas. Enzian, M. S. Hachita, G. T. Haldman, Chas. F. Huber, J. M. Humphrey, John Lloyd, F. J. McMahon, R. V. Norris, Wm. E. Shearman, A. C. Stahl, Paul Sterling, P. Wainer, T. L. Welles and F. E. Zerbey.

Cost of Machine Mining in Pittsburgh District

The following table of the cost of machine mining in the Pittsburgh district was compiled by Jesse K. Johnston, vice-president and general manager of the Pitcairn Coal Co.:

COST OF MACHINE MINING PER TON

1897 Cutting		1912 Cutting		Per Cent. Advance
Rooms	$0.075	Rooms	$0.1244	65.86
Entry	0.105	Entry	0.1644	56.57
1897 Loading		**1912 Loading**		**Per Cent. Advance**
Rooms	$0.28	Rooms	$0.5356	91.29
Entry	0.34	Entry	0.6537	92.27

Miners' Convention Cost $130,000

The Indianapolis convention lasted about 13 working days and cost about $130,000. The funds of the union, therefore, must now be about $150,000, or roughly 40c. per member. The advocates of direct action are strongly opposed to unionism, because they say it tends to conservatism, and they are right. Surely when the union men realize how their funds are continually depleted, they must understand, and in a degree sympathize, with the capitalist, and must realize that the large aggregations of capital, with their appalling figures, shrink into insignificance when the whole population serves as a denominator in determining the individual possession.

A good feed pump requires from 1 to 1¾ per cent. of the steam generated to deliver the necessary amount of feed water.

Discussion By Readers

How to Buy Coal

Letter No. 2—The several discussions of this question in past issues of COAL AGE have led the ordinary reader to believe that our present B.t.u. method is obsolete and beset with inaccuracies and that the system is on the decline. This may be true, but not to an alarming degree. It is safe to say, however, that its worth is not declining any more rapidly than it was taken up by the bituminous coal industry in general. It is necessary for the small as well as the larger consumers to have some standard and some method by which to gage the quality of their product, and for the want of something better the chemist is compelled to resort to this determination to arrive at some sort of a tangible figure.

The insurmountable obstacle to this proposition, as stated by Mr. Burrows, Vol. 4, p. 866, is in sampling. Accordingly, I think that the statement that the B.t.u. method is obsolete should be modified and the direct cause of imperfection be attributed to sampling, where it properly belongs, and not to the chemical method employed to determine the heating value of the coal. The correct sampling of all coals, ores, cement, etc., is one of the most difficult propositions known to the chemist, and while he may err on a few samples, yet his average analysis of a product, for a period of 365 days, is sufficiently correct for most commercial computations.

Periodic sampling of a small lot of coal and subsequent thermal determinations may not reveal the true value of a coal; but where a tonnage of several hundred tons a day is used, and the material sampled after plant crushing, the sample and analysis ought to be considered a fairly accurate indicator of the heating value of the coal. I am informed that large consumers do not accept analytical results from samples taken directly from the cars.

It is stated that the railroads and government have discontinued the heat-unit specifications, which, no doubt, is the result of being now in possession of complete chemical information, after years of investigation, of all the coal fields of any importance in this country. Assuming that given coal seams and districts produce coal quite uniform in quality, it is possible, now, to purchase the coal by trade names with fair satisfaction, and without entailing the cost of analyses. Shall we assume that the scientific force and value of analyses have been displaced because of this connection with politics? The analysis of a coal should be a shield for a public officer, whereby he can avoid suspicion of showing partiality in giving contracts of public tenders.

It is universally acknowledged that coal-burning apparatus must be adapted and proportioned to suit a particular fuel; but must not the character of this particular fuel, in the first place, be determined by chemical and physical tests? The chemical analysis should never be the final word as to the value of a coal, yet its chemical composition must be known, to some extent, for the benefit and help it will prove in the correct operation of a power plant.

In regard to inconsistencies in coal specifications, it is assumed that in modern specification systems where large tonnages are used, suitable provisions are made for every element and the behavior of the fuel in the furnace.

The trouble of the small consumer and dealers who handle two- or three-carload lots and probably get their supply from a number of different mines and districts in using this method should not condemn its use in other operations.

Specifications, however, should not work a hardship on the smaller dealer. Let the mine operator carefully ascertain the grade, adaptability and quality of his product; and then sell and guarantee it for the purposes for which it is best suited.

If we cannot reasonably rely on the present B.t.u. method why pay any attention to the ash and sulphur results. If we discard the one, which is dependent on the others, then our whole system of coal analysis is incorrect. Until a better method than the present is devised, I think that the present one is relatively accurate for assessing the thermal value of a bituminous coal, under proper sampling conditions.

J. V. FREEMAN.

Joliet, Ill.

The Mine-Run Problem

Letter No. 1—I have read with much interest the two articles analyzing the Ohio Mining Commission's report, COAL AGE, Jan. 24, p. 167; and Jan. 31, p. 196, and discussing the question of paying the miners for the nut and slack coal on what is known as the "mine-run system." It occurs to me that there should be some equitable solution of this vexing problem.

The discussion of the question in Ohio has resulted in the passage by the House, of the "Green Anti-Screen bill." There are many views as to the wisdom or expediency of such legislation. It appears to me, however, but just and right that the miner should be compensated for the handling of the finer coals, such as nut and slack, that pass through a 1¼-in. screen. In Kentucky, these "fines" amount to from 35 to 40 per cent. of the total coal mined and loaded on cars.

There are many cases where operators pay for the coal mined on a mine-run basis, but the price paid is generally about 42 per cent. less than the rate paid for screened coal. In innumerable cases, the payment for mining on this basis has imposed grievous hardships on the operator, as many miners seek to secure greater weight by an excessive use of powder in the mining of the coal. In every mine, there is a certain class of miners that will follow this practice, regardless of the large increase of screenings produced thereby, in order to increase their own daily output and lessen, to some extent, the labor of mining. Where this practice is followed, the impurities of the coal, slate and clay are reduced to such fineness that the smaller grades of coal are comparatively valueless, except as they are further prepared by washing. Few of the

smaller operations can afford the increased cost of washing these lower grades of coal and, except for coking operations, the process is hardly justifiable.

In my opinion, the rate of payment on a mine-run basis should be adjusted by a careful determination of the proportion and price of the two grades of coal. At the present time, the screenings, nut and slack, bring in this market 50c. per ton, while the lump coal is sold at $1.65 per ton. If we assume the price of mining screened coal is 87½c. per ton, the mining price for screenings, if taken proportionately, would be 1.65 : 0.50 : : 0.875 : 0.265; or, say 26½c. per ton. In this manner, it seems to me that an equitable price could be fixed for the payment of mining coal, on a mine-run basis. The adoption of some such system would go far toward settling the seemingly never-ending dispute. The miner would have no incentive to practice "hard shooting," producing thereby an excessive amount of dirty screenings. On the contrary, his interests would be in line with those of the operator, in producing larger quantities of lump coal, and, as a result, greater harmony would prevail.

S. F. Rock,
Civil and Mining Engineer.

Richmond, Ky.

The Certificate Law

Letter No. 18—It has been with great interest that I have read the different opinions expressed in relation to the interchange of certificates issued by the mining departments and examining boards of different coal-producing states and provinces. Being the holder of three first-class certificates issued, respectively, in Pennsylvania, Alberta and British Columbia, Canada, my experience may be of interest to others.

I strongly favor the adoption of a plan that would bring about an interchange of certificates of competency for the positions of mine manager, mine foreman, fireboss and hoisting engineer, in all states and provinces where the conditions of mining are similar. Such a plan would, however, require a uniform standard of examination. Without such a uniform standard and the limitation to similar conditions in mining, such an interchange of certificates would not be advisable. In my opinion, it would not operate in the interest of safety for the men and the security of mining property.

To make my meaning clear, I would say it would not be policy for an examining board to grant a certificate of competency to a mine foreman, for a gaseous mine, when his present certificate entitles him to hold that position in a nongaseous mine only. The same difference of condition should be considered in respect to dust. While one mine may be practically free from dust, or contain dust that is almost inert, the dust of another mine may be highly inflammable and explosive.

Again, assuming like conditions of mining and an equal standard of examination, the practical experience of the candidate should be a large factor in determining his qualification to take charge of a mine. I believe that a man of long experience who has duly qualified and obtained his certificate in one state, is better fitted to hold the same position in another state than the man who has succeeded in passing the examination in that state, but who has only the amount of experience required by law to enable him to secure a certificate. The man of large experience is a more valuable man and will be able to operate the mine with greater safety and advance the interests of the company more certainly than the man who has yet much to learn.

In regard to the life of certificates of competency, I am of the opinion that all officials in coal mining should be examined at least every five years, up to the age of 50 years, when I think they should be exempt from further examination. I believe that such periodical examination would be a great stimulus to efficiency; as mine managers, mine foremen and firebosses would then have to keep posted in reference to mining matters, as the examinations would naturally keep pace with the improvements made each year in coal mining. In my opinion, periodical examinations should be strongly advocated by all mining corporations, as it would provide more intelligent and efficient service and increase the safety of the men and security of the mines.

J. W. Powell, Supt.,
Cottonwood Coal Co.

Windham, Mont.

Letter No. 19—In connection with the discussion of the certificate law, I would like to draw attention to a common practice in mines that is very annoying to a conscientious fireboss and one that cannot but prove harmful and even dangerous in many cases. By drawing attention to this practice, which is more or less prevalent in all mining districts, it may be possible to obtain some remedial legislation that would go far toward eliminating the evil.

I refer to the fact that a fireboss who is thoroughly qualified and competent to discharge the duties of his office, and aims to fulfil the requirements of the mining law of the state impartially in the performance of his duties, and is governed by a single motive only, namely, to insure the safety of the men and the security of the property in his charge, may and often is intimidated and forced to make a report that is, to say the least, inconsistent with his knowledge and convictions.

Too often it happens that the fireboss is approached by a mine committee, whose conduct is influenced and regulated most largely by the careless, indolent and meddlesome element in the mine. It is this class of workers that breed trouble and do more to endanger the lives of their fellow workers than any other condition common to mining.

The consideration of these facts, which are well known to all familiar with mining conditions, must convince any unprejudiced mind that we have need of the enactment of a law making it a penal offense for any man or committee of men to interfere with the fireboss in the performance of his duties in the mine.

A Constant Reader.

Caldwell, Ohio.

Letter No. 20—In my opinion, the mine foreman is the most logical man to determine the nature of the dangers present underground. For this reason, he should have the knowledge and practical experience that will enable him to foresee dangers that may arise and detect any dangerous conditions that may already exist in the workings. On the mine foreman rests the responsibility of thus detecting and removing all dangers reported or known to exist in the workings.

A conscientious foreman, having at heart the "safety first" idea, will not fail to visit every portion of the mine as often as his duties and time will permit. The feeling of his responsibility will take him to the working face, into the gob and all abandoned places, and cause him to travel constantly the airways, haulage roads and traveling ways throughout the mine. Therefore, if anyone knows the true condition of the mine, it is the foreman. His knowledge and acquaintance with underground conditions are more intimate than that of the superintendent, the general manager, or even the mine inspector.

Referring to the work performed by the state mine inspector, his time is too limited for him to secure more than a general knowledge of each mine visited. He inspects No. 1 mine today, No. 2 tomorrow; and his time, for the next 60 or 90 days, is spent in other fields. On his return, he goes hurriedly through the mine, makes certain suggestions and notes the general conditions for the report he must make to his chief. It is absurd to think that the mine inspector with his many and varied duties, in connection with the special investigation of accidents, attendance upon coroners' inquests and the compilation of reports, can possess a knowledge of any particular mine equal to that of the mine foreman.

Because the mine foreman, of all other persons, is the man in closest and constant touch with the mine workings and the conditions existing therein, he should not only be a good moral and truthful person, but he should have the very best training possible to fit him to assume the duties and responsibilities of his position. He should be a man of sunny disposition that will enable him to gain and hold the good-will and respect of every man in his charge, as well as that of his superiors.

In view of these responsibilities, a mine foreman should never be allowed to take charge of a mine until he has become fully acquainted with the conditions existing within and around that mine. No argument is needed to prove that a man capable of assuming these responsibilities will have little or no trouble in passing an examination in any state in which he may seek employment. In my opinion, any man, with ambition to pass an examination for a certificate of competency, if he is a true man, will keep himself posted on mining matters sufficiently to enable him to pass an examination in any state, as that is his reasonable duty that he owes his fellow workers and the company who employs him. For my own part, I have never seen the time yet when I could not study and read. I am convinced that it is best for all concerned that each state examine its own foremen and firebosses.

A. H. Stansberry.

Oliver Springs, Tenn.

Study Course in Coal Mining

By J. T. Beard

The Coal Age Pocket Book

Potential Values of Different Airways—In order to show the resisting power of airways of different lengths of those sizes in more common use, the following table has been prepared, showing the potential value of each airway, as calculated by the formula

Potential of airway $$X = \frac{a}{\sqrt[3]{klo}}$$

Following this is another table giving the potential values of different circulations, by which is meant the circulation of different volumes of air under different pressures or water gages. A comparison of the potential values in these two tables will serve to show what circulation can be obtained in airways of given size and length when properly arranged and unobstructed.

TABLE—POTENTIAL VALUES FOR DIFFERENT AIRWAYS

Size of Airway	Length of Airway (ft.) 1000	2000	3000	5000	8000	10,000
	Potential Value of Airway					
4x10 ft.....	485.3	385.0	336.5	283.8	242.6	225.2
4x12 ft.....	557.0	441.9	386.2	325.7	278.5	258.5
4x14 ft.....	624.8	495.7	433.2	365.4	312.4	290.0
5x8 ft.....	497.4	394.6	344.9	290.9	248.7	230.9
5x10 ft.....	592.8	470.3	411.0	346.7	296.4	275.2
6x8 ft.....	582.3	462.0	403.8	340.6	291.2	270.3
6x10 ft.....	696.2	552.4	482.7	407.2	348.1	323.2
7x8 ft.....	664.0	526.7	460.4	388.3	332.0	308.2
7x10 ft.....	796.0	631.5	552.0	465.5	398.0	369.5
8x10 ft.....	892.6	708.1	618.9	522.0	446.3	414.3

Potential Values of Different Circulations—The circulation of a given quantity of air in a certain airway or mine requires a certain pressure or water gage, which determines the "potential of the circulation."

In the following table, the potential of the circulation is calculated by the formula

Potential of circulation, $$X = \sqrt[3]{\frac{Q^2}{p}} = \sqrt[3]{\frac{O^2}{5.2\ w.g.}}$$

TABLE—POTENTIAL VALUES FOR DIFFERENT CIRCULATIONS

Water Gage (In.)	Pressure (Lb per sq.ft.)	Volume of Air Circulated (cu.ft. per min.) 10,000	15,000	25,000	50,000	75,000	100,000
		Potential Value of Circulation					
6.....	31.2	147.4	193.2	271.6	431.1	564.9	684.4
5.....	26.0	156.7	205.3	288.6	458.1	600.3	727.2
4.....	20.8	168.8	221.2	310.9	493.5	646.7	783.4
3.....	15.6	185.8	243.4	342.2	543.2	711.8	862.2
2½....	13.0	197.4	258.7	363.6	577.2	756.3	916.3
2.....	10.4	212.6	278.6	391.7	621.8	814.8	987.0
1½....	7.8	234.0	306.7	431.1	684.3	896.8	1086.4
1.....	5.2	267.9	351.1	493.5	783.4	1026.5	1243.6
½.....	2.6	337.6	442.3	621.8	987.0	1293.4	1566.8

The Coal Age Pocket Book

A comparison of the two tables on the preceding page shows that to pass a current of 25,000 cu.ft. per min. through an airway of 5x8 ft., 3000 ft. long, including the return will require, practically, a 3-in. water gage. This is ascertained by observing that the potential value of an airway 5x8 ft., 3000 ft. long, as given in the first table, is, say 345. Then find the water gage corresponding as nearly as possible to this value, in the second table, in the vertical column for 25,000 cu.ft. per min. The potential of the circulation of this air volume under a 3-in. gage is, say 342, showing that a 3-in. gage is a little in excess of what is required to circulate 25,000 cu.ft. of air per minute in a 5x8-ft. airway, 3000 ft. long, including the return.

Effect of Splitting on Mine Potential—As a mine is developed and its airways extended, it becomes impracticable to carry the air in a single current throughout the entire length of the airways, as the water gage then increases directly as the length or distance of air travel. To avoid this difficulty, the air must be divided or "split" one or more times; so that there will be two or more separate currents in the mine. Each of these currents is called a "split of air," or simply a "split."

It should be observed that dividing the current does not change the total rubbing surface(s) in the mine; but the area of passage (a) is increased in proportion to the number of splits or currents. Since s = lo, the formula for potential of airway may be written as mine potential; thus,

Mine potential, $$X = \frac{a}{\sqrt[3]{ks}}$$

Since the rubbing surface (s) and the coefficient (k) are constant and the area (a) increases in proportion to the number of splits or currents, the potential (X) increases in the same proportion. Therefore, any of the airway potentials of the first table can be multiplied 2, 3, 4, etc. times according to the number of splits or currents employed.

For illustration, suppose the airways of a mine are 5x10 ft. and have a total length, including return, say 10,000 ft.; and the required circulation is 100,000 cu.ft. per min. The velocity of the air should not exceed, say 500 ft. per min., in the airways. This will require a total area of passage of 100,000 ÷ 500 = 200 sq.ft. But the sectional area of these airways is 5 × 10 = 50 sq.ft.; and there must, therefore, be 200 ÷ 50 = 4 splits or currents to comply with the conditions named. The potential value, as given in the table, for a single current, is, say 275; and the mine potential for four splits is, therefore, 4 × 275 = 1100. By referring, now, to the second table giving the values of the potential of circulation, it is found that a potential value of 1100, in the circulation of 100,000 cu.ft. per min. shows a water gage between 1 and 1½ in. The true value may be found by interpolation, if desired, and is 1.46 in.

The potential value of any desired circulation of air, as compared with the potential value or "potential factor" of the proposed mine or airway is thus seen to have an important practical value that commends it to all students of mining.

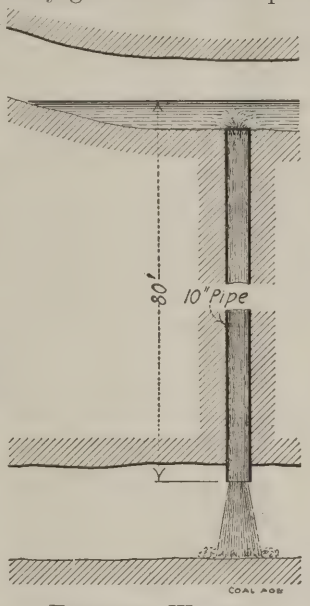
Inquiries of General Interest

Flow of Water in a Vertical Pipe

The accompanying sketch is intended to represent an accumulation of water in an overlying abandoned seam; and it is desired to know how many gallons of water per minute will flow down a 10-in. pipe, into an underlying seam, assuming the pipe is vertical and its mouth 80 ft. below the surface of the water in the upper seam.

DRAINAGE.

Seanor, Penn.



FLOW OF WATER VERTICAL PIPE

In this case, the gravity head, 80 ft., is opposed by three heads; namely, the entrance head (ho) required for the water to enter the pipe and due directly to the crowding of the stream lines, as illustrated in the accompanying figure. Beside the entering head, there is the friction head (hf) due to the resistance of the pipe to the flow of the water, and the velocity head (hv) absorbed in producing the velocity of the water in the pipe.

The velocity head and the friction head have been fully explained, COAL AGE, Vol. 3, pp. 541 and 970. Experiments have shown that if the mouth of the pipe is flush with the floor of the seam, there being no bell-shaped entrance, the entrance head is practically one-half of the velocity head. Therefore, these three heads are expressed as follows:

Entrance head, $$ho = 0.0013\frac{G^2}{d^4}$$

Velocity head, $$hv = 0.0026\frac{G^2}{d^4}$$

Friction head, $$hf = \frac{l\,G^2}{800\,d^5}$$

The sum (h) of these three heads may therefore be written

$$h = \left(0.0039 + \frac{l}{800\,d}\right)\frac{G^2}{d^4}$$

which may be written

$$h = \frac{1}{800}(3.12\,d + l)\frac{G^2}{d^5}$$

From the last equation, calculating the flow of water, in gallons per minute (G), through a pipe whose diameter is d, we have

$$G = 20\,d^2\sqrt{\frac{2\,dh}{3.12\,d + l}}$$

Substituting the values, h = 80 ft., l = 80 ft. and d = 10 in., we have for the flow of water, under the assumed conditions,

$$G = 20 \times 10^2\sqrt{\frac{2 \times 10 \times 80}{3.12 \times 10 + 80}} = say\ 7500\ gal\ per\ min.$$

Study Question--Timbering

I have been studying some of the back numbers of COAL AGE, and would like to ask for an explanation of the factor, 4/3, contained in the answer to the first question on p. 268, Vol. 2. The question is as follows:

"What load will break a white-pine beam 10x12 in. and 14 ft. clear span? Assume the beam is supported at both ends and uniformly loaded."

The answer gives the following calculation:

$$\frac{4}{3} \times 7500\,\frac{10 \times 12^2}{14 \times 12} = 85{,}700\ lb.$$

I do not understand the factor 4/3, and cannot find any table that gives the fiber stress as 7500 lb. per square inch, as stated in the answer to this question. Instead, I find it given as 450 lb., on p. 103 of the Coal and Metal Miners' Pocket Book. The formula I have always used does not give much more than one-half the above load.

Breaking load $$\frac{10 \times 12^2}{14} \times 450 = 46{,}300\ lb.$$

Kindly explain my difficulty.

"X."

Seanor, Penn.

In the first place, the rule quoted by correspondent gives the breaking load, in pounds, for a rectangular beam "loaded at the center," and the question states the beam is "uniformly loaded." For a uniform load the result must be doubled, which gives, by correspondent's method, 92,600 lb.

The formula given in COAL AGE, Vol. 2, p. 268, is a more accurate formula for determining the breaking load of a rectangular beam uniformly loaded. This formula is based on the fiber stress of the material, which, for white pine, is 7500 lb. per sq.in. This is an average value for a good quality of white pine, based on the reports of the U. S. Agricultural Department, Division of Forestry.

The factor, 4/3, has been determined, by experiment, for rectangular beams supported at each end and uniformly loaded. The two formulas will be seen to practically agree, remembering that the length of span in correspondent's formula is given in feet, while in the COAL AGE formula it is given in inches. Thus, comparing these two formulas, we have

$$\frac{4}{3} \times \frac{7500}{12} = 833$$

This is somewhat less than 2 × 450 = 900, which would be the value used by correspondent, corrected for a uniform load. The difference in these results lies in the value taken for the fiber stress.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—What are the duties of a mine foreman?

Ans.—Upon the mine foreman devolves the duty of seeing that the mining law is carried out in every particular. It is his duty to be thoroughly familiar with the state law in all its details and to see that the mine is operated in compliance thereto. The mine foreman must devote his entire time to the supervision of the mine. He must direct all operations underground; keep watch over the ventilation of the mine; inspect all machinery and appliances used in ventilating, pumping, hoisting and haulage and the means used for lighting and draining the mine. He must inspect all working places, haulage roads, air courses and traveling ways as frequently as practicable, and where his duties and limited time will not permit of a daily inspection of every part of the mine, he must see that this is properly done by competent assistants.

The mine foreman must make regular measurements of the air traveling in the mine and record the results of these measurements in a book kept for that purpose. He must superintend all work, see that it is performed in a proper and workmanlike manner; make suitable regulations for safety; and maintain discipline. Besides supervising the daily output of the mine, he must report all accidents to the mine inspector, attend all coroners' inquests and do all in his power to maintain safe conditions in and around the mine.

Ques.—What weight of coal dust does it take to cause an explosion?

Ans.—This question cannot be answered definitely, inasmuch as the explosive condition, with respect to fine coal dust in suspension in the air, will depend on a number of conditions, such as, the fineness and inflammability of the dust; the gaseous condition of the mine air, its temperature and hygrometric state; and the presence or absence of other gases that would increase or decrease the explosiveness of the mixture.

Theoretically, it is estimated that 1 lb. of finely divided coal dust, held in suspension in the air, in the absence of other gases than that produced by the burning of the dust, will render explosive 2440 cu.ft. of air measured at a normal temperature and pressure. This corresponds to practically 0.006 oz. of coal dust per cu.ft. of air.

Ques.—Assuming that an air current containing gas at its most explosive point, has a velocity of 400 ft. per min. in a 6x8-ft. airway; how much air must be added to this current to make the gas it contains 1 per cent. of the mixture?

Ans.—The sectional area of the airway is 6x8 = 48 sq.ft. The volume of air in circulation is, then, 400 × 48 = 19,200 cu.ft. per min. The air current being at its most explosive point contains 9.46 per cent. of gas. The volume of gas in the current is, therefore, 19,200 × 0.0946 = 1816.32 cu.ft. If this volume of gas is 1 per cent., the total volume of the mixture of gas and air will be 1816.32 ÷ 0.01 = 181,632 cu.ft. per min. The volume of air that must be added, therefore, is 181,632 — 19,200 = 162,432 cu.ft. per min.

Ques.—A colliery shaft 16 ft. in diameter and 250 fathoms deep is used entirely for the purposes of ventilation. Taking the coefficient of friction as 0.005, calculate the entire frictional resistance of the shaft and the horsepower expended when an air current of 250,000 cu.ft. per min. is passing.

Ans.—The sectional area of the shaft is 0.7854×16^2 = say 201 sq.ft. The velocity of the air current is 250,000 ÷ 201 = say 1250 ft. per min. There being 6 ft. in one fathom, the depth of the shaft is 250 × 6 = 1500 ft. The perimeter of the shaft is 3.1416 × 16 = 50.266 ft., nearly. The rubbing surface of the shaft is, therefore, $s = 50.266 \times 1500$ = say 75,400 sq.ft. Since the value of the coefficient of friction given is probably per thousand cubic feet of air, the velocity must be expressed in thousands of feet per minute; and is, in this case, 1250 ÷ 1000 = 1.25 thousand feet per min. The resistance of the shaft is then

$$R = k\,s\,v^2 = 0.005 \times 75{,}400 \times 1.25^2 = 589+ \textit{lb.}$$

To find the horsepower absorbed in passing the air through the shaft, this resistance must be multiplied by the velocity of the current, and that product, divided by 33,000; thus

$$H = \frac{589 \times 1250}{33{,}000} = 22.3\ \textit{hp.}$$

Ques.—In a mine working 312 miners, 49 daymen and 22 mules, how many cubic feet of air should be in circulation when 80 per cent. of the miners are at work in the mine?

Ans.—The total number of men at work is 0.80 (312 + 49) = say 290 men. Assuming a nongaseous mine and allowing 100 cu.ft. of air per min. per man, and 500 cu.ft. per min. per mule, the total quantity of air in circulation should be 290 × 100 + 22 × 500 = 40,000 cu.ft. per min.

Ques.—What material would you consider the best to use for building an overcast in a mine that is producing marsh gas in dangerous quantities; stone, brick, iron or wood? Give reasons.

Ans.—Although stone, brick and iron are often used for this purpose, wood is generally preferred, for the reason that a wooden overcast is more easily repaired when broken or displaced by the force of an explosion than one built of stone, brick or iron. The destruction of a brick or stone overcast will generally result in a heap of rubbish, while the twisted iron, in that type of construction, is always difficult of removal. On the other hand, the broken timbers of a wooden overcast can be quickly cut or sawed out and removed. In many cases, however, the wooden planks and timbers are not broken but merely displaced, and the air bridge can be quickly repaired. The principal objection to the use of wood for building an overcast is that the wood is combustible and therefore an element of danger.

Coal and Coke News

Washington, D. C.

The demand for active Government participation in the operation of mines still continues. The sub-committee of the House Committee on Mines which was authorized to investigate the Colorado coal strike has already gone to the field of action and is engaged there in beginning its work.

Meantime the Industrial Relations Commission which has apparently felt the necessity of undertaking something in line with the demands that have been made by Congress has also, it is understood, voted to start upon an inquiry into the mining conditions.

In order to push these efforts further, Senator Borah in a long speech delivered in the Senate on Feb. 4 made an elaborate attack upon the methods adopted by the State of West Virginia for the purpose of repressing the disorders in the coal mining regions.

Incidentally he said that the vast majority of coal mine workers favored peaceful methods in urging their purposes and that labor leaders who preached lawlessness were enemies to the man who toils and to the cause of better conditions, better pay and happier homes. He contended, however, that all guarantees of constitutional government must absolutely be insisted upon in the case of labor troubles just as in every other case where there was conflict between two elements in the community.

Rate Hearings Concluded by Shippers

Bituminous coal men have finished their case against the proposed increase of rates suggested by the railroads, occupying the bulk of Monday, Tuesday and Wednesday, Feb. 2, 3 and 4 in their argument. It is understood, however, that they will be permitted to add further data in reply to the carriers if it should be found that the latter have presented fresh information that is of a nature calling for additional data.

Among those who have testified most effectively during the latter part of the hearings for the bituminous coal shippers was H. H. McCue of the Pittsburgh Coal Co. who argued that the results of the Boileau case would be entirely neutralized and a much greater harm inflicted on the shippers if the proposed rate increase were permitted. The Canadian Manufacturers Association has also protested on the ground that the proposed advance would certainly be followed by a similar advance over Canadian lines.

HARRISBURG, PENN.

One of the many problems that have arisen in connection with the workings of the income-tax law, and one that vitally interests many people of the anthracite and bituminous regions of this state, is that which is involved in determining whether coal royalties are to be considered as income, or as the proceeds of a sale. The contention is made by holders of the fee that since when the coal is exhausted, the property no longer exists, the royalties should rightly be considered converted capital assets and not income.

The following opinion has been given from the office of the Commissioner of Internal Revenues at Washington, D. C.

. . . This office holds, that under the provisions of the income-tax law, Section 2, Act of Oct. 3, 1913, royalties, in a measure represent income to the individual receiving the same and must be so returned; but the owner of the fee from which the coal or ore is received may deduct from the income, to make good the depletion of assets, an amount not to exceed 5 per cent. of the gross value of the output at the mine, that is, the f.o.b. value at the mine.

What proportional amount received from royalties which represent gains and profits and what amount can be considered conversion of capital assets is not, as yet, finally determined, and until a definite rule is adopted relative to this matter, royalties will be considered an income and return will be made in accordance with the above suggestions.

A prominent attorney, who has taken this matter up with the Federal department in the interest of clients who have royalty bearing coal holdings, explains how this rule would work out, by the following example: If the gross value of the output at the mine is $3.80 per ton, which is a fair rating, then the discount allowed for depletion of assets would be 5 per cent. of that amount, or 19c. for each ton. If the owner of the fee held interests which netted him 30c. on each ton, then 19c. would represent the amount on each ton allowed for depletion, and would be regarded as the converted capital assets. The balance, 11c., would be considered income. If the output for the taxation period was 10,000 tons, then the individual's royalties would be $3000, of which $1100 would be regarded as income and $1900 as converted capital assets.

The Pennsylvania Files an Answer

The answer of the Pennsylvania R.R. Co. to the complaint of the Manufacturers' Association, of Lancaster, regarding the rate for the transportation of bituminous coal from the Clearfield district to Lancaster was filed recently with the Public Service Commission. The Baltimore & Ohio and the Philadelphia & Reading have also filed petitions for leave to intervene, as party defendants.

The coal-shipment-rate question has been before the commission for some time and expert advice has been called in on the question of rates from the Schuylkill region (anthracite) to Philadelphia. A report will soon be made.

In its answer regarding the rates charged for moving bituminous coal to Lancaster, the Pennsylvania R.R. denies that the rate is unjustly discriminatory against Lancaster, and asks that the complaint be dismissed.

The Baltimore & Ohio says that if the rates of the Pennsylvania R.R. are reduced it will be necessary for the Baltimore & Ohio either to reduce its competitive rates from the Meyersdale or Somerset region to Lancaster; or, if it maintains its present rates, to allow its shippers to be placed at a disadvantage in competition with shippers from the Clearfield region on the Pennsylvania R.R.

The Reading likewise asserts that if the Pennsylvania R.R. is compelled to make a reduction the Reading would be compelled either to maintain its present rate and thus lose a great part or all of its traffic in bituminous coal to Lancaster, or to reduce its rate to Lancaster and to the numerous intermediate points which are embraced in the rate group.

A reduction in rates to all such intermediate points would greatly decrease the revenues of the Reading and would result in a far-raching disturbance of its rates to eastern Pennsylvania points.

PENNSYLVANIA

Anthracite

Shamokin—All collieries of the Susquehanna Coal Co. in this region closed down Feb. 4 until Feb. 9, 5000 employees being rendered idle. Mild weather and a slump in the anthracite coal trade is given as the reason for the order.

Fire, which broke out in No. 16 vein of the Buck Ridge colliery, on Feb. 2, spread with considerable fury with the result that it was necessary to flood the workings. It is supposed that the fire resulted from defective dynamite. Over 100 miners were laid off for an indefinite length of time.

Wilkes-Barre—The court of Luzerne County, on Feb. 4, appointed the following to serve on the board of mine inspectors' examiners for Luzerne and Carbon Counties: George P. Gallagher, of West Pittston, and Charles S. Miles, of Wilkes-Barre, mining engineers; Benjamin McEnenay, of Exeter, Thomas J. Evans, of Nanticoke, and Patrick Dougherty, of Lansford, practical miners. The men succeeded are John W. Berry, Robert A. Quinn (vice-president of Susquehanna Coal Co.), mining engineers; George L. Walker, Plains, William Toner, of Larkesville, and Frank Schmear, of Lansford, miners.

Pottsville—An explosion of dynamite killed two men on Feb. 2, in the stripping of the St. Clair Coal Co., and was caused by a charge of dynamite left unexploded from Jan. 30, with which a drill came in contact when a laborer drilled into the hole unaware of the presence of the explosive. Mine Contractor Frank Denning and an unidentified Italian were killed instantly.

Bituminous

Outcrop—Alleging that John Heron, mine foreman of the Crystal mines of the United Connellsville Coke Co., had permitted Frank Fordyce to fire a blast from "solid" while other employes were in the immediate vicinity, Mine Inspector I. G. Roby recently made information against Heron charging him with violation of the mining laws.

New Bethlehem—Frank Williams & Co. have leased their upper Hillville mine at New Bethlehem in the Allegheny

Valley to A. W. Williams, of Pittsburgh. It has been idle some months, but will start up at once. It has a capacity of 400 tons, but will be pushed up to 600 tons soon.

Connellsville—It is reported the H. C. Frick Coke Co. is negotiating for the purchase from J. V. Thompson, of Uniontown, of 7000 to 10,000 acres of coal in Greene County at $500 to $800 an acre, the deal involving approximately $5,000,000.

Pittsburgh—Shipments of coke from the Connellsville region over the Pennsylvania lines to Pittsburgh and West were lighter in January than in the same month last year. Official figures show that 29,244 cars of coke were shipped in the initial month of 1914, while during the same period of 1913 the shipments aggregated 49,472 cars. This is a decrease for the present month of more than 20,000.

WEST VIRGINIA

Charleston—The coal business in West Virginia appears to be, at the present time, more slack than for years. Mines in the Clarksburg-Fairmont region are working but a small portion of the time, while some of the smaller concerns have closed down temporarily.

Kingwood—The Kingwood-Cleveland Coal Co., a corporation with main offices in Cleveland, Ohio, has recently purchased a large tract of coal land at Snyders' Crossing, where a siding is now being constructed from the main line of the West Virginia Northern to the company's holdings. Tipples and power houses will be erected in the near future as well as dwellings, it is believed. It is the expectation to be producing coal in large quantities at an early date.

Colliers—Officials of Brooke County are seeking some plan whereby they may disarm striking coal miners who are known to carry weapons, but are being careful to remain on their own property and are hence not amenable to the state law prohibiting the carrying of fire arms.

VIRGINIA

Virginia City—The mines of the Virginia City Colliery Co. were recently sold to George W. Lambert and W. T. Williams, and it is understood that the new owners will spend considerable money electrifying and otherwise improving the property so as to double its present output of coal.

ALABAMA

Oakman—The Atlas Coal Co. recently leased its mines near Oakman to J. C. Lilick, of Ensley, and Joseph Thompson, of Adamsville. Messrs. Lilick and Thompson are experienced and practical mining men.

KENTUCKY

Sebree—About 30 employees of the Sebree Coal & Fuel Co. have gone on strike on account of the refusal of the company to pay every Saturday night, instead of on alternate Saturdays, as the rule has been for a number of years. The mine is idle.

Henderson—Negotiations are under way by the Deep Water Coal & Coke Co. for a site on which a modern steel tipple and complete loading equipment for the company's barges will be erected. It is understood, however, that nothing definite has yet been determined with reference to the location of the site, as some difficulty is being experienced in securing land at a reasonable figure.

Dawson Springs—It is reported that Claud Gentry will open up a small operation near here to work a 58-in. vein of No. 6 coal which he has discovered.

Providence—The Harris Coal Co. has filed a voluntary petition in bankruptcy in the Federal court at Owensboro, Ky. Liabilities are fixed at $16,859, while assets are said to amount to $13,645. The Madisonville Savings Bank is the largest creditor of the company.

OHIO

Bridgeport—The 450 miners employed in the Wheeling Creek mine of the Lorain Coal & Dock Co. who have been idle since the explosion which killed Frank Hora have agreed to resume work. The order from the State Mining Department that only oil should be used for lighting purposes caused the men to go on strike. Their contention is that it was coal gas and not acetylene which caused the explosion.

Columbus—The pamphlet to be issued by J. M. Roan, safety superintendent of Ohio mines, to start the campaign of "safety first" will be published in seven different languages in order to reach all of the miners of the Buckeye state. Mr. Roan will write a personal letter to every miner injured, advising him of the way to prevent such accidents in the future.

East Liverpool—Eighty miners employed by the Card & Prosser Co., of West Pittsburg, walked out of the mine at that place recently because of a reduction in the wages for dead work. Steps are being taken to adjust the difficulties.

Cannelville—The announcement is made that mine No. 38 of the Maynard Coal Co. will be closed permanently, but this is denied by the company officers located at Columbus. The mine is to close temporarily because of lack of orders.

INDIANA

Petersburg—Nearly 1000 acres have been leased in Pike and Warren counties for surface coal mining. The veins are 3 to 7 ft. thick lying at a depth of 5 to 40 ft. It is estimated surface coal is available in 6000 acres in the two counties.

Sullivan—Clifford Botts, a machine operator at the Reliance mine, was recently fined $10 and costs for failing to provide break throughs in rooms and entries at a distance of at least every 45 ft., and Sam Watts, mine boss, was fined $10 and costs for failing to properly ventilate the mine.

Clinton—It is confidently predicted by officials of the Bunsen Coal Co. that provided there is no cessation of work in April, due to the wage-scale agreement, that one million tons of coal will be produced from the two Bunsen mines known as the "million-dollar twins," located five miles south of this city. Although expensively equipped, these mines have not thus far equaled in output some of the other coal mines in the Clinton field.

ILLINOIS

Marion—W. L. Dunsten and Hogan Williford have purchased the mine east of here known as the Pittsburg Big Muddy. It is not likely they will operate this property unless they can get a connection with the Iron Mountain R.R.. Its present connection is on the Illinois Central.

Irving—The Peabody Coal Co. is having some trouble with its mine at Taylor Springs. About a year ago a fall closed up one of the main entrances, shutting off a considerable amount of equipment, and damaging the farm of E. T. Richards. Recently another squeeze occurred, this time in the third and fourth entries and men have been warned to keep out of this portion of the workings

Chicago—Swift & Co. and three railroads were recently indicted by a grand jury in the U. S. District Court on charges of rebating and soliciting rebates. The packing firm alone faces a possible maximum fine of $1,200,000 under the charges. The other defendants were the Pennsylvania R.R., the Chicago & Northwestern R.R., and the "Panhandle."

IOWA

Knoxville—Workmen employed in digging a deep well on the Inebriate Hospital grounds report that the drill penetrated an 8-ft. vein of good coal at a depth of 290 ft. It is said that a shaft will be sunk and the deposit worked by the hospital inmates before the end of the present year.

MISSOURI

Moberly—In an accident recently at the Elliott mine, five miles south of this place, electrician Barman was instantly killed and two assistants seriously injured while repairing the ropes of the cage. One of the ropes broke, permitting the cage to drop to the bottom of the mine.

KANSAS

Courtland—A report that a 6-ft. bed of coal has been discovered near Courtland, brought a number of operators to the scene. If the veins prove as rich as expected, active operations will begin shortly.

Beulah—George & Lawler have secured 3500 acres of coal land, north of Beulah, and have begun prospecting. This is a comparatively new territory, but is believed to be rich in coal. They have leased also 1800 acres south of the tract referred to, to the Hamilton Coal & Mercantile Co., which is conducting experiments with a view of beginning operations in the near future.

ARKANSAS

Fort Smith—The strike of miners in the employ of the Central Coal & Coke Co. was terminated shortly after the walkout. About 1000 men were out, affecting eight mines. The miners charged that the company failed to abide by the decision of the district arbitrator, who upheld the claims of four men for compensation during a period of alleged enforced idleness. The company ultimately agreed to pay the claim and the miners returned to work.

Suit to annul the lease of the Pennsylvania Mining Co. on 100 acres of coal land in Johnson County has been filed by

J. T. Bailey and Van R. Norris in the United States court. The plaintiffs allege the company has failed to pay royalties of 10c. a ton on coal mined since 1911, and that the corporation has ceased using the land except to extract coal from adjoining territory. Both charges, the petition asserts, automatically annul the lease.

OKLAHOMA

Bartlesville—A. M. Parsons has secured a number of leases on coal land near Bartlesville, Okla., and will begin testing at once. The contracts provide that thorough tests must be made within six months, and that operating must begin within a year from the date of the leases.

COLORADO

Pueblo—It is reported upon military authority that but for the congressional investigation, the militia could be removed from the southern coal fields at once. It is alleged that about one-third of the original number of strikers are left in the tent colonies, and these are said to be leaderless and without heart. They have been urged on by false hopes and now the congressional investigation is holding those that remain together.

Colorado Springs—It is believed that Colorado Springs will be one of the cities in this state where the federal committee to investigate the coal strike will hold hearings. This belief is based upon advices received from Washington.

RECENT COAL AND COKE PATENTS

Improvements in Coal Conveyors. L. Hyve, of Dorignes, near Douai, Nord, France, 4700 of 1913.

Coal Jigger. C. Simon, Essen-on-the-Ruhr, Germany, 1,082,102, Dec. 23, 1913. Filed Sept. 4, 1912. Serial No. 718,550.

Improvements in and Relating to Coal Washing Plants. R. Thomson, Lilybank, Reid St.; Burbank, Hamilton, Scotland. 4451 of 1913.

Mining Machine. A. H. Gibson, assignor to Ingersoll-Rand Co., New York, 1,082,318, Dec. 23, 1913. Filed Nov. 18, 1908. Serial No. 463,211.

Improvements in Apparatus for Washing Coal and Other Minerals. W. Habets, Montegnee, Belgium, and A. France, Rue de l'Esperance, 223, Liege, Belgium. 17,012 of 1913.

A New or Improved Method of and Means for Screening or Grading and Conveying Coal, Coke and Other Material. R. Benson, Riverside, Middleton, St. George, Durham, and Head Wrightson & Co., Ltd., 28,115 of 1912.

PERSONALS

R. F. Rogers, formerly of the Rogers-Garlick Coal Co., has been appointed assistant general manager of the Blue Ash Coal Co.

J. W. Dean, formerly mine foreman of the Barker Nos. 2 and 3 mines of the Continental Coal Corporation, has been appointed mine inspector over the 15 mines of the same company. His special work will be looking toward further safety of the company's employees.

O. P. Gothlin, who has been connected with the Ohio Public Service Commission since its formation has resigned his position as head of the traffic bureau and will travel in Florida for a time. Later he may be connected with the Interstate Commerce Commission. Mr. Gothlin is recognized as a traffic expert.

H. D. Mason, Jr., in charge of the United States mine-rescue car No. 4, now at Pittsburg, Kan., recently submitted a report showing the results of the recent tour of Arkansas and Oklahoma, which was interrupted by the Dawson disaster. One hundred and sixty-six men took the full rescue course, according to the report, while 36 more took partial courses. Nearly 4000 persons visited the car on the tour.

F. J. Durdan has been appointed general sales agent of the B. S. Hammill Fuel Co., and is opening offices in the new Marine Bank Building. He was a former Buffalo coal man, but was for some years general sales agent of the Monongahela River Consolidated Coal & Coke Co., previous to the consolidation with the Pittsburgh Coal Co.

OBITUARY

John H. Jones, general coal freight agent of the Philadelphia & Reading Ry. Co., died at his home, 356 Church Lane, Germantown, Philadelphia, on Feb. 4, from heart disease. Mr. Jones was born Jan. 26, 1837, in Norristown, Penn. In 1861 he enlisted in the 81st regiment of Pennsylvania Volunteers and served until April, 1865, on the staff of General O. O. Howard. He entered railroad service in 1865, and in 1880 was appointed general coal freight agent of the Philadelphia & Reading Ry. In 1890 he was made special agent in charge of the United States Census for the Department of Mines and Mining.

CONSTRUCTION NEWS

Charleston, W. Va.—Extensive coal development will be undertaken by the Lackawanna Coal & Lumber Co. on a 30,000-acre tract of land in Boone County, West Virginia, early in the summer. It is proposed to develop a model town to be called Griffith.

Rockwood, Penn.—The Bradenburg Coal Co. has closed down its mine east of Rockwood, due to slackness of orders. The State Line Coal Co. has also laid off many of its miners until about Apr. 1. In the meantime, needed repairs will be made to the plant and several mining machines will be installed.

Columbus, Ohio—According to an announcement of the Ohio Public Utilities Commission steps will be taken soon to secure new equipment for the Detroit, Toledo & Ironton R.R. The shippers along that route have been hampered by lack of equipment and motive power as the road is in the hands of a receiver. Steps are being taken to refinance the road.

Columbus, Ohio—The announcement is made that the Norfolk & Western R.R. Co. will build a third track from Portsmouth to Columbus in order to take care of the increasing coal traffic from West Virginia to the lakes. The Chesapeake & Ohio R.R. Co. will build a bridge across the Ohio River at Sciotoville and thus a portion of the tonnage from that road can be diverted to the Hocking Valley Ry.

Grafton, W. Va.—The Winona Coal & Coke Co. with a mine located at Coffman, four miles from this city, is contemplating extensive improvements in the spring. This firm is now renting its coke ovens from another company, but is arranging to construct 60 ovens of the most improved type. Another mine opening will soon be made, and about 20 miners' houses, together with a power plant, were recently completed.

Martins Ferry, Ohio—The Barton Coal Co. is planning to remodel its present tipple on the St. Clairsville branch of the C., L. & W. division of the Baltimore & Ohio R.R. to take care of about 800 acres of coal to the southwest of the present development. The tipple will be remodeled with a viw to handling a larger daily tonnage.

McDonald, W. Va.—Twenty-two coal mines in the vicinity of McDonald in the New River field are to be electrified under plans which have been worked out by the Randolph-Means Co., of Pittsburgh, Penn. Contracts have been made with the West Virginia Power Co. for central-station current and arrangements are being completed to dismantle the individual power plants.

Greensburg, Penn.—The Randolph-Means Co. has contracted for the electrification of the Keystone Coal & Coke Co.'s Keystone Works at Greensburg, where an isolated-power plant will be discontinued and central-station power will be substituted. The latter will be supplied by the West Penn Power Co.

Greensburg, Penn.—The Greensburg Coal Co. is extending the electrical equipment of its mine and is installing an electric mine hoist to be operated on alternating current. This latter will be in operation shortly. This machine is believed to be the first installation of any importance of this type to be placed in the Pittsburgh district.

Robertsdale, Penn.—Extensive improvements are being made at the works of the Rock Hill Coal & Iron Co. at this place. A 500-hp. plant, including engines and generators, is being installed to operate the mine on alternating current. Contracts have been placed with the Ridgway Dynamo & Engine Co. for engines and generators.

NEW INCORPORATIONS

Chicago, Ill.—The Western Coal & Dock Co., of Chicago, has dissolved.

Frankfort, Ky.—The Belcourt Coal & Mining Co. of Webster County has increased its capital from $3350 to $5079.

East Chicago, Ind.—The Wisconsin Lumber & Coal Co. has increased its capital stock from $25,000 to $100,000.

Chattanooga, Tenn.—The Tennessee River Coal & Coke Co. has been incorporated with a capital stock of $125,000, to develop coal.

Indianapolis, Ind.—The Oak Hill Coal & Mining Co., Vermillion County, and the Summit Mining Co., of Bloomfield, have dissolved.

Barbourville, Ky.—The Hazardtown Coal Co. has been organized with a capital of $30,000. The incorporators are W. M. Jones, O. C. McClung, and J. B. Eversole.

Providence, Ky.—The Washington Coal & Coke Co. has been organized with a capital stock of $3000. The incorporators are Henderson Foxwell, James A. Foxwell and I. Foxwell.

Marissa, Ill.—A certificate of dissolution of the Borders Coal Co. has been filed in the recorder's office. This is one of the oldest firms in the county, and the dissolution came as a surprise.

McAlester, Okla.—The North McAlester Coal Co., of McAlester, has been incorporated with a capital of $5000. The incorporators are Richard E. Jones, Walter Cunningham and Rosy Jones, all of McAlester.

Marion, Ill.—The Economy Coal Co. has been organized with a capital stock of $60,000 for the purpose of mining, buying and dealing in coal and fuel. The incorporators are H. G. Ferrell, S. H. Goodall and G. B. Campbell.

Lexington, Ky.—The Carnahan-Hudson Co. has been organized, with a capital stock of $50,000, by Robert T. Carnahan, of Louisville, and George K. Graves, Leonard G. Cox and Charles N. Manning, of Lexington. The company will purchase and develop mineral and timber lands.

Albany, N. Y.—A charter has been granted to the Seiler-Blanchard Co. Inc. The capital stock of the company is $25,000, and the offices will be located at No. 1 Broadway, New York City, and at Binghamton, N. Y. This firm will handle a well-known line of anthracite and bituminous coal.

Washington, Penn.—A charter has been filed for the Lindley Coal Co. The principal incorporators are William S. Morehead, Pittsburgh; John S. McKelvy, Jr., of Wilkinsburg, and William F. Knox, of Ben Avon. The company will engage in coal mining, and its principal offices will be located in Pittsburgh.

Welch, W. Va.—The Cumberland-Campbell Coal & Coke Co. has been organized with a capital stock of $25,000. The chief works will be in McDowell, W. Va., and Harlan County, Ky. The incorporators are James B. Flanagan, of Welch, Ely L. Glade, of Chicago, J. M. Clay, of Louisa, Ky., J. W. Waldron and Thomas J. Flanagan, of Welch.

Charleston, W. Va.—The Acme Corporation of Parkersburg has been organized for the purpose of operating mines, drilling for oil, holding water rights, developing and selling electricity. The capital stock is $250,000, of which $2000 has been paid. The incorporators are S. D. Camden, C. C. Martin, Thomas Logan and W. W. Van Winkle, of Parkersburg, and W. W. Mills, of Marjetta, Ohio.

INDUSTRIAL NEWS

Chattanooga, Tenn.—The Tennessee River Coal Co. is preparing to reopen its mines near Chattanooga, which have been closed down for more than a year.

Evansville, Ind.—It is announced here that seven more coal mines in western Kentucky will be acquired by the Deep Water Coal Co., of Pittsburgh. This firm recently took over 17 coal mines in western Kentucky and one mine in Newburg, Ind.

Belleville, Ill.—The mine of the Belleville Colliery Co., formerly known as the Lattmann mine, was sold recently to satisfy judgments and a chattel mortgage. It was purchased by Ben Gundlach for $11,000. The judgments against the colliery company were for wages due miners employed.

Youngstown, Ohio—It is estimated that the Pennsylvania R.R. spent for locomotive fuel last year $11,187,448; the Baltimore & Ohio expended $6,926,745; the Lake Shore, $3,926,888, and the Michigan Central, $3,323,535. The Lake Shore spent more for fuel than for repairs to engines.

Pineville, Ky.—The Pineville Coal Co. has purchased 1346 acres of coal land on Straight Creek and will establish a plant for a daily capacity of 1500 tons of coal. The equipment will include retarding conveyors, shaker screens, electrical machinery, etc., and contemplates the expenditure of about $100,000.

Lansford, Penn.—The work of removing the large culm bank at Lansford is progressing rapidly, and it is expected that within a year, the ground which has been occupied by this refuse heap for more than 60 years will be divided into building lots. A scraper line is being installed to clean up after the steam shovel.

Monongahela, Penn.—Negotiations are under way for the sale of approximately 500 acres of coal land in Followfield Township by the Joseph Rider heirs, and others, to the Wanner-Leonard Coal Co. This firm operates the Leonard mine at Fayette City; also a mine at Brownsville. The main offices are in Cleveland, Ohio.

Moundsville, W. Va.—A deal has been consummated whereby Samuel Dorsey bought all of the coal underlying the land of Dr. M. F. Compton, turning the same over to the Mound Coal Co., which operates the mine on First St. The transaction gives the mining company an unrestricted right-of-way from the railroad to the Ohio River.

Scranton, Penn.—A sliding-scale bonus of $1050 was recently awarded by the Archbald Coal Co. to the miners who worked for this firm in March, 1912. The matter was finally adjusted by district board members, Stephen Reap and Harry Kerins, and the first half of the bonus will be paid immediately, and the balance during the latter half of February.

Bristol, Conn.—The New Departure Mfg. Co. will shortly occupy its large and handsome administration building which has been in the course of erection for the past 12 months. De Witt Page, who has been identified with the company for some time, has been appointed general manager, and Chas. B. Treadway, Treas., becomes chairman of the Board of Directors.

Detroit, Mich.—The 1914 sale convention of the American Blower Co. was held in Detroit on Jan. 28 to 30, and was attended by about 50 of the company's sales and engineering representatives. Somewhat contrary to expectation, pessimism had no place whatever in any part of the convention, and the feeling was general that more and better business would be handled in 1914 than was booked during the previous year.

Harrisburg, Penn.—The State Department of Mines reports that 1141 mine workers were killed in and about the mines of Pennsylvania last year. Of these, 615 met death in the anthracite region, and 526 in the bituminous district. The number of employees in the first named field is given as 180,000, and in the latter 185,000. The bituminous miners produced 168,000,000 tons of coal against 90,000,000 produced in the anthracite field during the same period.

Washington, D. C.—Discrimination by the Pennsylvania R.R. on rates of bituminous coal in favor of the Keystone Coal & Coke Co. and the Jamison Coal & Coke Co., both of the Greensburg dsitrict as against the Pittsburgh Coal Co. was recently charged by the traffic manager of the latter company before the Interstate Commerce Commission, while testifying in the hearing on the proposed 5 per cent. advance in rate for the railroads in the Eastern classification territory.

Denver, Colo.—Holding that the Union Pacific, Chicago, Burlington & Quincy, and Colorado & Southern railroads are charging an exorbitant rate for carrying coal from the northern Colorado fields to Denver. Judge Terry recently upheld the findings of the State Railway Commission, and ordered a reduction amounting to approximately 30 per cent. Unless Judge Terry's ruling is reversed by the Supreme Court to which the railroads will go on a writ of error the rate fixed by the commission of 55c., 50c. and 45c. per ton for lump, run of mine and slack coal will prevail as against the present rates of 80c., 70c. and 60c. a ton, respectively.

Uniontown, Penn.—Figures from the office of the commissioners of Greene County show that J. V. Thompson, of Uniontown, is in all probability the most expensive individual holder of coal in the United States. Greene County has 18 townships, and in 17 of these, Thompson owns coal. His total holdings aggregate 120,000 acres. If an acre of coal after being mined and placed on the market is reckoned as worth $10,000, this valuation of the coal held by Thompson would give a potential value of $1,200,000,000. None of the coal held, however, has been developed, Thompson being a speculator in virgin coal and not interested in its mining or sale.

Coal Trade Reviews

General Review

Colder weather creates some activity in anthracite but the domestic sizes continue under heavy pressure; steam grades still short. Demurrage and embargoes the rule in bituminous. Conservative interests accumulating surpluses against a suspension Apr. 1.

The recent colder weather acted as a temporary stimulant to the anthracite trade, but the movement was so prompt that the situation was easily met before it had an opportunity to affect the wholesale end. The fact that the independent operators are finding it necessary to curtail their production is significant evidence of the trend of conditions in this branch of the industry. There is a heavy loading of lake vessels in the Buffalo harbors. Consumers in all departments report a substantial decrease in consumption and there are many who predict that even the large companies will be forced to make concessions on the winter circular before the customary time, Apr. 1. Operations are so heavily restricted, as a result of the poor demand for the domestic grades, that the steam sizes are becoming steadily shorter and commanding larger premiums. Anthracite shipments for January were the lowest for that month since 1905.

Nominal prices are being relatively well maintained in the Eastern bituminous market but the large amount of consignment coal on demurrage is resulting in many sales at ridiculously low prices. There is practically no demand for spot coal and while a few contracts are being closed for the new year, embodying clauses protecting the consumer against a further decline, most agents are not actively seeking business; in view of the adverse conditions prevailing it is difficult to negotiate on a profitable basis, and sellers hesitate to weaken their position by attempting to force the market.

The possibility of a protracted suspension, Apr. 1, is creating confusion and a great diversity of opinion prevails as to the result. The larger conservative Eastern buyers are showing a disposition to stock up heavily in spite of the miners' tentative offer to continue at work pending a settlement. In other districts, however, the buyers are already so heavily stocked in excess of current requirements that they will not consider further offers.

Considerable coal is reported in the Pittsburgh district accumulating demurrage and operations are restricted to probably not more than 50% capacity. Many orders in Ohio placed for February delivery have been canceled, and the market is in bad shape. Hampton Roads reports continued light demand for spot coal, but a rather increased movement on contracts has materially reduced accumulations. Hopes of any real winter weather in the South have been abandoned and the market is quiet with shipments below the average for this period of the year; companies will enter the summer trade with heavier stocks than ever before.

The first seasonable weather of the winter has occurred in the Middle Western market and created a more active situation there. This has checked the tendency to cut prices and mine operations are much better, while the improvement in other lines of industry is also helping the situation. Some buying in anticipation of the impending labor troubles is also noted.

EASTERN MARKET

BOSTON

Active canvass for contracts by Hampton Roads agencies. No significant concessions in price thus far. No demand for spot coal. Water freights rather unfavorable to Pennsylvania coals and little doing. Anthracite extremely quiet.

Bituminous—The Pocahontas and New River shippers are actively canvassing for contract business. A few large orders have been entered through the customary channels and with the usual clause protecting the buyer against a decline in price and also including a provision with regard to the possible advance in tolls. Such arrangements are, of course, only options and have no direct bearing on the future of the market, but this is the only form in which buyers will consider making contracts at least for the present; $2.85 is still being maintained as the base price and what concessions are heard are confined to the smaller agencies who have to deal with accumulations at the Hampton Roads piers. Shipments from that quarter are still light for the season.

For spot coal there is practically no demand whatever in this territory. A large cargo of Southern coal was delayed here, discharging for more than a week recently, awaiting orders for distribution inland; that sort of procedure always has a depressing effect on what market there is. Stocks are large in every direction and nothing short of extravagant inducements will bring forth any material amount of business.

The high range of water freights maintained out of Philadelphia operates against any call for the Pennsylvania grades along the coast and what small orders offer are likely to find their way to the coals from Hampton Roads. Practically all the Pennsylvania districts, as well as Georges Creek, are under heavy curtailment, with no significant change in sight.

Anthracite—There is only a scattering demand for sizes, but some improvement is hoped for from the colder weather. Stocks to the Eastward are running down and there is reason for predicting a good demand as soon as April prices are in force. The independents are little heard from in this territory, and practically all the coal that is sold is on the current company circular. Moderate supplies continue to come forward to storage depots.

From all quarters it appears that the consumption of stove size is still increasing, while egg is as steadily growing less in demand. It will be interesting to see how this situation works out the coming season.

Wholesale quotations on bituminous are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.55	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.80	2.92@3.02	
New York*	2.50@3.00	2.80@3.10	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.58@3.65
Providence†				3.58@3.68

*F.o.b. †On cars.

NEW YORK

Many embargoes are being declared on soft coal. Few negotiations on contracts for the new year. Much demurrage coal and some low prices being heard. Heavy pressure on domestic grades of anthracite with steam sizes in strong demand.

Bituminous—Further recessions continue to mark the local soft-coal trade. There are large surpluses of coal at South Amboy and embargoes have been declared against certain consignees; these are having a beneficial effect upon the situation, however, by curtailing the shipment of market tonnages into a trade already oversupplied with coal of all kinds. On Feb. 9 the Philadelphia & Reading Ry. announced embargoes on all shipments of bituminous coal to consignees at Port Richmond, Philadelphia and Port Reading, N. J.

The movement on contracts continues to be the mainstay of the market, particularly for those operators who are not attempting to overload their customers. However, even the contract movement is getting steadily weaker, although there are a few consumers who are taking some extra in anticipation of a suspension Apr. 1. On contracts for the new year, the conservative selling agencies are not attempting to push for business, believing that their position would be materially weakened, should they do so in the face of the adverse conditions now prevailing. Consumers, on the other hand, are holding off, awaiting developments. Operations are already heavily restricted, and if no suspension occurs, the outlook for the summer business is decidedly pessimistic.

Because of the large amount of demurrage coal being negotiated, abnormally low prices are heard, as much as

45c., f.o.b. mines, being on gas coal. This condition is due to operators attempting to force the market, being ready to make sacrifices in order to hold their mine organizations together. Disregarding such sales of demurrage coal, we quote the nominal New York market off 5 to 10c. per ton from last week as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.60@2.70; best Miller Pennsylvania, $3.10@3.15; George's Creek, $3.15@3.25.

Anthracite—Although the recent cold weather has had a momentary stimulating effect upon the situation, the market continues discouragingly flat and devoid of interest. Operations in the mining regions are being restricted in an unprecedented manner for this period of the year, the curtailment being shared in by the large companies and individuals alike. A conservative estimate places the operations at not to exceed 60% capacity, as a maximum.

The pressure is concentrated entirely upon the domestic grades, as is to be expected. The difficulty in moving these has resulted in the curtailment of mining and has also placed the producers in an embarrassing position as regards the steam grades. Contracts were entered into for tonnages of these latter, gaged upon full-time operations; obviously, with mining restricted as it is, the expected output of the small sizes is not being realized, with the result that producers are unable to meet their obligations on these grades. It is not surprising, therefore, that premiums are being freely offered for all kinds of small coal, while the reverse obtains in the prepared grades, all of which are a drug on the market.

We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	$4.50@4.75	$5.05	$4.45@4.70
Egg	5.25	5.00@5.25	5.30	4.65@5.20
Stove	5.25	5.00@5.25	5.30	5.00@5.20
Chestnut	5.50	5.35@5.50	5.55	5.35@5.45
Pea	3.50	3.40@3.50	3.50	3.15@3.45
Buckwheat	2.75	2.75@2.85	2.70@3.45	2.25@2.80
Rice	2.25	2.25@2.35	1.95@2.20	1.85@2.30
Barley	1.75	1.75@1.80	1.70	1.55@1.70

PHILADELPHIA

Anthracite situation receives impetus due to colder weather. Steam sizes in active demand, but domestic market well supplied. Bituminous unchanged, but still reflecting low prices and limited demand.

Weather conditions have been more favorable during the past week for the anthracite coal trade, and while the wholesale market has not felt the impetus as yet, the retail end has profited more or less. While both classes of the trade seem to feel more optimistic, the general idea seems to prevail that one week of winter will not bring about any lasting results; the householders, recognizing that winter weather in this vicinity is not likely to last much longer, will economize to the greatest extent in the purchase of coal, and it will require at least four to six weeks of a continuous spell to dispose of the large stocks which most of the dealers are carrying. Many of them are doing considerable shopping in the face of the present market conditions, and are doubtless securing bargains on almost all of the prepared sizes.

The fact that even the individual operators have been curtailing operations at their mines does not speak well for the market, and judging from reports, they are having difficulty in disposing of their output at that. The large companies are still adhering to circular prices. It is understood with the curtailed mining, it has been impossible to fill contract obligations on the steam grades, and large inroads are being made into stocks; buckwheat is in particularly short supply. Broken coal seems to be about the only senior size that is short of the market, the contracts in some cases being far behind actual requirements; operators claim they cannot mine coal to supply a market for only certain sizes as they have to dispose of all.

The tidewater market from this city has fallen flat. Orders are few and far between, and it is understood that many of the barges of the transportation companies are being tied up on account of the lack of business. Everybody seems to be postponing taking on additional coal as long as possible, and the New England market is said to be well filled.

Depressing influences still continue to characterize the bituminous market in the shape of poor prices, and limited demand. Inferior coals are being offered as low as 80@90c. at the mines, and they are not particularly easy to dispose of at that. Better grades of coal are ruling at 35@40c. higher.

BALTIMORE

Cold snap has proven highly beneficial to the anthracite trade. Bituminous business still rather flat, with prices poor. Rumors of anticipated labor trouble causing interest. Heavy shipments over the piers.

A welcome drop in temperature has already had a distinct influence for good on the anthracite trade. The hard-coal business here has been flat for several weeks, but there is now a briskness to orders that is most encouraging. The movement from mines to tide proved prompt, however, and the situation was easily met as regards the domestic grades. There has been a growing demand for this latter class of coal here despite the fact that dealers have several times advanced the price.

While the soft-coal situation is for the moment uneventful there are rumors of labor troubles the coming April, In the face of the recent poor demand for soft coal and the low schedule of prices an unsettled labor situation might not prove entirely unwelcome. A little more activity was shown in West Virginia gas coals the past week, this fuel having recently been the most unsatisfactory feature of a poor market generally. Three-quarter gas is still selling to the trade at the mines around 80c. Steam coals of West Virginia are averaging around 90 and 95c. with liberal offerings on prompt delivery. Pennsylvania lower grades are running from 90c. to $1 while the best grades still hang at from $1.20 to $1.30.

The trans-shipment business here is quite satisfactory, at least to some handlers, as considerable business is being done both coastwise and to foreign ports. The vessel charter situation still remains easy in spite of a number of closings. There is considerable range in charters, ,African, European. South American and Central American loadings being noted since the first of the year, during which a total of about 100,000 tons has been exported up to the start of the present week.

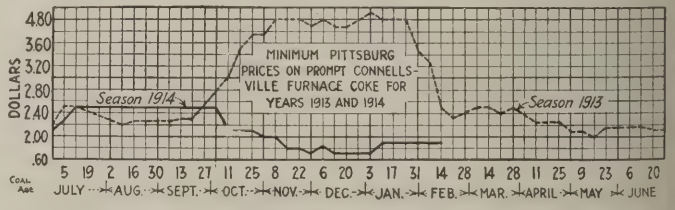
CENTRAL STATES

PITTSBURGH, PENN.

No prospect of wage scale agreement at Philadelphia conference, begun this week, and little possibility of mining suspension being avoided. Mine operations lighter, at less than 50% of capacity. Connellsville coke market quiet, but with better undertone. Shipments increased.

Bituminous—It is out of the question that this week's scale conference at Philadelphia should reach an agreement, but it is barely possible that arrangements will be made whereby there will be no suspension of mining in case agreement on the scale is not reached by Apr. 1. The balance of probabilities is clearly that there will be a suspension, and one of considerable duration. Some of the demands of the men, as formulated at the Indianapolis convention, are regarded by operators as impossible.

The coal market continues flat, owing to light domestic, industrial and railway demand. A sharp cold snap reached the district Sunday and domestic demand may prove better for a few days. There is considerable coal at distributing points without instructions, and demurrage is accumulating, resulting, it is claimed, in the railroads picking up some coal at bargain prices which will be held against the possible suspension of mining. Mining operations are somewhat reduced, and probably average less than 50% capacity. A number of mines are entirely idle, while many others are operating only from two to four days a week. Prices are rather badly cut on free coal, and even in some instances on slack, the regular circular prices remaining as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.



Connellsville Coke—The market has been quiet as to actual transactions, but is showing an improved undertone. It is believed that low-priced sellers are fairly well filled for as large a tonnage as they would care to take at under the $2 asking price of the majority of operators, while the somewhat significant incident has occurred that the Producers' Coke Co. has withdrawn all prices for shipment after Apr. 1. The move is not necessarily of significance from the fact that any inquiry likely to develop is only for early de-

livery, and the companies represented in this selling agency are not likely to miss any business by staying out of the market for the later delivery; at the same time they are placing themselves in position to profit by any material improvement that may occur in the iron situation and any sharp demand that might arise for raw coal through a suspension of mining in the union districts. It is claimed that under normal coal market conditions there is about as much profit in coal as in coke at less than $2. The coke market continues to be quotable as follows: Prompt furnace, $1.90; contract furnace, $1.90@2; prompt foundry, $2.40@2.60; contract foundry, $2.40@2.60, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending Jan. 31 at 301,055 tons, an increase of 10,000 tons, and shipments at 298,541 tons, an increase of 7955 tons.

BUFFALO, N. Y.

Capricious weather and too much coal weakens all prices. No strong market till steady low temperatures set in. Miners' actions closely watched. Loading vessels.

Bituminous—The market has strengthened a trifle, but the general erratic weather has kept prices unsteady. It is getting so late now that the trade is not looking for much of a market this winter unless it is later found that there is not likely to be coal enough to last through a reasonably long mining suspension. While it was announced that the miners would continue work after Apr. 1, pending a fixing of mining prices, the operators say the mines will be closed at the end of March and remain so till there is some profit in the business. This is the feeling all through the mining districts. Some of the operators say they expect to be shut down till sometime into May.

The miners are complaining that they do not get as much work as they need, mines often running only about half time, due to the condition of the market. Still there are many members of the trade who are decidedly cheerful; iron moves more freely and some are saying that by Mar. 20 there will be a good volume of all sorts of business. There is much activity in Buffalo harbor. The loading of anthracite for lake shipment in the spring has been resumed and the steamers are mostly putting on their fuel against shortage next April. As they are taking about 500 tons each the aggregate is large.

Bituminous prices are slightly stronger on the basis of $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.10 for slack. The price of Allegheny Valley is about 25c. lower for sizes, with slack about on a par with Pittsburgh.

Coke—There is no particular stir in coke. The amount going into consumption is larger than it was a month ago, but that appears to be only just enough to keep it from going lower. Prices are based on $4.50 for best 72-hr. Connellsville foundry.

Anthracite—The trade has not improved materially. Mines are running slow, and there is much complaint of stocks at practically all points. Consumers are reporting a large reduction in the amount consumed and indications are that not only the independents, but larger interests also will sell at April prices sometime before these go into effect. The retail trade has done less business here so far this winter than during any similar time on record.

COLUMBUS, OHIO

Ohio trade fast approaching demoralization. Circular prices being cut, and there is considerable tonnage on track. Not much stocking against a shortage in case of a suspension.

With low prices prevailing for all grades of coal and with no disposition on the part of steam users to stock up the coal trade is weak and quiet. Operations are at a low ebb and sales managers are able to place scarcely any tonnage. On the whole the market is in bad shape.

Production has become still smaller during the week as many mines have been closed down entirely and others are being worked with only a small force. Several operators who have been shipping on consignment have stopped which has cut into production still further. In the Hocking Valley the output is estimated from 35 to 40% of the average and the Pomeroy Bend district produced about the same percentage. In the domestic fields the output was about 25% of normal. In eastern Ohio the reports show that about 40% of the average was produced during the week.

Domestic business is slow as dealers are not inclined to stock up; their bins are full and the weather has been such that they cannot move it. Many of the orders placed by retailers for delivery early in February have been canceled. Domestic lump and ¾-in. are a drug on the market and spot coal can be bought for almost any price. There is some little demand for the fancy grades of rescreened West Virginia and Pocahontas.

Steam business is steadier but there is unusual quietness. Factories are taking about their usual requisitions, which means they are gradually accumulating stocks as their daily needs are not equal to receipts. Only a few railroads which do not touch the coal fields are stocking up any.

Most of the operators in the Ohio fields believe nothing can prevent a suspension after the expiration of the present wage agreement. The statement comes from West Virginia that there will be a suspension in that state also, in order to allow the tonnage on track to be cleaned up. Prospects for an active lake trade next season are not very promising as there is still a large amount of coal on the docks at the upper lake ports.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.40 @ 1.35		$1.50 @ 1.45	$1.40 @ 1.35
3-4 inch	1.25 @ 1.20	$1.20 @ 1.15	1.35 @ 1.30	1.30 @ 1.25
Nut	1.25 @ 1.20		1.30 @ 1.25	1.20 @ 1.15
Mine-run	1.10 @ 1.05	1.10 @ 1.05	1.15 @ 1.10	1.10 @ 1.05
Nut, pea and slack	0.80 @ 0.75		0.80 @ 0.75	0.80 @ 0.75
Coarse slack	0.70 @ 0.65	0.95 @ 0.90	0.70 @ 0.65	0.70 @ 0.65

CLEVELAND, OHIO

A slight improvement in the demand for slack. Close of last week developed temperatures approaching zero which gave the coal market a boost. Some larger manufacturers taking contract coal and the market has the appearance of cleaning up.

The colder weather that threatened northern Ohio the first of the month failed to materialize and last week the weather was almost spring like until Saturday, when a real cold wave swept the northern part of the state.

In spite of the warm weather the American Steel & Wire Co. began taking coal from its shippers who had been shut off for two weeks. Many factories have been embargoed because they cannot unload the cars. The American Steel & Wire Co. has a 30 days' supply on hand and many other plants have from two to three weeks' stock stored away; the Lake Shore R.R. has a month's supply of coal docked and other roads have stocked some, but more docking will be done before Apr. 1.

The hard-coal market has been so slow car service is being paid on coal on track. Until the cold wave struck the city, both Cleveland and its surrounding market offered little immediate prospect of absorbing the small amount of anthracite on hand.

The retail trade has had a fair business under the adverse conditions. None of the larger firms had all of their equipment working though, considering the weather, they did very well.

The wholesale market was well stocked with lump coal, especially from the No. 8 district. The larger demand for slack has left three-quarter, and inch and a quarter sizes to be disposed of on an overstocked market. This resulted in a continuation of the low prices on the larger coals, while slack was sold at an advance of 5c. Pocahontas is as low as it has been for several months. The fall prices were from 50 to 60c. above those that are prevailing today.

The Massillon district is not sending its product into the flat market. Many of the mines are shut down or working only a small part of the time. Operators in this district have a single price below which they cannot go without losing money and they have maintained this circular so far. Prices ranged a little higher last Saturday than during the middle of the week. Although the amount of coal that comes into Cleveland on Sunday and Monday tends to take the edge off the market as it closed the previous week, a continuation of the cold weather will probably bring a decided betterment during the next few days.

Sales of spot coal were made at the following car prices:

	No. 8	Middle District	Pocahontas
Lump, 1¼-in.	$2.00@2.10	$1.90@2.20	$3.25
Lump, ¾-in.	1.90@2.00	1.85@1.90	
Mine-run	1.85	1.75@1.80	2.75
Egg			3.25
Nut	2.10		
Slack	1.80@1.85	1.70	

DETROIT

Demurrage coal disappearing and a better tone evident in most quarters. Embargoes on local roads. Buyers becoming anxious.

With all the railroads leading into Detroit embargoed against fuel, and the recent sudden cold snap operators and jobbers are beginning to be optomistic. The steam business has shown a specially marked improvement in the last few days.

Buyers are anxious to be taken care of, and the several hundred cars of demurrage coal that have been on local tracks for the past three weeks are melting away quite rapidly as the demand increases. Should the cold weather continue, and the railroads delay in raising the embargo, it is possible that Detroit may experience a slight coal famine

within the next 10 or 15 days; should the weather moderate to any great extent, and the embargo raised, the local market will again be flooded with steam fuel from West Virginia, Ohio and Indiana, in such large quantities that it will be difficult to obtain even 50c. a ton for mine-run.

Anthracite—The large supplies of hard coal, are now being disposed of quite rapidly. The demand has increased materially and for spot cars, 25c. above circular is being asked.

HAMPTON ROADS

Conditions at Hampton Roads improving. Total dumpings for January. Accumulation of coal on railway yards somewhat reduced.

The situation at Hampton Roads is gradually improving and although there is little demand for spot coal the movement on contract during the week has considerably reduced the accumulation of cars on the various railway terminals. The largest shipments coastwise, as usual, have gone to the New England market with a fair number of cargoes moving foreign. These latter went to Bermuda, Canal Zone, Barbadoes, Dakar, Havana, Santiago, Rio, Kingston, St. Thomas, Valparaiso and Genoa. Perhaps the largest shipment of the week was that moving to Genoa this cargo amounting to about 10,400 tons. Approximately 2600 tons moved by schooner from Hampton Roads to Ponce, Porto Rico. The commander of the French oil supply ship "Garonne" asked for bids for supplying French government vessels with bunker coal at Hampton Roads. It is understood the price made was the regular foreign bunker rate plus cost of barging and stevedoring for such vessels as could not load at piers and the regular foreign bunker price for such as bunkered at piers. This contract is to cover 1914.

Dumpings over Hampton Roads piers for January amounted to 984,301 tons. Of this quantity the Norfolk & Western Ry. at Lamberts Point dumped 508,212 tons. the Chesapeake & Ohio Ry. from Newport News 247,219 tons and the Virginian Ry. from Sewalls Point 230,870 tons. From these figures it will be seen that the Norfolk & Western dumped considerably more than the other roads combined.

LOUISVILLE, KY.

Colder weather stimulates retail trade, but arrived too late to help the wholesale business. Prices on a midsummer basis. Steam market improving.

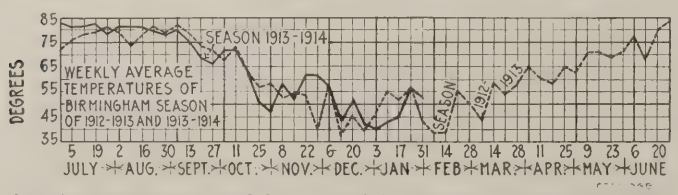
While the belated cold wave has finally arrived, the effect so far has not been noticeable in the wholesale end of the trade although the retailers have profited by the resulting increase in the demand. As pointed out heretofore, it will take a prolonged period of low temperatures to reduce retailers' stock to a point where they will have to place new orders, and the lateness of the season makes it improbable that the present cold snap can last long. Small orders are the rule with domestic consumers, and there is little doubt but what hand-to-mouth buying will continue. The total volume of business will be much smaller than it would have been had the present severe weather occurred a month or more ago.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM, ALA.

Little improvement in coal and coke. Market quiet and shipments below the average for this season of the year. Heavy tonnage of pig iron booked and prices advanced to $11 f.o.b., Birmingham, for 2 Foundry. Car situation satisfactory.

This week has shown little improvement in either steam or domestic coal. Warm summer-like weather has prevailed



for the past week, and lump coal is in small demand, though colder weather is predicted for the next ten days, which may bring about an improvement; prices are from 25 to 50c. per ton less than the February circular. Steam coal is also feeling the effects of the quiet market, but unlike the lump, the prices are holding up well under the circumstances. Furnace and foundry coke are quiet, sales in small tonnages only being made. Blacksmith coal is slightly better than last week, prices being from $2 to $2.25 f.o.b. mines.

A heavy tonnage of pig iron was again booked by the furnace companies, which are now holding for $11 f.o.b. Birmingham for 2 Foundry, some sales being made at $11.50. The iron market is in a better condition than it has been for several months. The car supply is quite adequate for the demands at this time.

NEW ORLEANS

Local sales much below last year. Larger business anticipated this summer due to higher prices of fuel oil.

All hope of protracted cold weather has been abandoned by retail dealers here. Sales for domestic purposes are 45% lighter this year than normal. As a result the influx of coal from the mines has been suspended as practically every company will enter the summer with larger stocks than ever before has been the case. It is expected, demand this summer will be larger, due to the number of steam plants that are returning to the use of coal because of increasing cost of petroleum.

INDIANAPOLIS

January was an unusually poor month but February weather is putting the coal trade at its best. Consumption of domestic grades has a boom and factory needs are gradually increasing. Mines working on slightly better time and prices hold firm.

February is displaying the most seasonable weather Indiana has had since summer ended. January was one of the mildest winter months on record for this state and the coal dealers, who had counted on making up for the slowness of fall trade were sorely disappointed. February came in with snow and sleet that not only increased the consumption of coal but caused much damage to wire communication and delayed transportation. The sun came out the third day but later a cold wave followed that carried the temperature down to about zero and retail coal dealers all over the state quickly fell away behind orders.

This was what was needed to stiffen the coal market, as there were reports of a shading of prices, which seemed to threaten to become general. As it is, no change is made from the retail schedule adopted at the beginning of the season. Mine prices are firmer and operations better, due to the cold spell and some improvement in the industrial situation. There is a general preparation for greater activity in this line and the working forces are being slowly but steadily enlarged, though in some cases, hundreds of men are taken back at once.

CHICAGO

Market continues soft. Producers eager to accept business at almost any price. Smokeless mine-run selling at $1@1.05, while lump and egg are being disposed of at $1.50. The top price for Carterville lump, egg and No. 1 washed is $1.60. Coke prices remain nominal.

"Continued soft" is the essence of comment among Chicago coal dealers, so far as market conditions are concerned. While zero weather has visited the territory this winter, it has not remained long enough to have any appreciable affect upon business. Producers and wholesalers will accept almost any price that is offered. Unusual weakness has been shown in the smokeless coal market; sales of smokeless mine-run at $1 and $1.05 have been frequent and lump and egg are being sold as low as $1.50.

The splint coal market, nominally, is $1.50 on shipments direct from the mines, but a large amount of large-sized splint lump on demurrage is being sold as low as $1 a ton. As a result of a general scramble for business, Franklin County operators are selling lump and egg at from $1.40@1.60, the mines. Quotations for mine-run range between $1.15 and $1.20.

Carterville operators are seeking business at almost any price that will attract trade. The top price for lump, egg and No. 1 washed is $1.60, and a less figure is being accepted for coal on demurrage. Springfield operators have been compelled to shade prices as a result of sharp competition.

Coke prices are practically nominal. Sales are made with difficulty as the current demand is light. There has been a slight upward tendency in the steam trade, but conditions are far from satisfactory.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07@2.17	$2.45@2.65	$2.12@2.27	
Steam lump	1.87		1.97	
Egg		2.45@2.65		$3.90@4.30
Mine-run	1.82	2.20@2.25	1.87	3.20@3.45
Screenings	1.37@1.42	1.70@1.80	1.37@1.42	

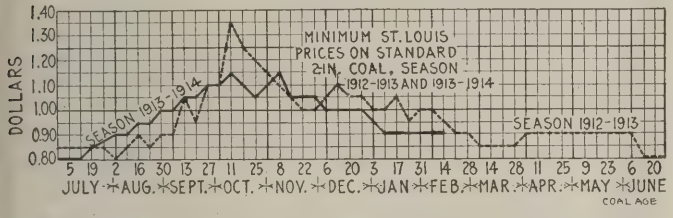
Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; byproduct, egg, stove and nut, $4.90; gas house, $4.65.

ST. LOUIS

Seasonable weather has caused an advance in prices, which will likely continue if cold wave holds out. Steam sizes still weak and slow movement of anthracite, coke and smokeless. Some storage supply being bought in anticipation of a suspension.

The first real touch of winter, as far as cold weather was concerned, arrived last Saturday, and it had a decidedly good effect on the market, beginning Monday. Prices advanced slightly on nearly all grades, and if the weather continues cold the latter part of the week will see a general advance that will likely continue.

There has been some buying of storage coal in the last few days, which has brought about healthier conditions in certain sizes, but on the whole there has been no material change. The washed-coal market is in a deplorable condition, with the exception of Nos. 4 and 5, which seem to be in fairly good demand.



The middle of last week Franklin County went down to $1.20 and Carterville to $1.05 on the domestic sizes. Standard 2-in. lump was sold freely at 80c. On the other hand, there was no advance in the screenings price. Carterville being held at about 60 to 65c. and Standard at 40 to 45c. A few plants in the south are storing coal, but there seems to be no inclination on the part of Northern steam users or railroads to acquire any surplus.

Anthracite, smokeless and coke are coming in with no demand, and going at any price the market will bring.

Prices continue unchanged from last week.

KANSAS CITY, MO.

Colder weather and an increased demand for fuel. Mine operations increased. Failure of gas supply has an important bearing on the market.

The market has stiffened to an appreciable degree, though no actual advance in quotations has yet been made. A continuance of present conditions, however, will result in this action. The situation is further improved in Kansas City and other cities in the Southwest, through the partial failure of the gas supply. The reserve accumulated during the mild weather has been consumed and the obvious and only remedy is to utilize coal.

PORTLAND, ORE.

Mild weather continues and little business being negotiated. Some interest over opening of Alaskan coal lands.

The Pacific Northwest is still enjoying a mild open winter and as a consequence the demand for coal for domestic purposes is not heavy.

The Portland Chamber of Commerce is investigating the possibility of cheaper coal on the Pacific Coast if the proposed government railroad is built into the interior of Alaska, and it is pointed out that with less expensive fuel the demand would be much larger than now as coal would displace other fuels and also stimulate industrial activity now hampered by the prohibitive fuel prices.

PRODUCTION AND TRANSPORTATION STATISTICS

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for November, 1912-13, and for the 11 months ending November, 1911-12-13, in long tons:

	11 Months			November	
Imports from:	1911	1912	1913	1912	1913
United Jingdom.	8,290	6,294	5,329	1,430	70
Canada	873,265	1,204,416	979,980	124,714	82,491
Japan	11,373	25,663	99,437	4,945	10,322
Australia and Tasmania	207,945	151,928	160,754	11,426	19,176
Other countries	355	2,202	3,296	97	.....
Total	1,101,228	1,480,503	1,248,796	142,612	112,059
Exports:					
Anthracite	2,312,755	3,404,958	3,927,995	372,267	329,652
Bituminous,					
Canada	9,917,740	9,838,701	12,749,300	930,733	1,086,831
Panama	451,743	423,327	452,551	27,100	32,871
Mexico	449,671	269,007	439,427	12,350	22,165
Cuba	941,504	1,033,220	1,200,958	89,958	89,385
West Indies	511,608	602,406	548,454	38,458	24,194
Argentina	.....	.....	70,048	.....	8,171
Brazil	.....	.....	250,663	.....	9,564
Uruguay	.....	.....	5,163	.....	.....
Other countries	608,076	1,383,092	1,140,217	55,378	39,944
Total	12,880,342	13,549,753	16,856,781	1,153,977	1,313,125
Bunker coal	6,118,494	6,766,443	7,093,271	610,153	610,251

ANTHRACITE SHIPMENTS

As anticipated, the hard-coal shipments for January experienced a sharp decline, amounting to only 5,175,732 tons as compared with 5,663,618 tons in December, and 6,336,419 tons in January of last year. Shipments were the lowest for this month since 1905, when 4,408,575 tons were handled. The nearest approach to this low record since that time was in 1909 when 5,183,345 tons were shipped.

It is interesting to note that the Reading company has again resumed the leadership as the largest mover of hard coal in the country. For the first time in the history of the anthracite statistics the Lehigh Valley outstripped the Reading in shipments last December by some 4000 tons, but Reading again assumes the lead in January by a comfortable margin of fully 20 per cent.

A rather encouraging feature of the current situation is the comparatively light stocks reported at tidewater. On Jan. 31 the stocks were 591,094 tons as compared with 602,328 tons Dec. 1. As compared with Jan. 31, 1913, stocks are considerably larger, supplies on that date being 375,566 tons, and on Jan. 31, 1912, 521,283 tons.

January shipments were as follows:

	Domestic		Steam		Total	
	1914	1913	1914	1913	1914	1913
Phila. & Reading	888,210	1,118,635	126,916	138,497	1,015,126	1,257,132
Lehigh Valley	753,819	1,062,367	56,769	112,784	810,588	1,175,151
Cent. R. R. N. J.	604,368	691,764	100,123	121,603	704,491	813,367
Del. Lack. & West.	525,481	758,576	93,457	163,523	618,938	922,099
Del. & Hudson	509,582	563,369	77,311	89,808	586,893	653,177
Pennsylvania	458,356	505,873	77,762	70,679	536,118	576,552
Erie	602,331	596,165	103,972	121,070	706,303	717,235
Ont. & Western	179,544	202,916	17,731	18,790	197,275	221,706
Total	4,521,691	5,499,665	654,041	836,754	5,175,732	6,338,419

SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for September and the first nine months of the years 1912 and 1913:

State	September		Nine Months	
	1912	1913	1912	1913
Missouri	242,871	250,763	2,122,744	2,049,969
Kansas	424,329	474,237	3,628,190	4,060,330
Arkansas	169,325	201,782	1,374,474	1,406,787
Oklahoma	249,604	297,213	2,064,561	2,523,135
Totals	1,086,129	1,223,995	9,189,969	10,040,221

This statement only covers the tonnage of members of the association, which is estimated to be at least 95% of the entire tonnage produced in the four states.

CHESAPEAKE & OHIO R.R.

The following is a statement of the coal and coke tonnage over the C. & O. R.R. for December, 1912 and 1913:

	Coal			Coal and Coke		
	December		Nov.	December		Nov.
	1912	1913	1913	1912	1913	1913
New River	463,230	469,490	502,230	485,550	486,230	518,520
Kanawha	708,980	958,740	787,400	712,520	961,020	880,040
Kentucky	153,180	145,810	155,970	155,610	157,060	163,920
Total	1,325,390	1,574,040	1,535,600	1,353,680	1,604,310	1,562,480

FOREIGN MARKETS

GREAT BRITAIN

Jan. 30—Supplies of large coals of most Admiralty qualities are abundant for early shipment, and the market is irregular in tone. Monmouthshire large coals are steadily held for prompt. Quotations are approximately as follows:

Best Welsh steam	$4.50	Best Monmouthshires	$4.17
Best seconds	4.38	Seconds	4.05
Seconds	4.26	Best Cardiff smalls	2.70
Best dry coals	4.38	Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Financial Department

The Coal and Coke Railway Company

President H. G. Davis, of this company, reports, in part, for year ending June 30, 1913, as follows:

Railway Earnings—While the gross revenues increased 11.6%, or $129,911, the operating expenses increased 18.6%, or $126,801. The expenses were increased chiefly by the higher wages paid to engineers, firemen and trackmen and the cost of repairs, amounting to some $20,000, necessitated by the floods of last summer. The net earnings from railway operations, after deducting taxes of $42,000 and ground rents of $2254, were $396,829, a slight increase over 1911-12.

Coal Department—There was a gratifying improvement in the earnings of the coal department. In the previous fiscal year the trade was greatly depressed, prices often being below the cost of production, and as a result the coal operations, after paying the rental, showed a slight loss. In the late fiscal year trade conditions were much improved, the market being good, with prices firm for both coal and coke. In consequence thereof, there was a clear profit, after paying the yearly rental, of $101,845.

Total Results—The profit of the coal department, together with the income of $27,481 from other sources, added to the profit from railway operations, gives the result of $526,155 applicable to fixed charges, and leaves, after payment of the same, a net surplus of $216,416, being an increase of $154,662 over 1911-12.

Improvements, Etc.—There was expended for betterments, heavier rails, side tracks, ballasting, etc., $43,666; betterments to equipment, $12,043, and in additions to coalplants, $19,628. These three items, amounting to $75,338, deducted from the surplus of $216,416, leaves a clear income of $141,078, which was used in paying equipment warrants, debts, etc.

Traffic Earnings—The coal and coke tonnage has continued its steady growth and the increase in freight earnings therefrom was $37,447. In three years the revenue from this source has increased 76%, and it is expected that it will soon reach the earnings from miscellaneous freights. As coal and coke take the lowest freight rates, they require a correspondingly larger volume of traffic to equal the miscellaneous freights in earning capacity. In the shipment of coal and coke produced on its line, the road last year exceeded for the first time a million tons, the exact amount being 1,016,690, an increase over the year before of about 20%, and nearly double the tonnage of 1910.

Coal Lands—The railroad owns about 100,000 acres of coal lands and coal-mining rights, all carefully selected within actual coal areas along its route in Randolph, Barbour, Upshur, Lewis, Gilmer and Braxton Counties, W. Va. In practically all of these coal lands the measures are above water level and the coal can be easily and economically mined by drift. Among the seams are the Pittsburgh, Sewickley, Masontown, Mahoning, Upper Freeport, Kittanning and New River seams. In addition to their steam-producing qualities, most of them are also excellent coking coals.

The railway company has also what is virtually a perpetual lease of all the properties of the Davis Colliery Co., and the latter is conducted practically as the coal department of the railway. It operates and markets the products not only from the mines on the coal lands of the railway, but on its own as well, and the profit from both sources above the rental accrues to the railway. The Davis Colliery Co. owns about 25,000 acres of coal lands and coal-mining rights in the well known Roaring Creek coal field in Randolph and Barbour Counties. It is the largest operator in that region and one of the leading mining companies of the state; its five plants are capable of producing daily 3500 tons of coal and 700 tons of coke.

In addition the Davis Colliery Co. is operating two mines in the Pittsburgh seam, on lands owned by the railway company—one at Bower and one at Copen; present output, about 800 tons and 600 tons, respectively.

There are 18 or 20 coal-mining companies on the line of the road operating some 24 mines.

Troubles of the Paint Creek Bondholders

The Paint Creek bondholders' meeting was made interesting by those opposed to permitting the trustee to exchange $1,250,000 Crescent Coal & Lumber 5s with 50% stock, now held in the sinking fund, for $1,250,000 of outstanding Paint Creek, 5s, which latter bonds apparently the Lackawanna Coal & Lumber Co. interests have finally purchased or will purchase in the open market, in order to effect the exchange and release the Crescent's so that they may be canceled and at the same time automatically release $1,250,000 Lackawanna Coal & Lumber 6s now held by the Republic Trust Co., trustee, against a like amount of Crescent's in the lumber company treasury. The entire issue of Crescent's would be canceled and the property be subject to the lien of the Lackawanna Coal & Lumber 6s outstanding, whereas the Paint Creek bonds which at the present have a pro rata interest in 40% of the Crescent's property, would lose this equity and have nothing as a compensation except that the issue would be reduced from $3,000,000 to $1,750,000 of outstanding bonds. The exchange was voted through by $1,088,000 of bonds, and opposed by $535,000 bonds, practically $900,000 being unrepresented.—"The Commercial and Financial Chronicle."

COAL SECURITIES

William J. Hoey reports the market on various coal securities for the week ending Feb. 7, as follows:

Stock	Bid	Asked	Stock	Bid	Asked
American Coal	80	100	Jef. & Cle'fd. C. & I. Pfd.	70	80
American Coal Products	83	84	Kentucky Block Cannel	40	60
Amer. Coal Prod. Pfd.	104	106	Lehigh Valley Coal Sales	185	195
Big Muddy Coal & Iron	75	100	Leh. & Wilkes-Bar. C. Co.	310	360
Burns Bros.	50	53	Mahoning Coal R. R.	700	750
Burns Bros. Pfd.	94	99	Mahoning Investment	64	70
By-Products Coke	112	120	Maryland Coal of Md.	3	6
Central Coal & Coke	80	86	Maryland Coal of W. Va.	7	9
Central Coal & Coke Pfd.	78	86	Maryland Coal of W. Va. (5% Bonds)	54	62
Chicago Lumber & Coal	45	55	Midland Coal	80	90
Chicago Wil. & Ver. Coal	25	32	N. Y. S. & W. C. Pfd.	15	30
Colo. Fuel & Iron Pfd.	150	160	Pocahontas Con. Collieries	92	101
Cumberland Corporation	10	14	Pocahontas Con. Coll. Pfd.	98	105
Cumberland Corp. Pfd.	39	44	Texas & Pacific Coal	97	101
Del. Lack. & West. Coal	260	270	Unite Coal of Pittsburgh	3	101
Elkhorn Fuel	4	10	Victoria Coal & Coke Pfd.	40	80
Elkhorn Fuel Pfd	55	70			
Hocking Valley Products	1	4			

No important dividends were announced during the week.

The New River Co.—Indications are that the British syndicate formed to take over the New River Co. and other West Virginia properties, means business. The alleged recent option of the New River properties provide for a payment of $600,000 Feb. 16, the balance to be payable not later than June 30.

Hocking Valley Products Co. (Earnings 1913)

Gross Earnings	Net Earnings	Interest, Taxes & C.	Sink. Fund. Reserve & C.
$628,965	$198,593	$176,737	$62,693

Leaving Deficit Balance of $40,897.

The earnings of the Maryland Coal Co., of Maryland, should show a big increase this year over last, as they will begin shortly to ship coal from the new mine recently opened on their property.

There is a larger demand lately for bonds of coal companies; some of the better class have made good advances in prices since Jan. 1.

It is quite possible that the Colorado Fuel & Iron Co. will soon pay more of the back dividends on the preferred stock. The bid side for stock has advanced over 20 points since the latter part of 1913.

Index of Current Coal Literature

We will furnish a copy of any article (if in print) for the price quoted. Where no price is quoted, the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

ACCIDENTS AND THEIR PREVENTION

Mining Accidents in 1912. Coll. Guard., Dec. 24, 1913; 1⅔ pp. 40c.

Monthly Statement of Coal-Mine Fatalities in the United States, November, 1913, with Revised Figures for Preceding Months. Albert H. Fay. Bureau of Mines; 18 pp.

BLASTING, EXPLOSIVES

Electric Blasting in Shafts with Relay Action Exploders. C. W. Morse. Min. & Sci. Press, Jan. 31, 1914; ½ p. 20c.

Powder in Open-Cut Mining. Coal Age, Jan. 3, 1914; 1 p., illus. 10c.

Sprinkling Machine for Use During Shotfiring. (Translated from Glückauf) Coll. Guard., Jan. 16, 1914; ½ p., illus. 40c.

The Use and Abuse of Explosives in Coal Mining. J. J. Rutledge, with preface by J. A. Holmes. Bureau of Mines, Miners' Circular 7; 44¼ pp., illus.

Tests of Permissible Explosives. Clarence Hall and Spencer P. Howell. Bureau of Mines, Bull. 66; 307 pp., illus.

BORING AND TUNNELING

The Modern Rock Drill. (Extract from paper of W. L. Saunders presented before the Butte meeting of the A. I. M. E.) Can. Min. Jour., Jan. 1, 1914; 2½ pp. 20c.

The Younger Generation of Rock Drills. Chas. Hirschberg. Min. & Eng. Wld., Jan. 31, 1914; 2 pp., illus. 20c.

BRIQUETTES

Briquetting in North America. C. T. Malcolmson. Coal Age, Jan. 10, 1914; 1 p. 10c.

Production of Coke and Briquettes in 1912. (From Part III of the General Report on Mines and Quarries.) Coll. Guard., Jan. 16, 1914; ⅔ p. 40c.

COAL DUST

Austrian Coal Dust Experiments. Fourth Report. (Translated from Oest. Zeit. f. B. u. H.) Coll. Guard., Jan. 16, 1914; 2 pp., illus. 40c.

Dust-Collecting Plant at Brackley Colliery. Iron Coal Tr. Rev., Jan. 16, 1914; ½ p., illus. 40c.

The Transition from Inflammation to Explosion of Coal Dust. Coal Age, Jan. 31, 1914; 4 pp., illus. 10c.

COKE

Coke Making in China. Min. & Sci. Press, Dec. 27, 1913; 1 p., illus. 20c.

Correlation of the Gas Lighting and Coke Oven Industries. (Lecture by J. E. Christopher.) Gas Wld., Jan. 17, 1914; 5 pp., illus. 40c.

Increased Use of Prepared Coke. F. C. Atwell. Coal Dealer, January, 1914; ¾ p. 20c.

The Automatic Control of Byproduct Coke-Oven Plants—II. A. Thau. Gas Wld., Jan. 3, 1914; 1½ pp., illus. 40c.

Types of Coke-Oven Plants as Seen in Operation—VII. (Semet-Solvay Installation at Normanby Park Steelworks.) Gas Wld., Jan. 3, 1914; 6 pp., illus. 40c.

COMPRESSED AIR

Air Compressors and Compressed-Air Machinery. (Chapter V on large compressed-air engines and mining machinery.) Robt. L. Streeter. Min. Mag., January, 1914; 18¼ pp., illus. 35c.

Air Compressor Testing. W. C. Lancaster. Power, Jan. 4, 1914; 3¼ pp., illus. 15c.

Moisture in Compressed Air. A. Hofmann. Power, Jan. 13, 1914; 2 pp., illus. 15c.

Sullivan Angle-Compound Power-Driven Air Compressor. Coal Tr. Bull., Jan. 2, 1914; 4½ pp., illus. 25c.

The Testing of Air Compressors. H. Keay Pratt. Coll. Guard., Jan. 9 and 16, 1914; 3⅔ pp., illus. 80c.

DRAINAGE, PUMPING, ETC.

Deep Mine Pumping and Air Lifts. A. E. Chodzko. Min. & Sci. Press, Jan. 17, 1914; 4 pp., illus. 20c.

Mine Drainage by Compressed Air. A. D. Spears. Coal Age, Jan. 17, 1914; ¾ p., illus. 10c.

The Oneida No. 2 Anthracite Drainage Tunnel. M. C. Reed. Mine & Quarry, January, 1914; 3½ pp., illus.

ELECTRICITY

Choice of Electrical Machinery for Use in Mines, with Discussion. (Paper by J. P. C. Kivlen read at A. M. E. E., West of Scotland Branch.) Iron Coal Tr. Rev., Jan. 2, 1914; 2¼ pp. 40c.

Maintenance of Mining Electrical Plant. (Paper by C. C. Reid read before the East of Scotland Branch of the A. M. E. E., Nov. 14, 1913.) Iron Coal Tr. Rev., Dec. 26, 1913; ⅔ p. 40c.

EXPLOSIONS

Dawson, New Mexico, Mine Disaster. Coll. Engr., January, 1914; 2¾ pp., illus. 35c.

Notes on the Prevention of Dust and Gas Explosions in Coal Mines. Geo. S. Rice. Bureau of Mines, Tech. Paper 56; 17¼ pp.

Prevention of Gas or Dust Explosions. (Paper by J. R. Booth read at the fourth annual Safety Boosting dinner of U. S. Coal & Coke Co., Jan. 10, 1914.) Coal & Coke Op., Jan. 29, 1914; ½ p. 20c.

Rock Castle Mine Explosion. Coal Age, Jan. 24, 1914; 1½ pp., illus. 10c.

The Dawson Mine Explosion. Coal Age, Jan. 3, 1914; ¼ p. 10c.

The Senghenydd Disaster. (Inquiry conducted by the Home Office.) Coll. Guard., Jan. 9, 1914; 2 pp. 40c.

Testing for Firedamp with Wire Loop. Henry Briggs Coll. Engr., January, 1914; 2½ pp., illus. 35c.

FUEL TESTING

A Float and Sink Test Diagram. Coal Age, Jan. 31, 1914; 1 p., illus. 10c.

Varieties and Properties of Coal. Min. Eng., January, 1914; 2½ pp. 40c.

Work of the Birmingham Coal-Testing Plant. (Paper by E. W. Smith and G. C. Pearson read before the Midland Jr. Gas Assn.) Gas Wld., Dec. 20, 1913; 2½ pp., illus. 40c.

GENERAL

American Coal Mining at 80 Degrees North. C. A. Tupper. Coal Age, Jan. 24, 1914; 4½ pp., illus. 10c.

A New Mining Theodolite. Iron Coal Tr. Rev., Jan. 9, 1914; ½ p., illus. 40c.

A Resumé of the Coal Trade of Nova Scotia in 1913. F. W. Gray. Can. Min. Jour., Jan. 15, 1914; 4¼ pp. 25c.

American Mining Industry and Its Future Prospects. Horace V. Winchell. Eng. Mag., February, 1914; 5 pp. 35c.

A Modern Coal Mine and Its Equipment. Geo. M. Crawford. Mine & Quarry, January, 1914; 12 pp., illus.

Coal Mining History of Muhlenberg County, Ky. (Paper read by Otto A. Rothert before the Ky. Min. Inst., Dec. 3, 1913.) Coal Age, Jan. 3, 1914; 1½ pp. 10c.

Coal Markets and Business Aspects of the Fuel Industry in 1913. A. T. Shurick. Coal Age, Jan. 10, 1914; 5 pp. 10c.

Efficiency in and About the Mines. John F. Bevan. Penn. State Min. Quart., January, 1914; 6½ pp. 35c.

Output and Value of Coal in 1912. (From Part III of the General Report on Mines and Quarries for 1912 by R. A. S. Redmayne, H. M. Chief Insp. of Mines.) Coll. Guard., Jan. 9, 1914; 1⅔ pp. 40c.

Present Conditions in the Coal Fields of Mexico. Coal Age, Jan. 10, 1914; 1½ pp., illus. 10c.

Review of the Export Coal Trade in 1913. F. R. Wadleigh. Coal Age, Jan. 10, 1914; 1¾ pp. 10c.

The English Coal Trade of 1913. Coll. Guard., Jan. 2, 1914; 10 pp. 40c.

The Production of Coal and Coke in Canada During the Calendar Year 1912. John McLeish. Can. Dept. of Mines, Mines Branch; 37 pp.

To Increase Yield of Motor Fuel from Coal. Iron Age, Jan. 29, 1914; ½ p. 30c.

The History of Anthracite in Its Earliest Days. Coal Tr. Jour., Jan. 28, 1914; 2 pp., illus. 35c.

The Origin of Coal. W. G. Burroughs. Coll. Engr., January, 1914; 2⅔ pp. (Continued from December.) 35c.

GEOLOGY

Geology and Fossil Flora of the Kent Coal Field. (Communication from Dr. E. A. Newell Arber read at meeting of Geol. Soc. of London, Dec. 3, 1913.) Iron Coal Tr. Rev., Dec. 19, 1913; ½ p. 40c.

Prospecting Bering River Coal Field. (Describes the methods required by the nature of the country, which is rough and mountainous.) W. R. Crane. Coll. Engr., January, 1914; 3½ pp., illus. 35c.

HOISTING AND HAULAGE

Automatic Gong for Underground Motor. Eng. & Min. Jour., Jan. 3, 1914; ¾ p., illus. 25c.

Electric Mine Haulage. E. A. Lof. Coll. Engr., January, 1914; 5¾ pp. (Concluded from December.) 35c.

Electric Winding. (Paper by James Gillespie read before the East Scotland Branch of A. M. E. E.) Iron Coal Tr. Rev., Jan. 9, 1914; 1½ pp., illus. 40c.

Installing Electrical Haulage in Longwall Mines. Black Diamond, Jan. 3, 1914; 1¾ pp., illus. 20c.

Mechanical Haulage System in Coal Mines. (Paper by R. W. Stuler prepared for reading at the Coal Min. Inst. of Amer. Dec. 4.) Coal & Coke Op., Jan. 1, 1914; 2¾ pp., illus. 20c.

LEGAL REFERENCES

Change in Alberta Mining Laws. Norman Fraser. Coll. Engr., January, 1914; ⅔ p. 35c.

When Is a Coal Yard a Nuisance? A. L. H. Street. Coal Age, Jan. 3, 1914; 1 p. 10c.

When Does a Labor Union Become an Unlawful Combination? A. L. H. Street. Coal Age, Jan. 10, 1914; 1 p. 10c.

Revision of the Mining Law. Grafton Mason. Min. & Sci. Press, Jan. 10, 1914; 2¼ pp. 20c.

Trade Unions and the Law. (From The Survey.) H. R. Seager. Coal Age, Jan. 17, 1914; 1¾ pp. 10c.

LIGHTING

Efficiency of Portable Electric Mine Lamps. (Final part of paper read by H. H. Clark at the Dec. 5, 1913, meeting of the Coal Min. Inst. of Amer.) Coal Age, Jan. 3, 1914; 2½ pp., illus. 10c.

Testing of Safety Lamps. (From Part II of the Mines and Quarries General Report.) Iron Coal Tr. Rev., Dec. 26, 1913; 1¼ pp. 40c.

MINE FIRES

Spontaneous Combustion in Coal Mines. (Continuation of evidence before the Departmental Committee.) Iron Coal Tr. Rev., Dec. 25, 1913, Jan. 2, 9, 16 and 23, 1914; 8 pp., illus. $1.20.

Two Underground Fires at a Colliery in Raniganj Coal Field. C. H. McCale. Trans. Min. & Geol. Inst. of India, Vol. VII; 29 pp., 2 pl.

PREPARATION

Coal Washing in Illinois. F. C. Lincoln. Univ. of Ill., Bull. No. 69; 103 pp., illus. 60c.

Mining at Lowe, West Virginia. (Describes new method of coal cutting and modern tipple of the Weyanoke Coal & Coke Co.) Wm. Z. Price. Coll. Engr., February, 1914; 2 pp., illus. 35c.

RESCUE, SAFETY APPARATUS

A New Safety Catch. Coll. Guard., Dec. 24, 1913; ⅓ p., illus. 40c.

German Rescue Organization. (Translated from Glückauf. Describes the use and care of breathing apparatus at the Clausthal Central Station.) Coll. Engr., January, 1914; 2⅔ pp. 35c.

Important Report on Rescue Apparatus. (Report of Dr. J. S. Haldane to the Doncaster Coalowners' Association on self-contained rescue apparatus for use in irrespirable atmospheres.) Coll. Guard., Jan. 23, 1914; 2¾ pp. 40c.

Oxygen Breathing Apparatus. F. W. Gray. Can. Min. Jour., Jan. 1, 1914; 1½ pp. 20c.

Right and Wrong Rescue Apparatus. John A. Menaugh. Coal & Coke Op., Jan. 22, 1914; 1¼ pp., illus. 20c.

The Draeger Self-Rescue Apparatus. (This apparatus is designed on light and compact lines, weighs 7 lb. and when folded up measures 11x7 in.) Iron Coal Tr. Rev., Jan. 9, 1914; ⅓ p., illus. 40c.

SANITATION, DISEASES

Commission of Resuscitation from Electric Shock Recommends Meltzer Apparatus. (Read before the Natl. Elec. Light Assn. Convention, June, 1913.) Coal Tr. Bull., Jan. 15, 1914; 2¼ pp. 25c.

Pithead Baths at the Atherton Collieries, Lancashire, England. (A model installation containing some new features.) Coll. Guard., Jan. 2, 1914; 2 pp., illus. 40c.

The Mount Pleasant Bath House of the Scranton Coal Co. Coll. Engr., January, 1914; ¾ p., illus. 35c.

STEAM ENGINES AND BOILERS

Coal and Ash Handling at Pierce-Arrow Plant. Chas. H. Bromley. Power, Jan. 13, 1914; 3¾ pp., illus. 15c.

The Clinkering of Coal and Its Composition. (Paper read by Oscar W. Palmenberg before the Society of Chemical Industry.) Iron Age, Feb. 5, 1914; 1½ pp. 30c.

The Use of Pulverized Coal in Metallurgical Furnaces. (Discussion of Mr. Lord's paper read before the Engrs. Soc. of Western Penn., Sept. 30, 1913.) E. W. Shinn. Coal & Coke Op., Jan. 1, 1914; 2¼ pp. 20c.

The Dunn Pulverized Coal Burner. G. A. Roush. Metall. & Chem. Eng., January, 1914; 1¼ pp., illus. 35c.

SHAFTS, SHAFT SINKING

Cementation in Shaft Sinking. Coal Age, Jan. 24, 1914; 2¾ pp., illus. 10c.

Shaft Sinking Below Low-Water Mark. (Abstract of the annual report of Mr. Walker, Inspector for the Scotland District.) Min. Eng., January, 1914; 1¾ pp., illus. 40c.

SIGNALING

A Wireless System of Telephony for Coal Mines. Coal Age, Jan. 31, 1914; illus. 10c.

TRANSPORTATION

A New Dirt Dip. (A simple and inexpensive arrangement of tipping gear.) Iron Coal Tr. Rev., Jan. 2, 1914; ½ p., illus. 40c.

Some Notes on the Interior Water Movement of Coal. Coal Age, Jan. 3, 1914; 1¼ pp., illus. 10c.

Transportation and handling of Alaskan Coal. W. R. Crane. Penn State Min. Quart., January, 1914; 16 pp., illus. 35c.

Using Canals to Carry Eastern Coal. Black Diamond, Jan. 31, 1914; ⅔ p., illus. 20c.

TIMBERING, PACKING, ETC.

New Method of Making Large Arches in Mines. (Abstract of paper by John Roberts read before the So. Wales Inst. of Engrs.) Iron Coal Tr. Rev., Jan. 23, 1914; 1 p., illus. 40c.

Slushing. Edw. J. Kelley. Penn. State Min. Quart., January, 1914; 3¼ pp. 35c.

Underground Concrete Protective Work in Illinois Mines. G. E. Lyman. Coal Age, Jan. 17, 1914; 3¾ pp., illus. 10c.

VENTILATION

Ventilation of Mines With a View to Eliminating Accidents. (Address of A. G. Hahn at the fourth annual Safety Boosting dinner of U. S. Coal & Coke Co., Jan. 10, 1914.) Coal & Coke Op., Jan. 29, 1914; ⅔ p. 20c.

WORKING OF MINERALS

Machine Mining vs. Shooting Off the Solid. (Paper by Wm. Abrams read before the Mine Managers of Dist. 2, Des Moines, Ia., Dec. 7, 1913.) Coal & Coke Op., Jan. 8, 1914; 1⅔ pp. 20c.

Methods of Working in County Durham. Wm. Cummings. Min. Eng., January, 1914; 1 p., illus. 40c.

Mining Methods for Maximum Coal Recovery. (Paper by Wm. H. Grady read before the winter meeting of the W. Va. Coal Min. Inst.) Black Diamond, Jan. 10, 1914; 3⅓ pp., illus. 20c.

The Furnace Run Mines. (A description of the equipment of two mines, worked on the room-and-pillar system, of the Allegheny River Min. Co., near Kittanning, Penn.) Wm. Z. Price. Coll. Engr., January, 1914; 4½ pp., illus. 35c.

Working a Steep Coal Seam. S. H. Ash. Coal Age, Jan. 3, 1914; 2¾ pp., illus. 10c.

COAL AGE

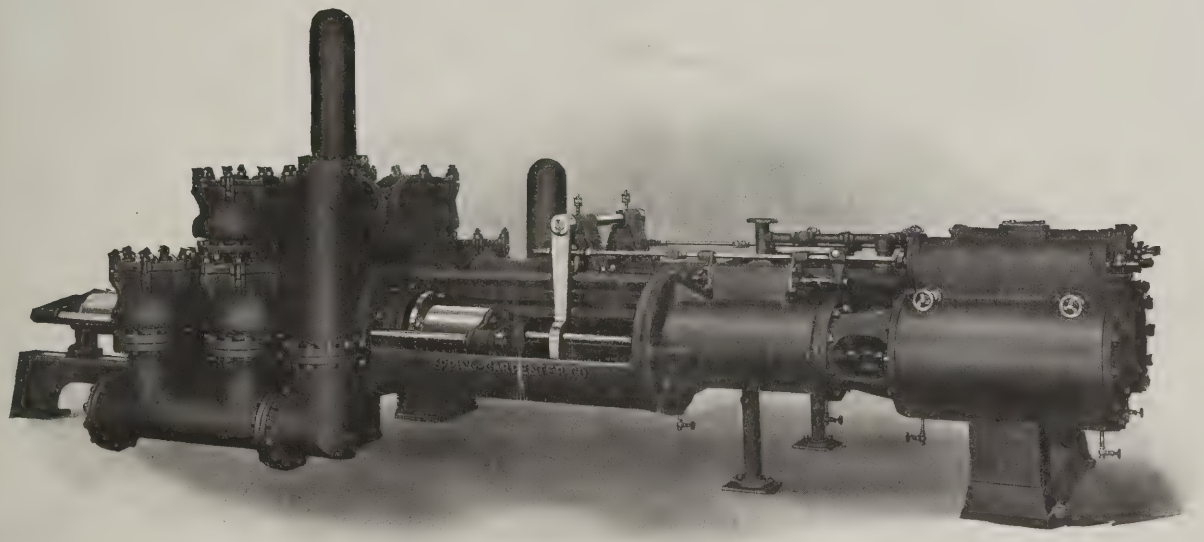
DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 10
Issued Every Saturday
Hill Publishing Company

NEW YORK, MARCH 7, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

"Epping-Carpenter"



The Pump That Landed the Order

In the face of the competition of over 25 pump manufacturers and all kinds of price-cutting, "Epping-Carpenter" Pumps landed an important order for a $38,000 mine pumping installation. This is another instance where superiority of service rather than low price was the governing factor.

If "Epping-Carpenter" Pumps are superior for a $38,000 installation, isn't it possible they will please you on a single pump?

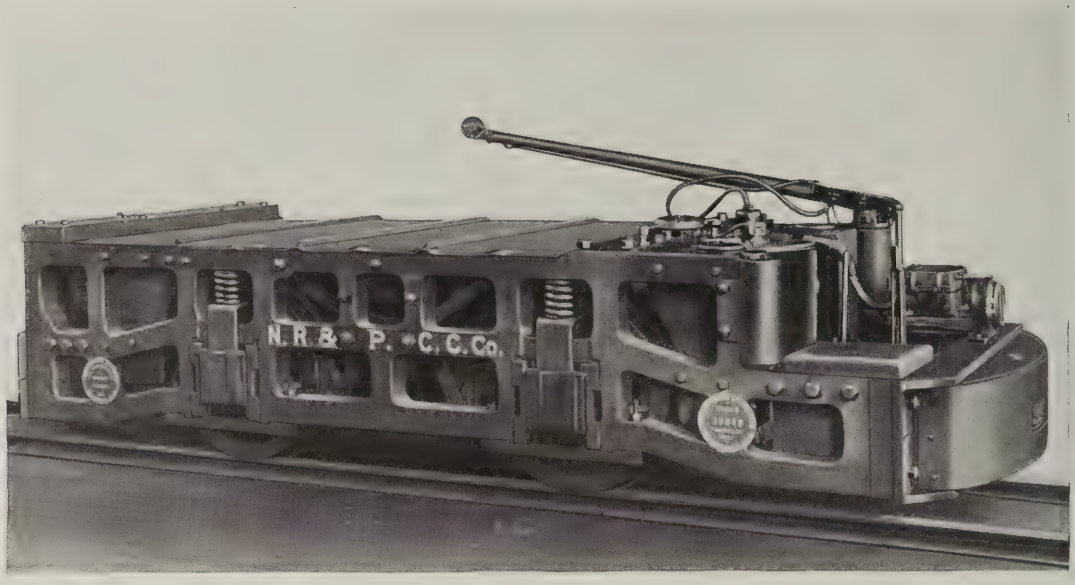
We have had 50 years' successful experience in building mine pumps including single and duplex mine pumps, triple expansion, Corliss high duty, centrifugal and power pumps for all heads and capacities.

Write for a Free Book on Mine Pumps

Anyone who is interested in the kind of pumps that makes the most sales when competition is greatest, should send for the Epping-Carpenter Salesman's Book. **Write today and you won't have to wait for the next edition of this interesting book.**

EPPING-CARPENTER PUMP CO. Main Office and Works: PITTSBURGH, PA.

New York Chicago Cleveland Philadelphia Boston



Barsteel Heavy Haulage Locomotive

4 Features of Baldwin-Westinghouse Barsteel Electric Mine Locomotives That Assure Maximum Tonnage with Least Expense

The Cast Steel Bar Frame which gives great strength with least weight; permits easy access to, and excellent ventilation for the motors.

The Vauclain Removable Gib which greatly facilitates the removal of journal boxes and permits inspection or replacement of all wearing parts with a small cost of time and labor.

The Oil and Waste Lubricating System for the motors, with specially designed bearings for long life in service, which has been adopted as a standard after years of investigation.

The Commutating-Pole Motors which insure sparkless commutation at all loads. As a result, the commutator and brushes are long lived and require little attention, brush renewals are seldom required, and carbon and copper dust inside the motor is practically eliminated.

These features are but few of many which have been incorporated in Baldwin-Westinghouse **Barsteel** mine locomotives in order to give the user the greatest possible service. You can obtain them only when you specify Baldwin-Westinghouse.

Address either company for full information.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MARCH 7, 1914 NUMBER 10

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 391

Some remarks concerning the practice of decorating the walls of an office with inspiring mottoes. One such message in the office of a Scotch friend emphasizes the responsibility of a man in the mines for his every act. A slight mistake, or a bit of carelessness, on the part of a single individual may affect the lives of a number of people for all eternity.

*SOME FRENCH AND GERMAN ELECTRIC HOISTS: *Pages* 392-394

Some recent installations for deep shafts are here described. The hoists are all fitted with direct-current motors, but the sources of supply are plain and flywheel motor-generator sets or low-pressure turbo units, operating on exhaust steam. COAL AGE, Vol. 5.

NOTIFICATION TO OPERATORS AND MINERS: *Page* 394

*SOME NEW TYPES OF ELECTRIC HOISTS: *Pages* 395-396

THE PHILADELPHIA CONFERENCE: *Page* 396

*TYPES OF ELECTRIC WINDING ENGINES: *Pages* 397-401

Local conditions governing the service of hoisting engines, which have a direct bearing upon the design, are here discussed. The systems of electric supply and control common in the coal fields are also described. L. F. Mitten. COAL AGE, Vol. 5.

RHENISH WESTPHALIAN COAL SYNDICATE: *Page* 401

THE PROPER USE OF OILS: *Pages* 401-402

*THE CARE OF WIRE ROPE: *Pages* 402-403

If a wire rope is carefully watched at work, it is possible to prevent much wear and tear. The article describes where the deterioration is to be expected, and the cure for it is obvious. COAL AGE, Vol. 5.

THE CONGRESSIONAL INVESTIGATION IN COLORADO: *Pages* 404-405

The operators admit the importation of arms, but declare that it was done to protect their property. They show clearly that the men were making good wages and had saved over a half million dollars. The right of the committee to subpoena witnesses, who are held by the governor, is denied. COAL AGE, Vol. 5.

*AN AIR-POWER CHART: *Pages* 405-406

A chart is here presented by means of which, if the volume of air handled and water gage are known, we can determine (1) the actual horsepower in the air, (2) the horsepower necessary for the engine or motor driving the fan, and (3) the diameter of the cylinder. In the latter case, we are to assume the piston speed. Dwight Gerber. COAL AGE, Vol. 5.

*METHOD OF OBTAINING TIME AND AZIMUTH: *Page* 407

*THE GASOLINE INDUSTRIAL LOCOMOTIVE: *Pages* 408-410

A general summary of the industrial railway field, with particular attention to the mine tramway. A short description is then given of the Vulcan gasoline locomotive, which has successfully met the exacting conditions of underground service. S. T. Nicholson. COAL AGE, Vol. 5.

REASONS FOR OPPOSING THE ANTHRACITE TAX: *Pages* 410-411

*THE EXPLOSION AT RAVENWOOD: *Pages* 411-412

This accident seems to prove the efficacy of shale dust as a preventive of widespread coal-dust explosions. It is stated that shale dust is not likely to cause lung troubles. Much depends on having dust-tight cars. Samuel Dean. COAL AGE, Vol. 5.

THE DUBOIS, PENN. CONVENTION: *Pages* 413-414

Patrick Gilday advocates fines for violation of agreements. The miners are anxious to start coöperative stores. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 415-416

Electric Winding Engines—Reversing Mine-Air Currunts in Coal Mines—Mine Visitation—List of Fatal Coal-Mine Explosions—The Business Outlook—Prohibition in West Virginia.

LEGAL DEPARTMENT: *Page* 417

The courts incline toward an interpretation of leases as exempting liability for rent or royalties where production is impossible or unprofitable, except where there is an express agreement to the contrary. A. L. H. Street. COAL AGE, Vol. 5.

DISCUSSION BY READERS: *Pages* 418-420

High Safety Records—List of Coal Mine Explosions—The Mine-Run Problem—Longwall-Mining Methods. Letter No. 7—The Certificate Law. Letter No. 22. Study Question, Hoisting Problem.

STUDY COURSE IN COAL MINING: *Page* 420

INQUIRIES OF GENERAL INTEREST: *Page* 421

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 422

COAL AND COKE NEWS: *Pages* 423-426

COAL TRADE REVIEWS: *Pages* 427-431

ADVERTISING INDEX: *Page* 64

NUMBER OF COPIES PRINTED THIS ISSUE 12,000

None sent free regularly, no returns from news companies, no back numbers.

This Is An Ad-Reading Age

The Weekly Ad-Talk Page

¶ People in every walk of life, today, read ads. ¶ They read them because the ads of today are universally interesting, because they are informative. ¶ Because the ads not only enable the buyer to buy wisely but very frequently teach what one wants and needs to buy. ¶ They read the ads because they know that advertised goods, equipment, supplies or what not are *good* goods—equipment or supplies—if they were not they could not be advertised continuously. ¶ They *find pleasure* in reading the ads of this wide-awake, stirring commerical age; they *learn* by reading the ads; they *save money*. ¶ *Cultivate the ad-reading and ad-buying habit—it's a good one!*

COAL AGE

Vol. 5 NEW YORK, MARCH 7, 1914 No. 10

MOST every mine superintendent decorates his office walls with mottoes. We use the word "decorate" advisedly; in fact, we believe that we might have used a more sarcastic term without giving offence.

Occasionally though, we bump into a motto that does not seem to be a part of the furniture, but belongs rather, to the atmosphere of the office.

Such a one adorns the wall immediately facing the incoming visitor, at the office of a Scotch friend of ours:— "Let men know that they are men; created by God, responsible to God; who work in any meanest moment of time what will last throughout eternity." "That's fine," we said, "Where did you discover it?" Our Scotch friend looked at us pityingly, "Discover it! why man that is *the* message that John Knox gave to mankind."

We have since had revealed to us by an essay of Carlyle's that our friend knew what he was talking about. Scotchmen generally do.

But to return to the motto: Since *we* discovered it, the real meaning of the thought has constantly grown on us and whenever we run across "safety first" literature, the idea occurs to us that possibly nothing has been published equal to this motto, as a reminder to man of man's responsibility for his every act.

For example: A miner carelessly wanders around with an open light, in a room known to contain gas. An explosion results and several lives are snuffed out. Perhaps the victims had never thought seriously of death or of a world to come. Surley, to quote the motto, in a meanest moment of time their lives have been effected for all eternity. Pretty serious business, that; when you come to consider it from such a view-point, be ye atheist, deist, or theist.

And how about the widow and the orphans. Yesterday a happy, complete family; to-day sorrowing; to-morrow separated by the ends of the earth; father dead, mother here, childern there. Changed are their lives for all eternity, and yet the carless one who wandered around down in the pit, whistling as he went, never so much as gave *them* a thought.

Throughout eternity is a pretty long time: so long, in fact, that any fellow who is willing to tempt fate by going contrary to "safety first" rules, might well hesitate long enough to take a second think before starting into action.

Some French and German Electric Hoists

Special Correspondence

SYNOPSIS—Some recent installations for deep shafts are here described. The hoists are all fitted with direct-current motors, but the sources of supply are plain and flywheel motor-generator sets or low-pressure turbo units, operating on exhaust steam.

The application of electric power to hoisting coal and the handling of men and material has received much attention in Europe during the past few years. This is particularly true in France and Germany. As a result there are now to be found in the coal-mining regions some good examples of hoisting engines, the principal features of which will be here briefly summarized.

We are indebted for the data to the Societe Alsacienne de Constructions Mecaniques, of Belfort, which has for several years made a specialty of electrically operated hoists in connection with converter sets both with and without flywheels. Among the most interesting of these installations may be mentioned those at Bethune, Courrieres, Kali-Sainte-Therese, and Carmaux.

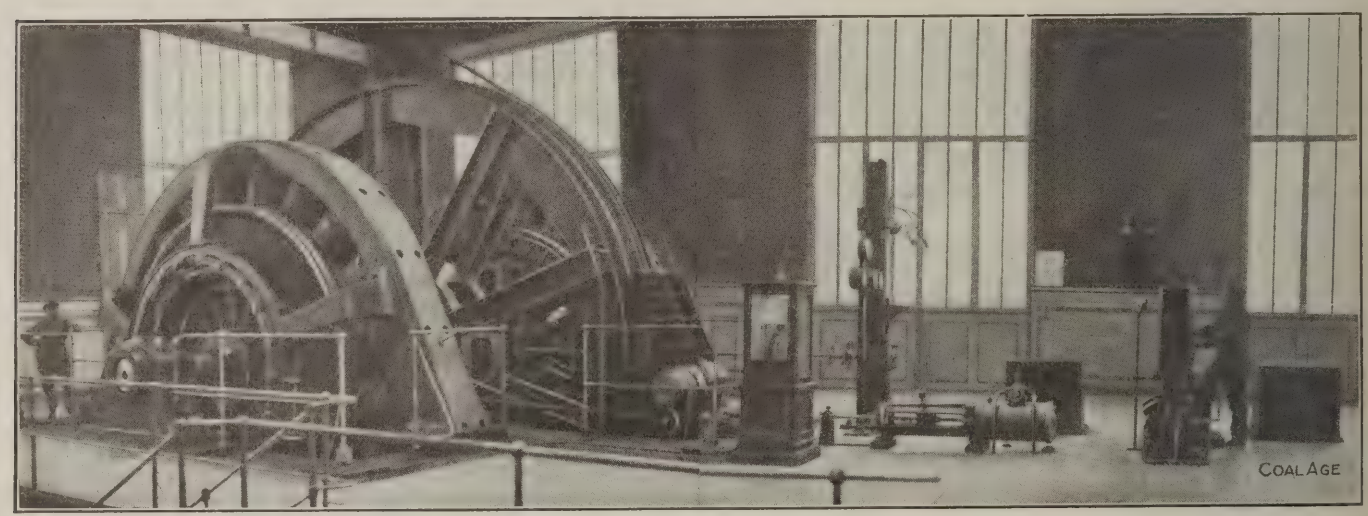


Fig. 1. Hoist Installed at the Bethune Mines

Two Sets of Conditions Must Be Met

The hoist at the Bethune mines (see Fig. 1) has been built to cope with a double set of requirements. The first is to hoist 235 metric tons (approximately 240 American tons) per hour from a depth of 430 m. (1420 ft.) in 50 hoists, while the second is to handle 265 metric tons (approximately 270 American tons) from a depth of 530 m. (1780 ft.) in 38 hoists. The machine is provided with a Koepe pulley 7 m. (23 ft.) in diameter with a balancing rope.

At each end of the Koepe pulley shaft, there is a continuous-current motor operating at a maximum speed of 32.7 r.p.m. for the 430-meter stage and at 29.5 r.p.m. for the 530-meter level. The supply voltage to these motors varies from 0 to approximately 500 volts. The current is furnished by the generators of two converter sets provided with a flywheel turning at a speed varying between 485 r.p.m. and 410 r.p.m. Each set consists of a continuous-current generator operating at 500 volts in either direction with commutating poles and an asynchronous three-phase motor drawing its current from a 5000-volt 50-cycle system of supply, and capable of developing as a normal load 400 hp.

There is also a flywheel consisting of a single steel casting weighing 22 metric tons (approximately 22.4 American tons), the peripheral speed of which is 85 m. (278 ft.) per second. This is capable of storing energy to the extent of 5,000,000 kgm. (36,800,000 ft.-lb.).

Normal hoisting is accomplished by placing the two motors in series, these being fed by the two generators also operating in series. In case of damage to one of the machines, it is possible by a single converter set and the two motors to raise the full load at half speed, or with a single set and single motor half load at half speed can be negotiated. In this way, even supposing that a motor and converter set were both put out of business, operation would not be completely interrupted.

Exhaust Steam Furnishes Hoisting Energy

The hoisting installation at the Courrieres mine is particularly interesting since it utilizes as its source of energy the exhaust steam from several engines. The electric motors of the two converter sets are here replaced by low-pressure steam turbines. Each set comprises a turbine and two generators with independent excitation.

Between the two groups which are placed end to end as shown in Fig. 2, there is a flywheel which can be coupled to either of the sets by means of a clutch. The set connected with the flywheel operates the hoist motor only. It runs at a normal speed of 1500 r.p.m., and a drop in speed of 25% allows the stored energy of the flywheel to be used.

The other set runs independently of the first at a speed of 1500 r.p.m. and furnishes continuous current at 500 volts to various motors about the plant.

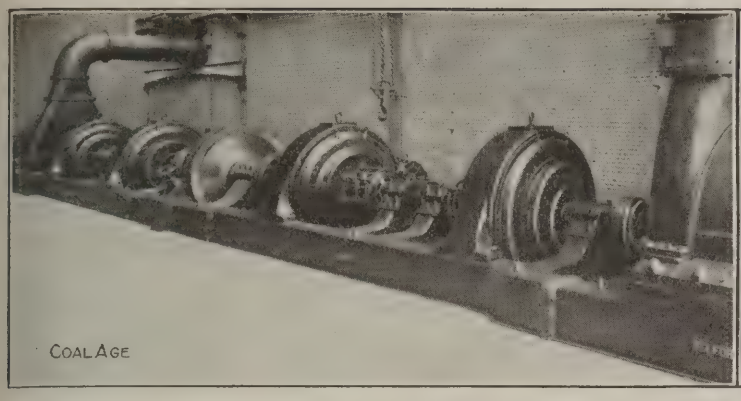


FIG. 2. TURBINE-DRIVEN GENERATORS PROVIDED WITH A FLYWHEEL

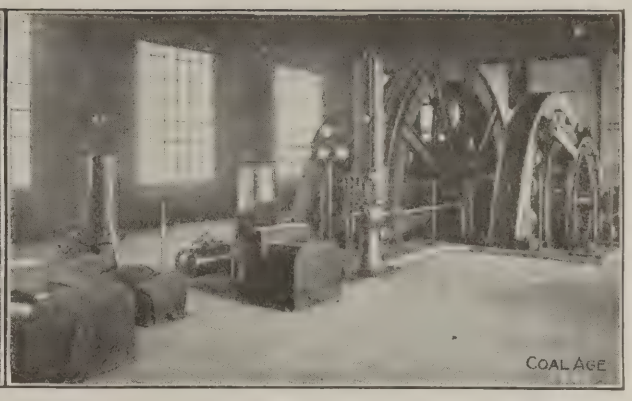


FIG. 3. A TWO-MOTOR HOIST WITH A KOEPE PULLEY

A simple modification of the connection effected by section and change-over switches allows the feeding of the hoist motors by the second group, which then operates under the same conditions as the first. The electric motors, which are ordinarily supplied with current by this group, are then replaced practically immediately by the old steam-engine equipments which were displaced.

The turbines shown in Fig. 2 operate on the Zoelly system, the pressure at the admission valve being 1.15 kg. per sq.cm. (about 16.4 lb. per sq.in.). The centrifugal governor operates by throttling and allows the running to be effected either at a constant speed of 1500 r.p.m., or at a speed variable between the limits of 1500 and 1125 revolutions per minute.

The generators which for hoisting are connected in series, give a potential of approximately 500 volts. They are furnished with auxiliary poles and their commutators are strengthened by hoops or bands to resist the high peripheral speed. Excitation of both generators and motors is furnished during normal operations by an exciter, belt-driven from the set operating at constant speed. When, however, the hoist operates with the second converter-set the exciter is driven by a vertical high-speed steam engine.

The converter flywheel is of forged nickel steel weighing about 8½ metric tons (approximately 8.64 American tons), while its peripheral speed attains 130 meters (427 ft.) per second. This is capable of storing 3,500,000 kgm. (25,300,000 ft.-lb.) of energy.

The hoisting engine shown in Fig. 3 is provided with a Koepe pulley 6½ m. (21.4 ft.) in diameter. It is capable of hoisting 200 metric tons (203 American tons) per hour from a depth of 400 m. (1330 ft.) in 48 hoists. The two continuous-current motors driving it, operate at a potential varying between zero and approximately 500 volts and turn at a maximum speed of 35 r.p.m. One motor is placed upon either side of the Koepe pulley.

HOISTS AT POTASH MINES

Mention might also be made of the four electric hoists installed at the Kalibergwerke, which are important potash mines in the Alsace territory. These machines, one of which is illustrated in Fig. 4, are of the Koepe pulley type, the pulleys being 5 m. (16.4 ft.) in diameter, running at a speed of 42 r.p.m. The rate of hoisting required is 90 metric tons (91½ American tons) per hour from a depth of 750 m. (2460 ft.) in 30 hoists, or 80 metric tons (81.3 American tons) from 900 m. (2965 ft.) in 70 hoists.

Two of these machines are used for sinking and for this purpose are furnished at one side or other of the Koepe pulley with special drums for use in this work. The motors of these machines are fed by a Leonard converter set without flywheel of the type shown in Fig. 5. This method of operation is economical since the supply system is sufficiently large to withstand without ill effects the variation of load due to the hoisting engines.

DRUM HOISTS TAKING A FLAT ROPE

The Societe Alsacienne has installed four electrical hoisting engines at the mines La Grillatie and La Tronquie in the Carmaux district. These two installations are practically identical, so that only one requires a description.

The two machines included in the installation are re-

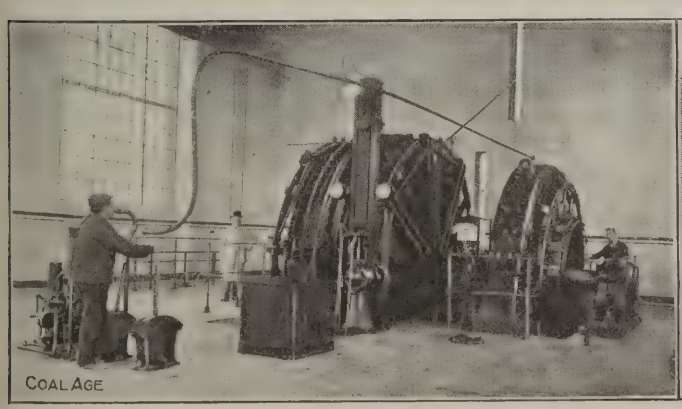


FIG. 4. A HOIST AT A POTASH MINE

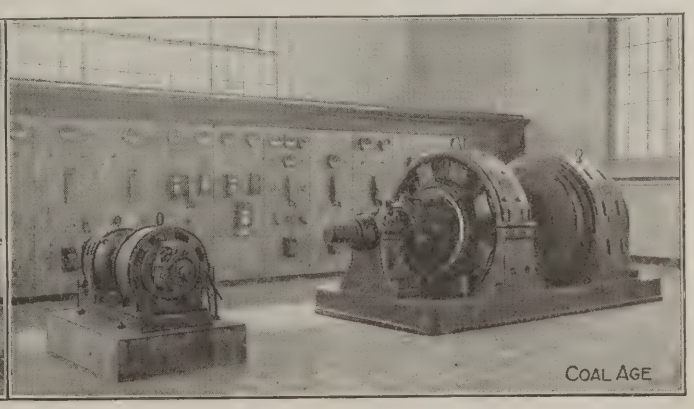


FIG. 5. A LEONARD CONVERTER SET

quired to extract 120 metric tons (122 American tons) per hour from a depth of about 440 m. (1446 ft.) in 43 hoists, the net load dealt with being 2820 kg. (6220 lb.). They are of the drum type, as shown in Fig. 6. A flat steel rope is employed having a section decreasing from 310x50 mm. (approximately $12\frac{1}{4}$x$1\frac{15}{16}$ in.) to 230x40 mm. (9x$1\frac{9}{16}$ in.) The drive for each machine consists of two electric motors capable of running together or separately, which are fed by a converter set (see Fig. 7) composed of two direct-current generators furnishing a 500-volt supply from an asynchronous three-phase motor of 480-hp., running at 585 r.p.m.

The converters of both engines are coupled mechanically to the same flywheel and the generators are also held in step electrically. This allows the uniting of the stored energy of the turning masses of the two converters for the purpose of smoothing out the variations of load produced by the combined action of the two hoisting engines.

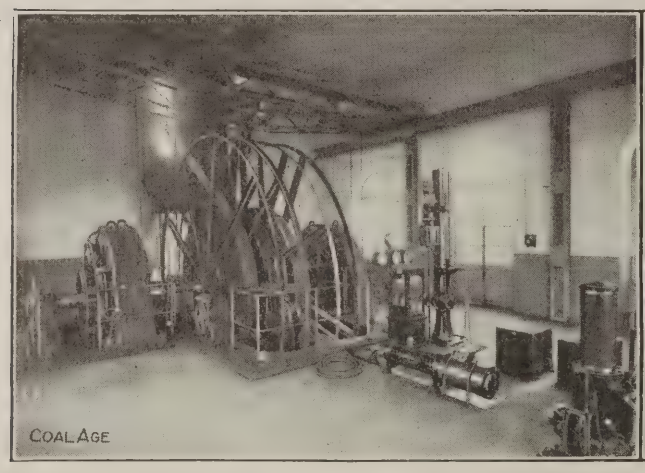


FIG 6. A DRUM-TYPE HOIST USING A FLAT ROPE

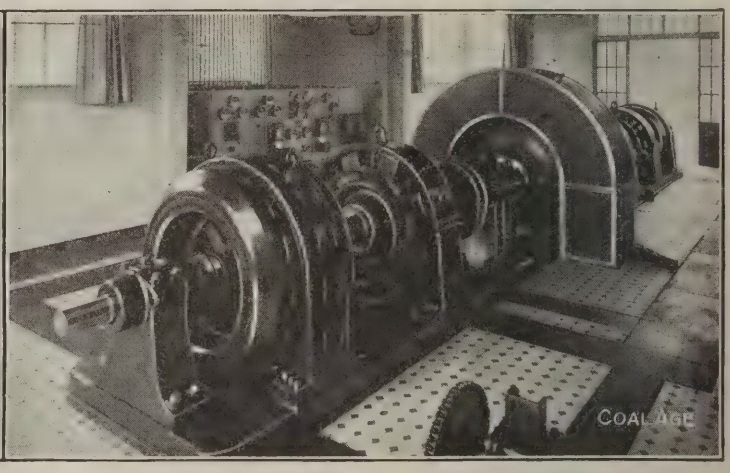


FIG. 7. MOTOR-GENERATOR SETS FEEDING HOIST SHOWN IN FIG. 6.

These examples well illustrate the lines upon which the installation of electricity for hoisting from deep and medium depth shafts is being dealt with in an important European coal area. The types of machines are, of course, divergent depending on the requirements of the work to be done in each particular case. The complete applicability of electric power and the value of the rotary converter are, however, points well worth noting.

Notification to Operators and Miners

Reckless miners and mine foremen who risk their own lives and the lives of other men working in the mines are to be punished to the fullest extent of the law hereafter. This announcement has been made by the State Mining Department of West Virginia in a circular letter to the various district inspectors.

Each of the twelve district inspectors of the state has received the letter from Chief Inspector Henry, containing his specific and unmistakable instructions that whenever a man is found persisting in dangerous practices he is to be summarily dealt with. The letter of Chief Inspector Henry to the district inspectors is as follows:

By referring to Section 15 of the mining laws you will notice that the mine foreman is in absolute charge of all underground conditions and it is his duty to see that the mining laws are strictly complied with, and, in the future, where you find it necessary to prosecute miners or mine laborers for persisting in any dangerous practices that would create accidents or destruction of property, you will prosecute the mine foremen also for permitting any violation of the mining laws and rules of the companies. In your future inspections you should warn all foremen in regard to the above instructions.

In addition to this letter, Chief Henry has also written to the operators of the state, notifying them that the inspectors will prosecute mine foremen and miners hereafter for violation of the state laws and the company's rules for the conduct of the men underground.

Mr. Henry said recently that it had been necessary lately to prosecute miners for shooting off the solid and he said that it had been proven in each instance that the men had done this in the face of direct and specific instructions from mine foremen to the contrary. He also called attention to the fact that miners persisted in riding on trips and that that was a direct violation of the state mining laws.

He added that if the state officials could not induce the miners to have regard for their own lives and the lives of others by showing them what was right, the officials would see that every man violating the law was punished. He added that after a few men had been heavily fined it would not be necessary afterward to tell them or their comrades more than once to do or not to do a given thing that would insure safety.

WHY APPLY LAW ONLY TO MINERS AND FOREMEN?

We are glad to see that Mr. Henry so clearly understands his duties and we hope he will show equal energy in shutting down mines, and obtaining convictions of operators and superintendents where second openings are not provided, where the bratticing is defective or the air current insufficient. We would not be displeased to see some few unruly miners and foremen fined, but we would like to arrange that they might have some distinguished company.

As the legal responsibility of the mine foreman is more easily proved than that of his employer or the superintendent, Mr. Henry writes to the operators, doubtless hoping that they will provide the needed funds for improving their mines, so that it will not be necessary for their mine foremen to serve jail sentences or resign their positions. We trust they will take that gentle hint.

Some New Types of Electric Hoists

SYNOPSIS—A description of two new machines for use in replacing single cars in coal mines where the grades are too steep to admit of their being successfully moved by man-power.

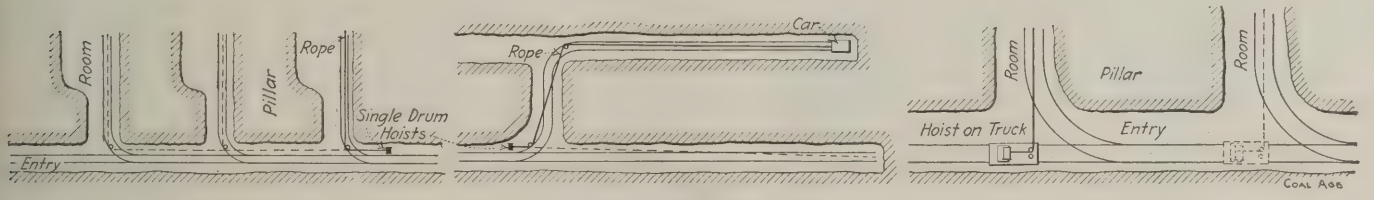
In practically every coal mine there are some working places driven upon such grades that mine cars cannot be readily handled by the miner and his helper. In such cases it becomes necessary to remove the cars by some force other than man-power.

Mules or gathering locomotives are sometimes applicable to this work, but in many instances the most satisfactory system is one whereby the miner handles his own cars by means of a small semi-portable hoist. He is thus able to work at his best efficiency while at the same time the haulage locomotives can be utilized to their utmost extent, as they are relieved of the work of gathering.

To meet the demands for machines suitable for this work, two small electric hoists have been recently placed upon the market by the Pneumelectric Machine Co., of Syracuse, N. Y. These machines were developed after a careful study of the conditions to be met. They are designated by the manufacturer as the Room Hoist, and the electric Cap-Stan, respectively, and are shown in Figs. 4 and 7. Both machines have been designed for the purpose of handling one or two cars, loaded or empty, on grades such as prevail in coal mines.

The particular uses to which each machine is adapted will be brought out briefly in the following paragraphs. Both machines are extremely simple and rugged in construction, and the ordinary miner is abundantly capable of operating either to the best advantage.

The Room Hoist shown in Fig. 4 is a complete hoisting machine equipped with a suitable motor and controlling device, clutch, brake, etc. It is capable of hauling cars by power or lowering them by the brake, and is in



FIGS. 1, 2 AND 3. SHOWING SOME APPLICATIONS OF THE ROOM HOIST

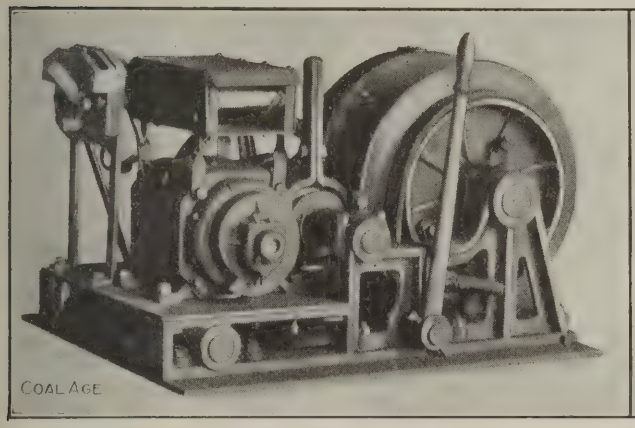


FIG. 4. THE ROOM HOIST WITHOUT FOUNDATION

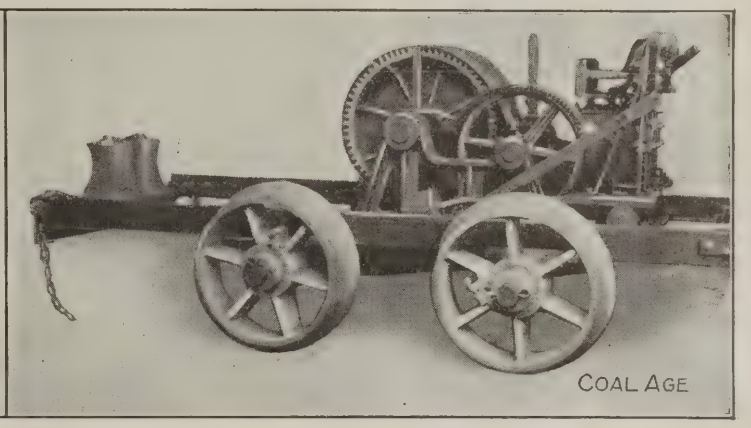


FIG. 5. ROOM HOIST MOUNTED ON A MINE TRUCK



FIG. 6. THE ROOM HOIST IN OPERATION



FIG. 7. CAP-STAN IN OPERATION

every way a small edition of larger electric hoists with which all mining men are familiar.

A special application of this machine is shown in Fig. 5, and some methods of its use are illustrated also in Figs. 1, 2 and 3.

This miniature hoisting engine is but 26 in. in height, 28 in. in width and 38 in. in length over all, and the weight without rope is only 830 lb. It may be seen from this that the machine is easily portable and can be used anywhere without the necessity of making an excavation for its accommodation.

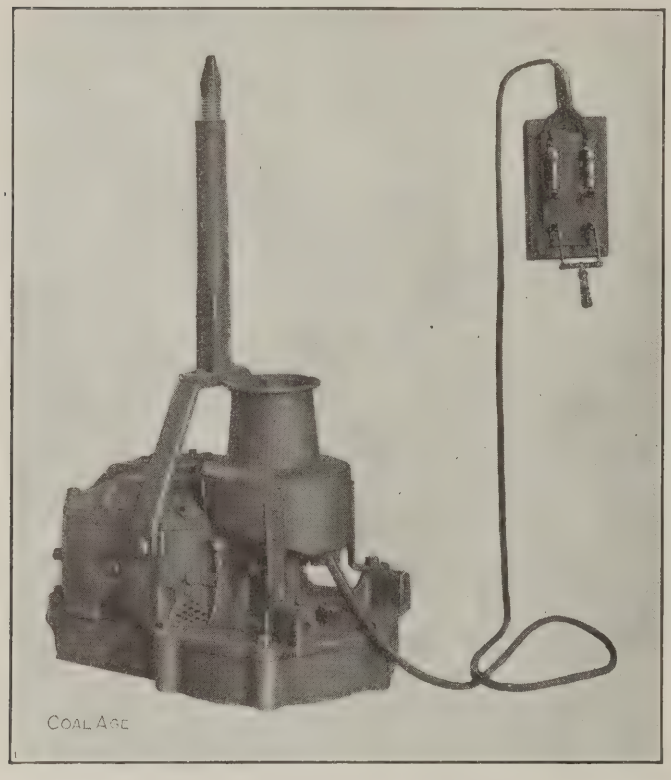


FIG. 8. THE ELECTRIC CAP-STAN

The Cap-Stan, illustrated in Fig. 7, is a novel application of electric power to hoisting or pulling purposes. The machine is especially designed for application to coal-mine work and is solely and primarily a pulling machine, there being no brake or other apparatus. The principle employed is that of the familiar vertical steam capstan, namely, the use of a hemp rope on a revolving spool or capstanhead. Fig. 8 clearly illustrates this principle.

Ordinary hemp rope used in this connection has the disadvantage of wearing rapidly, but a steel-center hemp rope, recently developed, has proved especially satisfactory for this service, since it combines the strength and wearing ability of metallic cordage with the flexibility and ease of handling of hemp.

The weight of the electric Cap-Stan is but 450 lb., and its dimensions are such that it can be used under any condition. The ruggedness and simplicity of this machine commend it for use under severe conditions and by unskilled labor. It will be at once apparent that the machine is virtually food-proof, inasmuch as there are but few parts, and the pulling principle which depends upon the friction of the rope on the spool or capstanhead will not admit of serious overload.

The Philadelphia Conference

Last week, we stated that the subcommittee on the new scale made a report on Wednesday morning, Feb. 25, to the joint conference. The operator members of that committee were as follows: Hugh Shirkie and P. H. Penna, of Indiana; C. E. Maurer and E. A. Cole, of Ohio; W. W. Keefer and G. W. Schleuderberg, of Pennsylvania. The miners represented were Joseph Moore and C. W. Savage, for Ohio; Duncan McDonald and Joseph Pope, for Illinois; Van Bitner and Robert Woods, for Pennsylvania, and Charles Fox and William Houston, for Indiana. The miners were allowed to select two alternates for Indiana, Lawrence Garrigas and Edney Buck, to represent the block-coal district of that state.

The conference finally adjourned on Feb. 26, having accomplished nothing though it had been in session since Feb. 10. The two features creating debate were Demands 1 and 7 of the Union. The first calls for payment for all coal mined, both lump and finer coal, and the second "that all the local inequalities and internal differences be referred to the various districts for settlement.

The operators desired the so called Cleveland agreement of 1912 which runs almost identically with the above, but has a most important qualifying clause:

> That internal differences be referred for adjustment to the various districts affected, it being understood that nothing shall be done in district or subdistrict conventions that will increase the cost of production or reduce the earning capacity of the men.

There are still three weeks before April 1, during which the conference will probably be called again.

BY THE WAY

The morning sun never lasts all day.

A monkey remains a monkey though dressed in silk.

If you don't scale the mountain, you can't view the plain.

It generally happens that where might is master, justice is servant.

Any man can bear another's misfortune like a good Christian.

Those who believe that money can do everything, are generally prepared to do everything for money.

The Sherman Law in restraint of trade might have been appropriately applied to the Ohio Mining Commission.

Five minutes talk with any coal producer will convince one that it is high time some philanthropic personage established a "Home for Indigent Coal Operators."

Dear sirs & Gentlemen i enclose you under separate cover herewith still anuther manyscrip article (with stamps as usual) and all I got to say is that i want to know why you all don't never print none of my articles cause I read everything in Coal age every week (includin & exceptin respectively the advertisements and the trade Reviews [and Believe Me them is Some advertisings]) and I aint never yet seen no one that had me skinned none in writin—and—and—(ad infinitum.)

Good Night!!

Types of Electric Winding Engines

By L. F. Mitten*

SYNOPSIS—Local conditions governing the service of hoisting engines which have a direct bearing upon the design are here discussed. The systems of electric supply and control common in the coal fields are also described.

The selection of the proper type and the design of an electrically operated hoist for slope haulage, where the rope speed is not high and the equivalent rope pull not excessive, is a comparatively simple proposition from the builders' standpoint.

The proper size of motor for a slope hoist where the load is pulled up and the empty cars lowered by mechanical brakes is determined by the following formula:

$$hp. = \frac{R \times W}{33{,}000 \times \text{efficiency of hoist}}$$

When R = rope speed in feet per minute, and W = equivalent rope stress in pounds.

In selecting the motor the rating should be based on

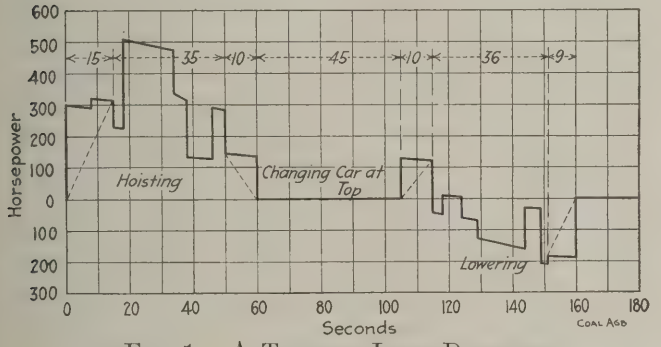


Fig. 1. A Typical Load Diagram

one-half hour or intermittent service, inasmuch as the machine is idle, and, therefore, allowed to cool, while the trip is being lowered and the rope transferred from the empty to a loaded trip, and *vice versa*. When the hoisting conditions differ from those given above (or when the rope speed is high with a resulting high starting peak) the conditions must be gone into thoroughly, a duty cycle given and the average heating determined.

Conditions Must Be Fully Known

To better show why the conditions must be fully known in order to determine the proper equipment, a typical load diagram is shown in Fig. 1. This diagram was plotted from the following data:

No. of cars per trip	1
Cars handled in 8 hours	140
Weight of loaded car, lb.	12,000
Weight of empty car, lb.	3,600
Diameter rope, in.	1½
Length of slope, ft.	1,005
Maximum rope speed hoisting, ft. per min.	1,270

A profile of the slope is shown in Fig. 2.

In this case the loaded cars are hoisted and the empty ones lowered, the braking being done mechanically. From this diagram the size of the motor required would have a continuous rating of 250 hp. The capacity of this motor would have to be increased if the braking was done by letting the machine run as a generator "pumping" power back into the line.

Figs. 3, 4 and 5 show hoists that are used on ordinary slope haulages where the rope speed is low and double reduction gears are necessary. Outfits of this type are built with friction, or loose drums, or with tight drums keyed to the shaft. The advantages of the friction drum are that in lowering the trip the drum is unclutched and there is, therefore, no wear to any part of the outfit with the exception of the drum bushings and brakes. Oftentimes it is absolutely necessary to have a friction drum on account of a slight pitch on the slope, which would not give a sufficient rope stress to turn the drum, gearing and motor over.

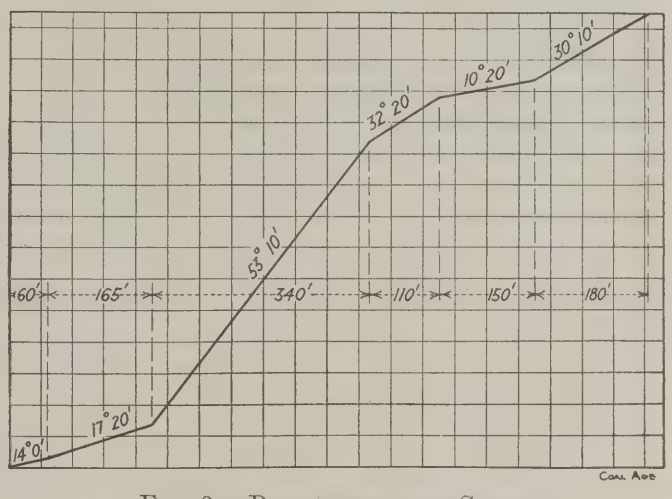


Fig. 2. Profile of the Slope

The tight drum has the advantage of low first cost and simplicity. One great disadvantage, however, is that should the descending trip exceed a safe speed the driving motor may be damaged owing to the high peripheral speed of the armature.

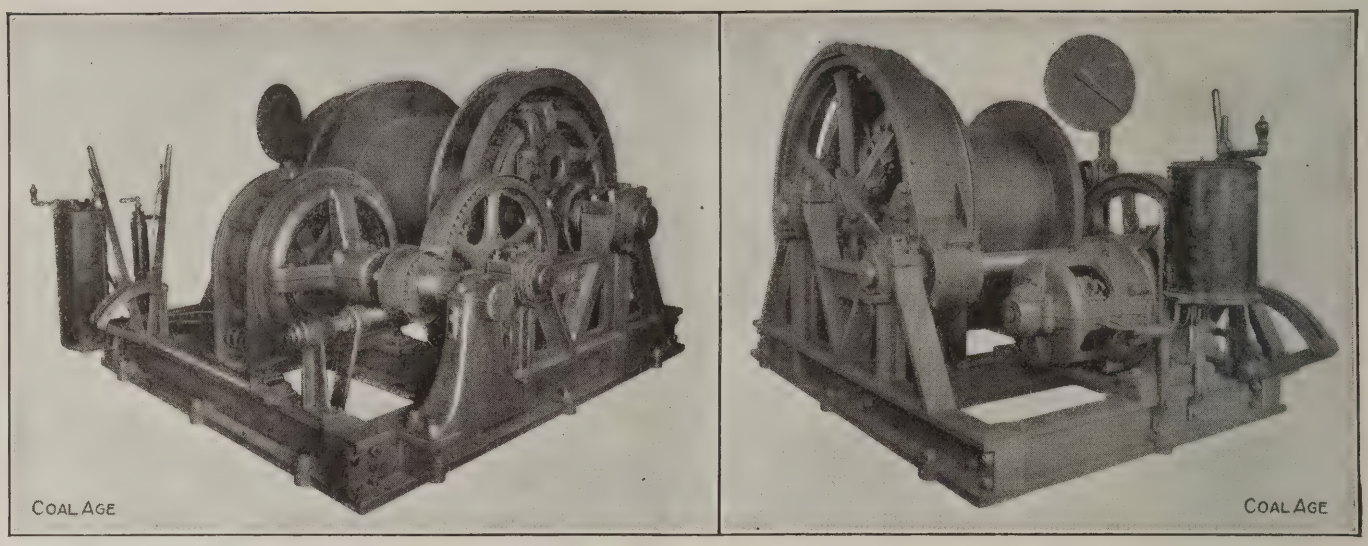
Figs. 6 and 7 are hoists designed for heavy rope stresses at medium speeds. The outfit in Fig. 7 handles a load of 26,000 lb. at a speed of 500 ft. per minute and is driven by a 500-hp. induction motor with a liquid-type controller.

Speed-Change Gears Are Often Employed

It is often necessary in the case of inside rope haulage to pull the load up heavy grades, for a short distance, the slope then flattening off. In such instances, in order to reduce the size of the motor, hoists with speed-change gears have been installed. An outfit of this type is shown in Fig. 8. The gears are shifted by means of hand levers, these being interlocked so that it is impossible for the operator to get both sets in mesh at the same time and damage the hoist.

As an example of the adaptability of this type of outfit, we will assume that under ordinary conditions it is desired to pull a load up an incline with a resulting rope stress of 5600 lb. at a speed of 500 ft. per minute. For this duty where the cycle of operation is not severe, as previously outlined, a motor having an intermittent rating of 100 hp. would be required.

*Engineer, hoist department, Vulcan Iron Works, Wilkes-Barre, Penn.



FIGS. 3 AND 4. ORDINARY SLOPE HOISTS WITH DOUBLE REDUCTION GEARS

Let us now assume that occasionally it will be necessary to bring supplies up this same slope, the load being increased so that the resulting rope stress is, say 9500 lb. The speed at which the motor would handle this load would be approximately in direct proportion to the rope pull, or at the rate of 295 ft. per minute. The hoist would, therefore, be designed to give these speeds at the full-load speed of the motor, and the outfit would, of course, have to be of sufficient strength throughout to withstand the maximum rope stress.

THE HORSEPOWER IS MEANINGLESS

The horsepower rating of an electric hoist means practically nothing, as far as the size of the machine is concerned. As an example, a hoist is designed for a maximum rope pull of 6000 lb., and is driven by a 75-hp. motor with gearing to give a rope speed of 350 ft. per minute. This same hoist could be adapted to be driven by a 150-hp. motor at a rope speed of 700 ft. per minute, provided the acceleration period is not so short as to create stresses that would exceed the safe capacity of the machine, with but little change in the mechanical construction.

We will now assume that an outfit is desired with a smaller motor, say 50 hp., and designed to give a rope

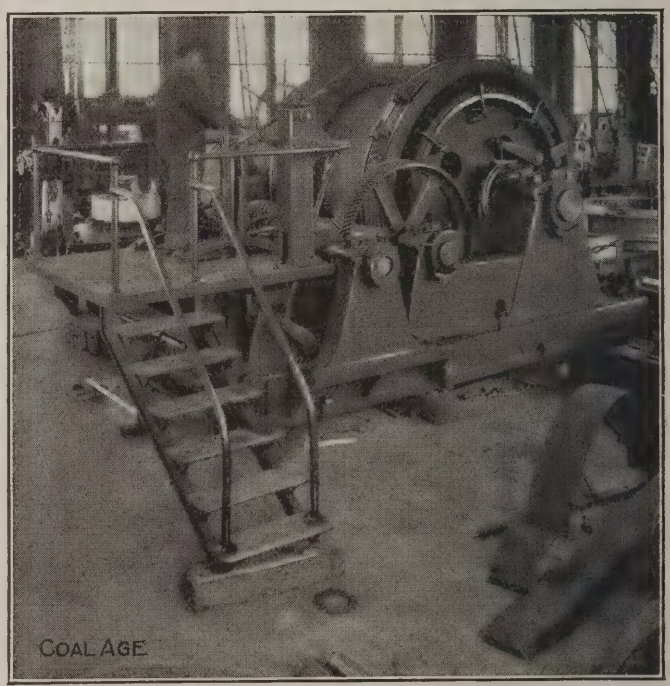


FIG. 7. A HEAVY-DUTY MEDIUM-SPEED HOIST

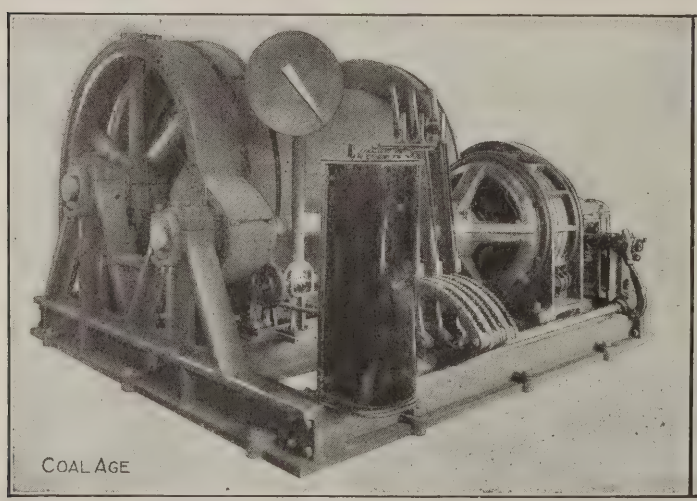


FIG. 5. ANOTHER DOUBLE REDUCTION HOIST

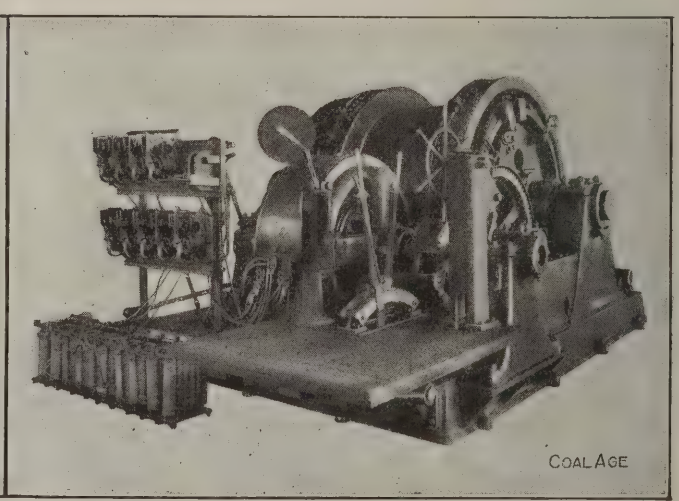


FIG. 6. A HOIST BUILT FOR HEAVY ROPE STRESSES

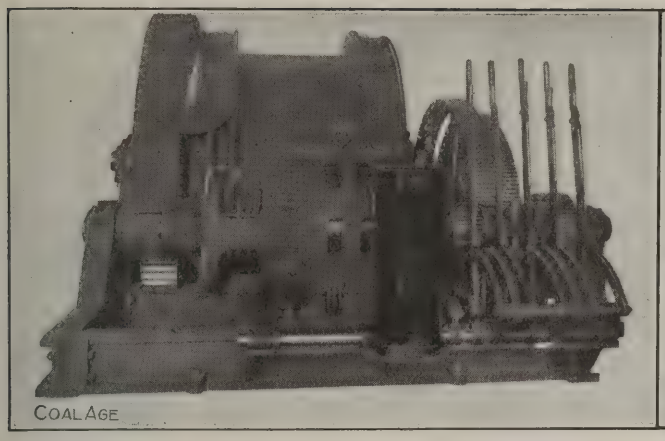


FIG. 8. A HOIST PROVIDED WITH CHANGE GEARS

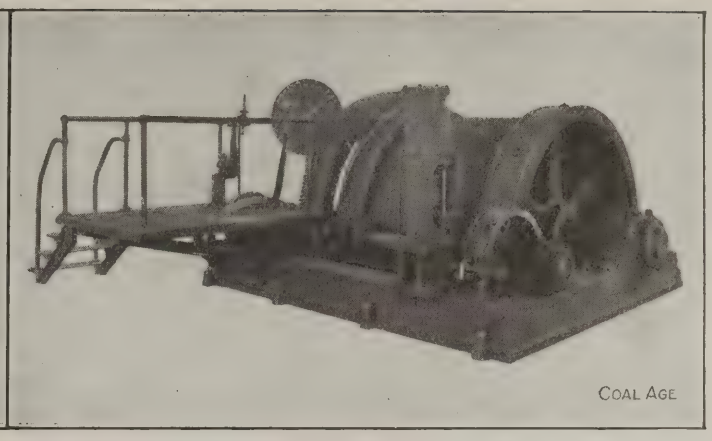


FIG 9. A HOIST WITH SINGLE-REDUCTION HERRING-BONE GEARS

speed of 100 ft. per minute. This motor would then handle a load of

$$\frac{50 \times 85 \times 33{,}000}{100} = 14{,}000\ lb.$$

equivalent rope stress. For this load a much stronger and heavier hoist would have to be selected.

In the foregoing examples the heating of the motor due to accelerating the load has not been taken into consideration, inasmuch as the rope speed is low and the acceleration peak may be neglected.

One of the objections to the electric winding engine is the noise from the gears. This has been practically eliminated, however, by the use of gearing of the machine-cut herringbone type. These gears work silently and without backlash or vibration, friction and mechanical losses are greatly reduced and much higher ratios and velocities may be obtained. Herringbone gears are higher in first cost than machine-cut spur gears, but are preferable in all cases where high rope speeds are desired. A hoist with the ordinary foundry-molded gears should not be given serious consideration under any conditions.

Fig. 9 shows a hoist with single reduction herringbone gears of the Weust type, having a ratio of 12 : 1. Fig. 10 has the same type of gear and is a modern installation in every way. This hoist has a rope speed of 1800 ft. per minute and handles the following load on a slope having an inclination of 30 deg. from the horizontal:

Weight of cars and ore, lb.	63,600
Weight of ore, lb.	33,600
Diameter of rope, in.	1½
Length of slope, ft.	1,800

The load is counterbalanced by a weight of approximately 45,000 lb. This is operated on a two-part rope and has a travel of 900 ft. The drums are 10 ft. diameter and wind the rope in two layers. The motor is a 700-hp., 290-r.p.m., 3300-volt, 3-phase, 25-cycle General Electric variable-speed machine with polar-wound rotor. The speed is varied by cutting resistance into and out of the rotor circuit.

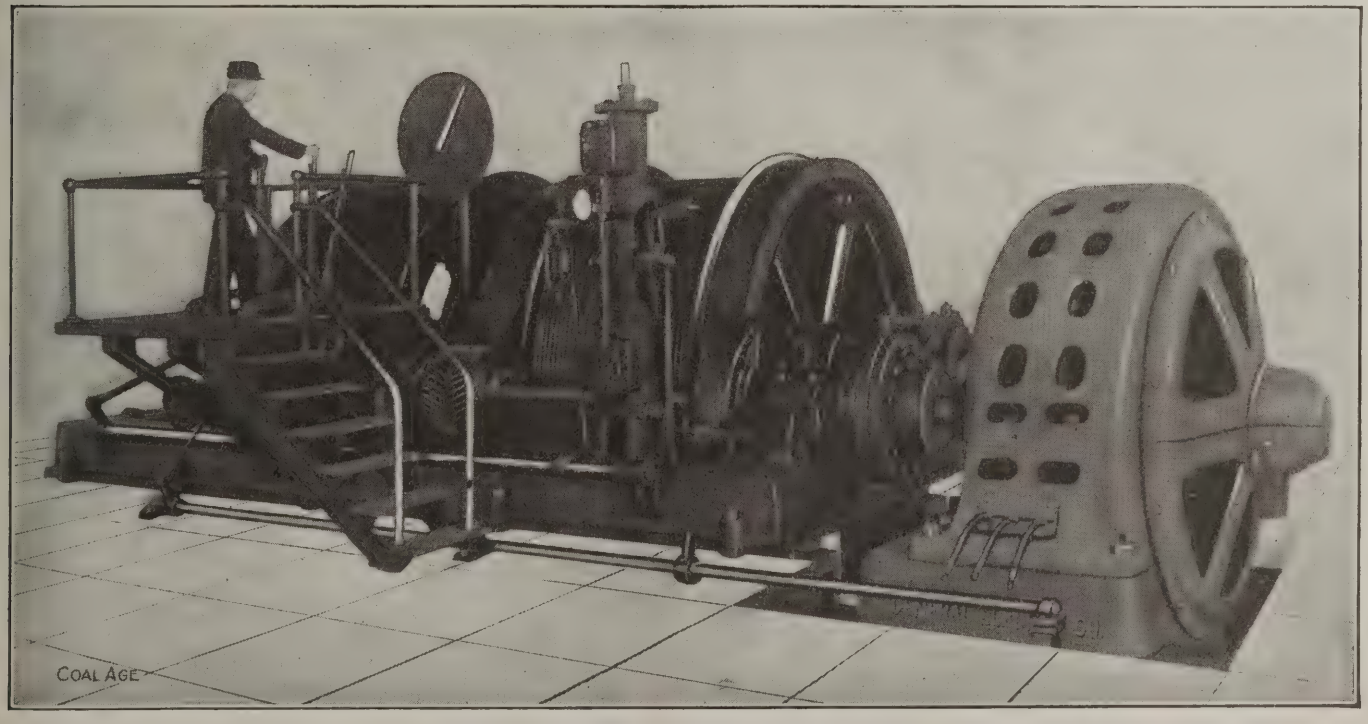


FIG. 10. A HOIST BUILT TO HANDLE 63,600 LB., PARTIALLY COUNTER-BALANCED ON A 30-DEG. SLOPE AT A SPEED OF 1800 FT. PER MIN.

The rheostat is of the liquid type. The electrodes are connected to the collector rings of the motor, and the resistance in series with the rotor winding is varied by changing the level of the water in the rheostat by raising or lowering a hand operated weir.

The rate at which the water level may be raised, and therefore the rapidity of acceleration of the motor can be made independent of the weir so that automatic acceleration can be obtained, while the lowering of the weir for retardation can be done very rapidly.

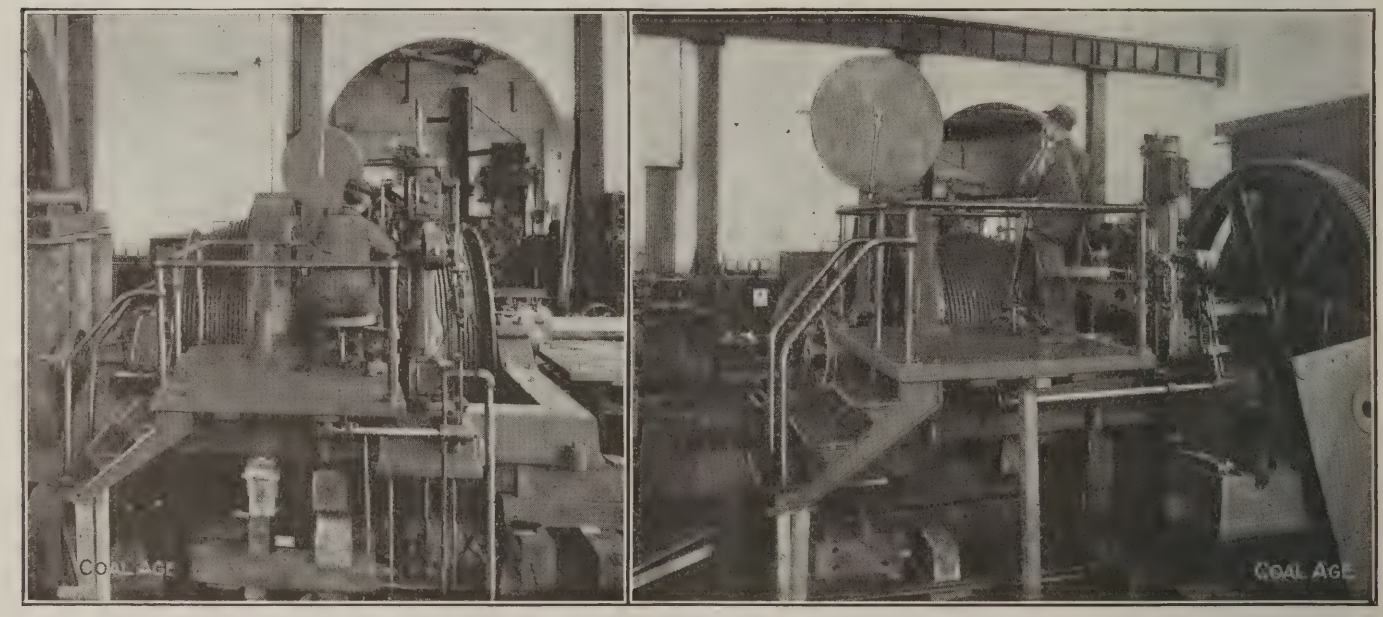
The motor is connected to the hoist through a flexible coupling. Each drum is equipped with an extra-heavy band brake, one being operated by a weighted power cylinder of the floating lever or compensated type. This permits of the band being applied partially or set up tight, as may be desired.

The general design is very similar to the one shown in Fig. 9, with the exception that the drums are conical and the brake is of the post type, having a parallel motion. The conditions under which this hoist operates are as follows:

Depth of shaft, ft.	190
Weight of cage, lb.	11,000
Weight of car lb.	2,650
Weight of coal, lb.	4,500
Diameter of rope, in.	1⅜
Maximum rope speed, ft. per min.	1,140
Caging rest, seconds	8

Fig. 13 shows the load diagram plotted from the above data and from which the size of motor was determined.

The method of calculating the sizes of driving motors and the plotting of load diagrams is an interesting study, but would lead too far for this article.



FIGS. 11 AND 12. ELECTRICALLY OPERATED SHAFT HOISTS WITH CONICAL DRUMS

The hoist is equipped with the usual safety devices which bring the drums to a dead stop should the operator pull into the danger limit. In case of failure of power supply the machine is also brought to a full stop. A motor-driven compressor for supplying power to the auxiliaries is located in the hoist house.

SHAFT HOISTS WITH CONICAL DRUMS

Figs. 11 and 12 show electrically operated shaft hoists with conical drums driven by General Electric 300-hp., 450-r.p.m., 2300-volt, 3-phase, 60-cycle, form "M" induction motors. The speed of these machines may be varied and controlled by cutting resistance into and out of the rotor circuits.

The resistance is of the cast-iron grid type and is short-circuited by a contactor operating from a master controller. A geared limit switch is driven from the drum shaft and when the cage approaches the surface there is inserted a block of resistance, bringing the hoist to the slow-running speed. Should the cage fail to stop after passing the landing, this limit switch opens the contactor circuits and applies a weighted, compensated brake, such as has been previously described. This operation, however, takes place only in the event of the operator neglecting his duty.

THE CHOICE OF POWER SYSTEM

In the case of large electric hoists there are a number of systems from which to choose and each installation must be gone into thoroughly in order to determine the system best suited for local conditions.

The system that is used in practically all cases in the Pennsylvania coal fields is the straight induction mo-for, geared to the hoist drums through single-reduction herringbone gears, similar to Figs. 9, 10, 11 and 12.

A system that is used in a number of installations is a direct-current shunt-wound motor, direct connected or geared to the drum. This machine gets its power from a synchronous or induction-motor-generator set. With this arrangement a separate motor-generator set must be installed for each hoist motor inasmuch as the latter is controlled by varying the voltage of the generator.

Still another system is a direct-current hoist motor with a motor-generator set practically the same as that described with the addition of a flywheel for the purpose of storing up energy and an automatic speed regulator.

The first system has the advantage of being low in first cost which is of prime importance in many installations and in most cases the efficiency compares favorably with the other systems.

Hoist Delays Cover Much Time

The great objection in the coal field to the direct-current hoist motor driven by a motor-generator set is that the delays in hoisting cover a considerable period; in fact, during an eight-hour day the actual time consumed in hoisting would be from four and one-half to five hours. In addition to this it is necessary to lower men and supplies into the mines during the day and at night, in which case the motor-generator set would have to be kept running. The stand-by losses would, therefore, be considerable, and this, together with the high initial cost and maintenance, make the induction-motor drive the only practical solution.

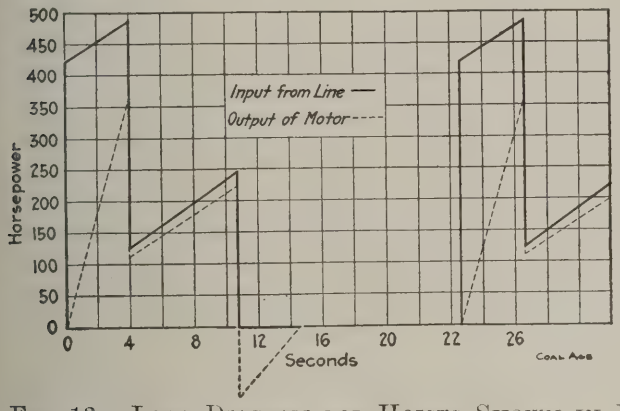


Fig. 13. Load Diagram for Hoists Shown in Figs. 11 and 12.

Wherever it is imperative that the peak load be kept down, owing to the size of the power station, or where current is purchased and peak loads are penalized, the flywheel motor-generator set is usually the only solution.

Each system has its advantages and disadvantages and these can only be brought out by taking up each individual case separately after knowing local conditions. Examples showing power consumed per ton of coal hoisted by each of the foregoing systems for a given depth of shaft lie beyond the scope of this article.

In conclusion I would say that in all cases where electric hoists are being considered, complete information relative to operating conditions should be given the hoist manufacturer, so as to enable him to determine the type best suited for the duty.

Rhenish Westphalian Coal Syndicate

In the report on the trade and commerce of Dusseldorf (Westphalia and the Rhenish Provinces) for the year 1911, presented to the British Houses of Parliament, it is stated that toward the close of that year the Prussian Government began to negotiate with the Rhenish Westphalian Coal Syndicate with a view to turning over the whole coal production of the government mines for sale through the syndicate.

Early in 1912 an arrangement was concluded between the government and the coal syndicate, under which the production of the government's mines in Westphalia and the Rhenish provinces is sold by the syndicate. Previous to the government's decision there seemed to be doubts as to whether the syndicate would be renewed, as there were a number of private owners who were desirous of withdrawing. But now that the government has joined the syndicate, all the coal companies will likewise be compelled to join.

As the report explains, the Prussian Government works a large area of coal fields in the Saar district of the Rhenish province, and also has large interests in some of the most important companies in Westphalia. It is a well known fact that the coal mines managed and worked by the government do not pay as well as those in private hands. The Government has attempted in the past to counteract exorbitantly high prices and to be independent of the private companies.

In the view of the Consul-General the recent agreement points to a change in that policy, and the competition which formerly existed between the government and the mining companies will cease. The result of this agreement is that since Apr. 1, 1912, the Rhenish-Westphalian Coal Syndicate has raised the price of coal and coke all around.

The Proper Use of Oils

By James R. Williams*

Lubrication is the introduction of a medium between two moving surfaces, which will keep them apart and prevent them from seizing or abrading each other.

To secure efficient lubrication, it is not only important to use a good lubricant but it is also necessary that all main bearings, crank pins and cross-heads be kept in proper adjustment, and that all oil holes should be open down to the journal or the part to be oiled. Apply only small quantities at a time, and when oil cups are used, as they should be wherever possible, the feed should be adjusted to the smallest quantity necessary to keep the parts well lubricated. It takes only a small amount of oil to pass between two surfaces, between a revolving journal and a stationary journal brass, or between a sliding contact, such as a cross-head and guide. All material in excess of the amount necessary runs off and goes to waste or drops down on the parts below the point of application, causing an untidy appearance. This wasted oil has been crowded out of the journal before performing its mission. Furthermore, it picks up dirt and grit that are so harmful to smooth surfaces.

Cylinder Oil

Cylinder oil, as the name implies, is intended for use in cylinders only, and should not be used for any other purpose. It may be applied to advantage, however, on hot journals, but its use should cease when the journal is cooled. Some engineers think that cylinder oil is improved by mixing a little graphite with it. This is doubtful; for the tendency of graphite when mixed with cylinder oil is to separate and drop to the bottom of the lubricator. When this mixing is practiced there is always a danger of depositing some of the graphite between the piston rings and the piston body, thereby preventing the rings from performing their duties properly.

Engine oil is especially adapted to the lubrication of all external parts of engines. Being more limpid than cylinder oil, it will spread over the bearing quicker, and will reach all parts to be lubricated in much less time than

*Galena Signal Oil Co., Franklin, Penn.
Note—Abstract of an article in the "Employees' Magazine," January issue.

either cylinder or car-journal oil. The latter oils will lie in heaps. If used on a cross guide they will be pushed off with the first stroke of the cross-head. Engine oil should not be mixed with other oils for any purpose. Its use should be confined to the lubrication of engine bearings, because it finds its way to the journal and fills up the irregularities of the bearing, thereby increasing the smoothness of its surface. It should never be used in steam cylinders, either by itself or mixed with cylinder oil, because it disintegrates when raised to high temperatures.

Oiling the Engine

Upon entering the engine house prior to starting up, especially if the engines have been idle for some hours, the engineer should open the cylinder cocks to allow any water that might have accumulated to escape. They should also be left open for a little while after starting, to allow the escape of the steam which the lower temperature of the steam pipes and cylinder walls causes to condense. The neglect of this important precaution might result in serious personal injury, damage to the engine and throwing the entire colliery out of work for some time.

The cylinder-oil lubricator, if of the sight-feed type, should be adjusted to feed about five minutes before starting the engine. If of the mechanical-feed type it should be operated by hand a few times to give the cylinder a good initial lubrication. The oil cups on the crank pins, cross-heads, main journal and all other bearings should be set to feed two or three minutes before the engine is started. This precaution is especially advisable with the crank-pin cup, because an abrasion of the metal at this point might cause expensive trouble and delay.

Importance of Cleanliness

Great care should be taken to prevent dust and dirt from getting into the engine room. The oft-given advice to keep all oil and grease cups covered should be religiously observed. Hot bearings are liable to occur when dirt or grit is carried into them by the oil, even though the oil is of the best. Drip pans should be used wherever necessary and the waste oil contained therein dumped into the filter frequently.

It has been my experience that where an engine house and its machinery are kept clean and tidy, trouble of any kind rarely occurs. Before leaving the engine house after the day's work is over, all windows and doors should be closed, and all waste or inflammable material of any kind should be put into a covered metal can. The feeds on all oil cups and lubricators should be closed, and if the latter are nearly empty they should be filled ready for the start next morning, it being understood, of course, that reference is made only to engines that are in daily service and worked single shift.

The Care of Wire Rope

SYNOPSIS—If a wire rope is carefully watched at work it is possible to prevent much wear and tear. The article describes where the deterioration is to be expected and the cure for it is obvious.

Experience has taught that there are four leading causes for the destruction of wire rope, namely, abrasion, overstrain, undue bending and corrosion. In time, one or more of these causes will so weaken a rope that it can no longer support the load for which it was designed. When it fails, from any of the above mentioned reasons, the cause can usually be determined from the appearance of the rope. If, for example, the wires wear thin in a short time, the rope has been subject to abrasion; if the wires are but little worn and broken off squarely, usually sticking out all over the rope, it has suffered from either severe bending stress or overstrain; and if the wires are rusty and pitted, corrosion is to blame.

Causes of Abrasion

Abrasion in a wire rope is frequently the result of one of the following causes: (1) Faulty grooves in wheels that are roughly worn or too tight for the rope.

(2) Dragging of the rope upon the ground or over some fixed obstruction.

(3) Using a rope under conditions for which none but the toughest steel (plough or improved plough) is adapted, and failing to select ropes of such grades.

Another cause for sudden breaking may be excessive abrasion at some point. This may occur to ropes running on slopes over heavy knuckle sheaves. After the train has come to a rest, if the sheave keeps on spinning, it tends to wear the portion of the rope resting upon it, and that part will slowly wear and become weak.

Causes of Broken and Corroded Wires

Badly broken wires, showing excessive bending, indicate that the wheels are too small or too numerous. They should be rearranged or a more flexible rope used.

Rope badly corroded shows the lack of proper lubrication. Local corrosion sometimes causes failure. If, in passing through a tunnel in which water is dripping from the roof, a rope is allowed to lie still for a considerable length of time, the part exposed to the drippings will rust faster than the rest.

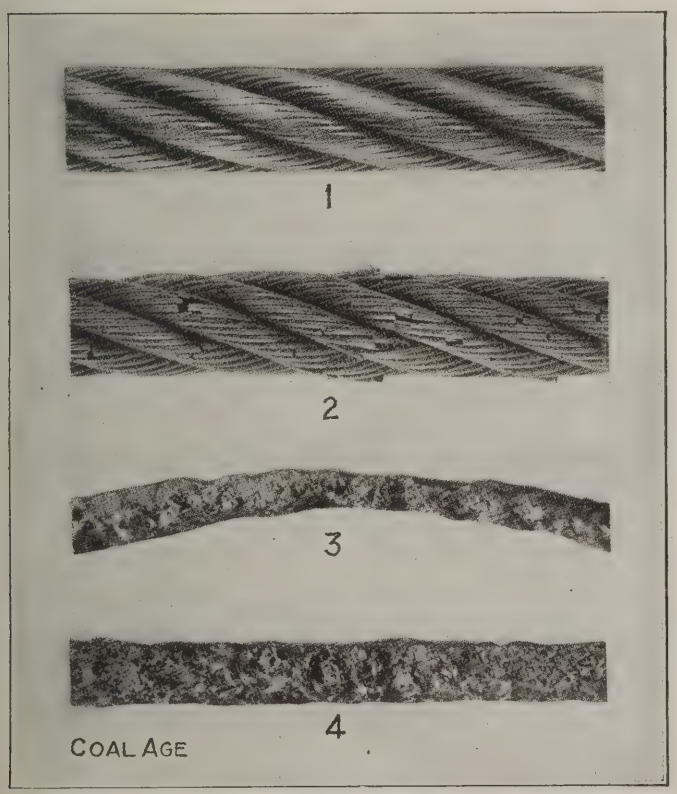
In addition to the destructive causes mentioned above, ropes sometimes suddenly tear apart. Such cases are invariably the result of accidents to machinery or appliances, which bring upon the rope a load far beyond its capacity, or they are due to a serious weakening of the rope at the point of rupture, caused by some local abuses. Such abuse should by all means be avoided. A new rope made from the materials and with the care that distinguishes "A-1" quality, is sent from the factory as nearly perfect as a mechanical product can be and the purchaser should protect the rope from those injuries which may with very little care be prevented.

One of the most common of these injuries is the damage arising from "kinking." If for any reason the rope is allowed to form a loop, and this loop is drawn taut, a kink will result. Though the kink may be straightened out, it leaves a permanently damaged and weakened spot and so should always be avoided.

Note—From the January issue of the Employees Magazine, published by the Lehigh Valley Coal Co. This article was furnished by the John A. Roebling's Sons Co.

When a running rope has a socket attached to the end, constant vibration tends to weaken the wires, and this weakness is increased if water collects directly over the end of the socket. It is, therefore, advisable every three to six months to cut off a piece from the end of the rope and reattach the socket.

Besides the causes mentioned, the effects of which are usually revealed by inspection, temporary overloads producing excessive stresses are sometimes applied, and by straining the wires beyond their elastic limit these tend to shorten the life of wire rope. Such excessive stresses are more apt to occur where a rope is slack, or is attached to a short length of slack chain, and the power to lift or haul a load is suddenly applied, with the result that, instead of the rope gradually adapting itself to the required pull, it is subjected to the jerk arising from the full inertia of the load. Lifting tests made on wire ropes, attached to chains having from 2½ in. to 12 in. of slack attached, show that when loads are applied sud-



1—Wire Rope Used under Proper Conditions, Shows Normal Wear. 2—Wire Rope That Has Been Subjected to Short Bends, Causing Broken Wires. 3 and 4—Enlarged Views of Pieces of Wire Taken from Badly Rusted Rope

denly, the stresses are from one to four times as great as those sustained when the same loads are gradually applied. Therefore, care should be taken to avoid, as far as possible, such pulls and jerks.

Wire-Rope Lubrication

When a complaint is made that a wire rope has not given satisfactory service, the first questions asked by the manufacturer are: "How was the rope lubricated?" "What is the condition of the inside wires?" These questions arise because the experienced wire-rope maker fully appreciates that a wire rope is a complex piece of machinery and knows that the importance of proper lubrication is too often overlooked. Sometimes a wire rope is covered with a compound too thick to penetrate beyond the outside wires. The effect of this is to leave the inside strands without protection against water and moisture.

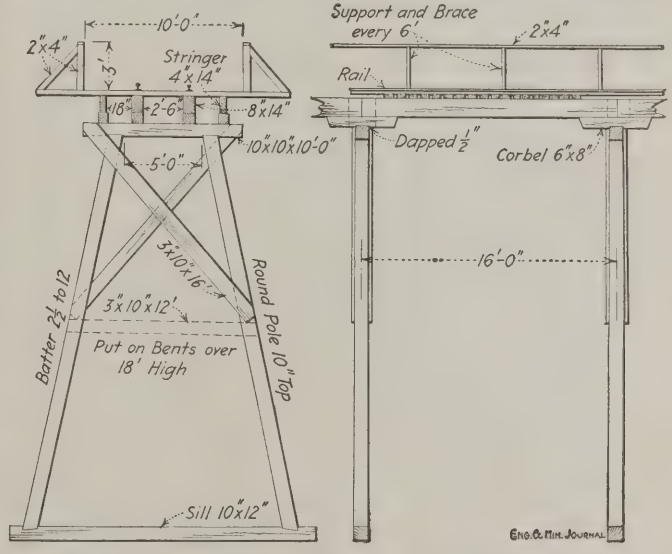
Examinations of ropes that have fallen short of the period of good service, frequently show the outside wires to be in apparently good condition, while the areas of the inside wires have been materially reduced and the whole rope weakened. This is due to corrosion that could have been prevented by the use of a lubricant which would have reached and protected the inside wires.

A lubricant or preservative should not only penetrate to the hemp center, in order to saturate it and prevent absorption of water, but it should also coat thoroughly the inside wires of each strand. This cannot be expected from thick, heavy and sticky compounds or the greases frequently used for the lubrication of wire ropes, which were made primarily for some other and quite different purpose.

Wood Trestle for Motor Tramming

By William Wallace

From a typical iron-range shaft several trestles usually lead off, one or two for the ore stockpile, one for the waste rock and a short one for a tail track, when motor tramming is employed. The bents of these trestles are sometimes steel, more frequently wood, and in the latter case are often temporary. The accompanying illustration



Elevation Showing Details of Construction

represents a rather typical bent of light construction. It is designed for a load of 10 tons, that is, a loader car and an electric locomotive. The material specified is hemlock, except for the posts which are cedar, spruce, or tamarack round poles. Such a trestle will range in height from 15 to 50 ft., although for the higher structures, three or four posts are used in the bent. The stringers instead of being sawed timber, are frequently hewed poles, which may be lapped and the corbels eliminated. The full sill shown here is often omitted on a temporary bent and 1x6-ft. bearing blocks used under the various posts. —*Engineering and Mining Journal.*

The Congressional Investigation in Colorado

SYNOPSIS—The operators admit the importation of arms, but declare that it was done to protect their property. They show clearly that the men were making good wages and had saved over a half million dollars. The right of the committee to subpoena witnesses who are held by the governor, is denied.

In the coal-strike hearing the importation to Colorado from West Virginia of rapid-fire guns for use during the strike in the southern field was the subject of considerable investigation by the Congressional committee while in session in Denver. Albert C. Felts, of the Baldwin-Felts Detective Agency, testified to having shipped four such guns together with 4000 rounds of ammunition, but that this was not done until after murders had been committed by the strikers. He claimed that the arms were secured for protection and not for offensive warfare, and that the freight on them had been paid by the operators. John G. Osgood, president of the Victor-American Fuel Co., declared that he would assume full responsibility for his share in the importation of the arms, and stated that they were not used by anybody except the sheriffs.

OSGOOD'S TESTIMONY

Osgood declared that violence, on the part of the strikers, began the first day of the strike and that altogether he believed 11 company men and three strikers have been killed. He accused the strikers of many depredations, such as the burning of bridges and attacks on nonunion camps. He testified that there is no formal organization among the coal operators of the state, but that they have frequently met in one another's offices for consultation, inasmuch as their interests are largely common. Both Osgood and J. F. Welborn, president of the Colorado Fuel & Iron Co., emphatically stated that they did not wish to and would not deal with the United Mine Workers of America, Welborn saying, "I am going to run my own business or not have any business."

These men explained their attitude in this matter as based upon the fact that the union, being unincorporated, is not a responsible body and does not abide by its contracts nor can be forced to do so. Osgood said that while he is personally opposed to the eight-hour law that has been in force for about a year in Colorado coal mines, he has enforced it. He believed that the miners themselves preferred not to be limited to the short hours, for their work is seasonal, the mines frequently running on short schedule during the summer months. Numerous canvasses of the men on this subject, he claimed, showed that the miners were opposed to the eight-hour restriction. Referring to troubles arising over disputed weights of coal, Osgood said he was glad to have checkweighmen at his mines but that it is always difficult to find men who will accept such positions.

SCRIP AND SALOON REGULATION ARE NECESSARY EVILS

Questioned regarding the use of "scrip," he explained that his company inaugurated the system as a convenience to the miners who are never obliged to trade at company stores and are not discriminated against if they trade elsewhere. He is opposed to the system on the ground that shiftless miners often use scrip in payment for saloon bills. He stated that his company had no relation with the saloons of the coal camps except to regulate them somewhat for the benefit of its employees. At some of the camps, his company had established "clubs" where liquors and tobacco were sold at reduced prices that effected savings, for some men, of about $5 per month.

He said that one notorious saloon, flaunting a red flag with a bowie knife on it, was frequented by anarchists and that the company had raided it a number of times. Osgood further declared that his company had done everything it could to comply with the new coal-mining code and had even anticipated some of the demands. He also explained the organization of rescue crews and the purchase of a car fully equipped for instruction, two years ago. So far as he was concerned, he said, the strike was over, for his company is producing more coal than the market demands.

Welborn declared that his company had already spent $250,000 resisting the present strike but that this expenditure was preferable to recognition of the union. He created some surprise among the members of the Congressional committee when he asserted that the strikers had about $400,000 in money deposited with his company. The corporation has a system of notes whereby miners may deposit their earnings, and when the strike began such deposits amounted to about $500,000. Questioned concerning the need for the militia now, Mr. Welborn said that, although the strike is settled, so far as production of coal is concerned, violence is still imminent. Concerning scales of pay, he testified that the average pay for miners in his company's mines just previous to the strike was $3.84 per day. Both Osgood and Welborn denied any interference with the political liberty of employees and disclaimed any part in the control of local elections.

MOTHER JONES

After the taking of testimony from these two large operators, the work of the investigation was transferred from Denver to Trinidad, where it was resumed Monday, Feb. 16. About the first important feature to occur in the work at Trinidad was a scathing attack on Gen. John Chase and the militia in general. Horace N. Hawkins, attorney for the union, filed a habeas corpus petition on behalf of Mary ("Mother") Jones, who has been held military prisoner since Jan. 12 in a hospital at Trinidad. The document sets forth many alleged acts of the militia that are contrary to the Federal and state constitutions.

When the Congressmen proposed to subpoena Mrs. Jones, Major E. J. Boughton, judge advocate for the National Guard, objected on behalf of Governor Ammons. He declared that neither Congress or any of its committees has any power to subpoena persons held incommunicado by a state militia acting under the orders of the governor. Lengthy discussion ensued which much surprised the Congressmen. The position assumed by the military authorities and the governor rests upon a decision of the supreme court of Colorado some years ago, during the Cripple Creek strike, on the appeal of Charles H. Moyer, president of the Western Federation of Miners, for a writ of habeas corpus; and also upon a decision of the United States supreme court in a civil suit afterward brought by Moyer against Governor Peabody. The state supreme court decided that the governor is the supreme power whenever he has declared a state of insurrection to exist. In the present instance, Major Boughton declared that the public presentation of "Mother" Jones would incite riot. John R. Lawson, of the United Mine Workers, made a plea for Mrs. Jones and agreed to assume full responsibility for any disorder that might result from her presence in public. This elicited a noisy demonstration, requiring sharp criticism from Chairman Foster, who threatened to hold further hearings in secret session.

The committee wired to the Governor, in Denver, requesting him to direct the military authorities to bring Mrs. Jones before the committee. To this the governor replied by wire that he would obey the request but would prefer that her testimony be taken either at the hospital or in Denver. The evidence taken on the second day at Trinidad was from witnesses produced by the strikers and was intended to prove that the militia had been guilty of numerous assaults upon strikers and had interfered with postal rules in preventing strikers obtaining their mail at the post office. Two miners testified that they had been turned back from the post office, and that when some miners had resisted such interference, they had been attacked with muskets. One Michael Skidoda created much amusement by his ludicrous and dramatic description of such mistreatment, and required frequent reprimands from the chairman. The testimony of several strikebreakers was taken to prove that they had been brought from Pittsburgh under misrepresentations concerning the existence of a strike.

A PITTSBURGH STRIKE BREAKER

But to offset their statements, the operators called upon Charles Morgan, who testified that he came from the East, with other strikebreakers, fully aware of conditions. Contradicting statements made by preceding witnesses, he declared that traveling conditions were satisfactory throughout the trip, that he had never had any trouble with the militia, and that he had never known it to disturb anyone who was not drunk or disorderly. He considered the conditions of miners here better than they are in Pennsylvania, where he had worked for years. He scored the immigration of foreign, nonEnglish-speaking miners. A woman witness charged the militiamen with much drunkenness. Another woman who had been active in a street riot and was held

under arrest 11 days, complained of the filth of her prison quarters and of the food furnished her.

THREAT TO WRECK A TRAIN

A fireman and a brakeman engaged on the Colorado & Southern R.R. claimed that they had been arrested by the military authorities for refusing to pull a train in violation of the law that regulates the working hours for train crews. John H. Abrams, superintendent at Trinidad for the same railroad, related the receipt of a telegram warning him not to permit a passenger and mail train to pass a striker's tent colony at Ludlow. He took the train as far as Forbes Junction and then sent a messenger afoot to the colony, with the assurances that the train carried no deputies, before he was told that it would be safe for the train to proceed. During the day, Representative Evans, of Montana, secretly visited this tent colony to obtain personal information. The following day, the committee spent its time visiting the coal camps and interviewing the strikers. It is anticipated that the inquiry will soon come to an end.

An Air-Power Chart

By D. Gerber*

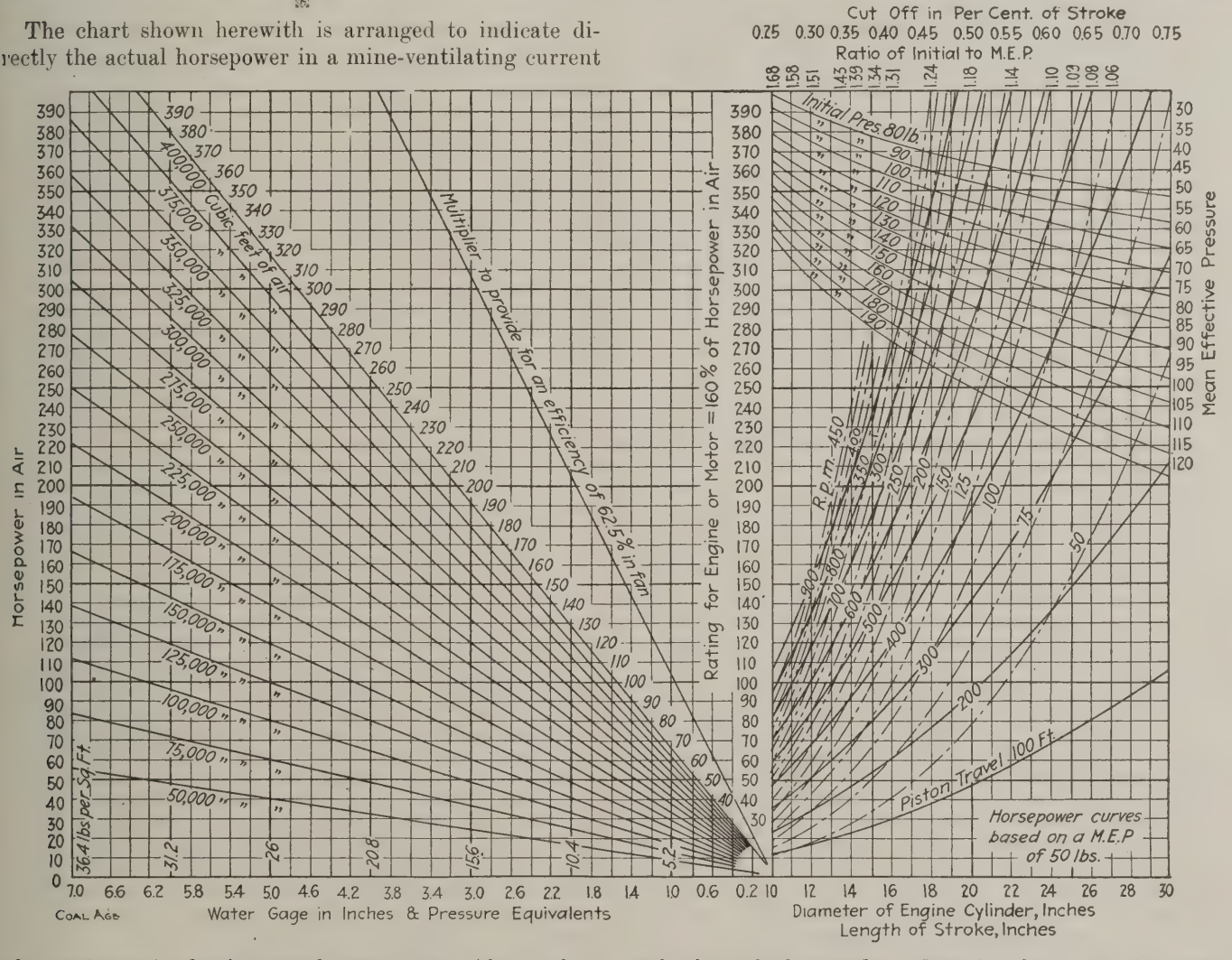
SYNOPSIS—A chart is here presented by means of which if the volume of air handled and water gage are known, we can determine (1) the actual horsepower in the air, (2) the horsepower necessary for the engine or motor driving the fan, and (3) the diameter of the cylinder. In the latter case, we are to assume the piston speed.

The chart shown herewith is arranged to indicate directly the actual horsepower in a mine-ventilating current of a predetermined volume and water gage. Also to show the commercial rating of a motor or steam engine required as a source of power. In the event of using a steam engine for power, the diameter of the engine cylinder required for a given piston speed may be read directly from the chart.

The calculations for cylinder diameters are based on a mean effective pressure of 50 lb. per sq.in. For other mean pressures it will be necessary to interpolate. As noted on chart, the assumption is made that the mechanical efficiency of the fan is approximately 62½ per cent. This percentage may be taken at any figure, however.

In general, the chart is constructed with a water-gage scale along the lower edge, advancing from near the center of bottom border toward the left. Above this scale is a group of converging lines, used to represent volumes of air in cubic feet, and a single inclined line passing through the common converging point. This line serves as a multiplier to obtain a proper figure for power under the assumed efficiency of 62½ per cent.

The vertical line passing through the point of convergence is graduated to show the rating of the prime mover.



*Pittsburgh, Penn.

the series of (heavy lines) curves to the right of horsepower scale, represent piston speed in feet per minute. Extending to the right from the common converging point, along lower border is a scale-reading diameter of engine cylinder and may be read in connection with horsepower value and piston speeds.

The graduations used to represent cylinder diameters may also be used to designate length of stroke, and when read in connection with the light (dot and dash) curved line, marked revolutions per minute, a continuation reading of stroke revolution from which piston speed may be read. Care should be taken in making such a reading to avoid confusing the length of the stroke and the diameter of piston.

In the upper left-hand corner of right portion of chart there is a group of curved lines from which may be obtained a value for the mean effective pressure corresponding to any point of cutoff for a range of initial pressures.

By the initial pressure is meant that at engine throttle or near it. These values do not have any direct connection to the work done by the chart, but serve as a ready means of arriving at a value for a mean effective pressure with which the charted results may be checked.

An Example to Illustrate Method of Using Chart

The method of using chart may be readily understood from the following example:

Example—It is desired to know the horsepower in a volume of 275,000 cu.ft. of air moved against a pressure of 3½ in. of water gage, the horsepower of a suitable motor or engine to drive a fan, having an efficiency of 62½ per cent., of the above capacity, also the diameter of cylinder of this engine, the piston speed of which is 500 ft. per minute, the mean effective pressure to be 50 lb. per sq.in. Find the 3½ graduation in water-gage scale and read up to a line marked 275,000 cu.ft. of air, thence to the right to scale reading actual horsepower in air and read 152, thence up to the line marked multiplier, thence to the right to horsepower-rating scale and read 242 horsepower.

Note that these ratings are based on a mean effective pressure of 50 lb. per sq.in. Should the pressure be more or less in connection with any problem it will be necessary to interpolate; for instance say the mean effective pressure is 40 lb.; it would be necessary to add 20 per cent. to the horsepower reading, or use 290 instead of 242. If the mean effective pressure is greater than 50 lb. the rating would be reduced.

From the rating above found read to the right to the heavy curved line designated as 500 ft. per min. piston speed, thence down to the cylinder-diameter scale and read 20¼ in. diameter of cylinder.

By reading up from the scale indicating the length of stroke in inches to the 500-ft. piston speed, the number of revolutions per minute of engine may be determined. From the group of lines indicating mean effective pressures the per cent. of cutoff required for a particular initial pressure may be found.

Suppose a mine superintendent has an engine of known diameter and stroke; he also knows approximately the steam pressure available and wishes to ascertain the range of volume and pressure under which such motive power would be effective.

The number of revolutions per minute and stroke combined will give the piston speed. The diameter combined with the piston speed will give the horsepower for a mean effective pressure of 50 lb. per sq.in., and by interpolation this figure may be changed to correspond with any mean effective pressure.

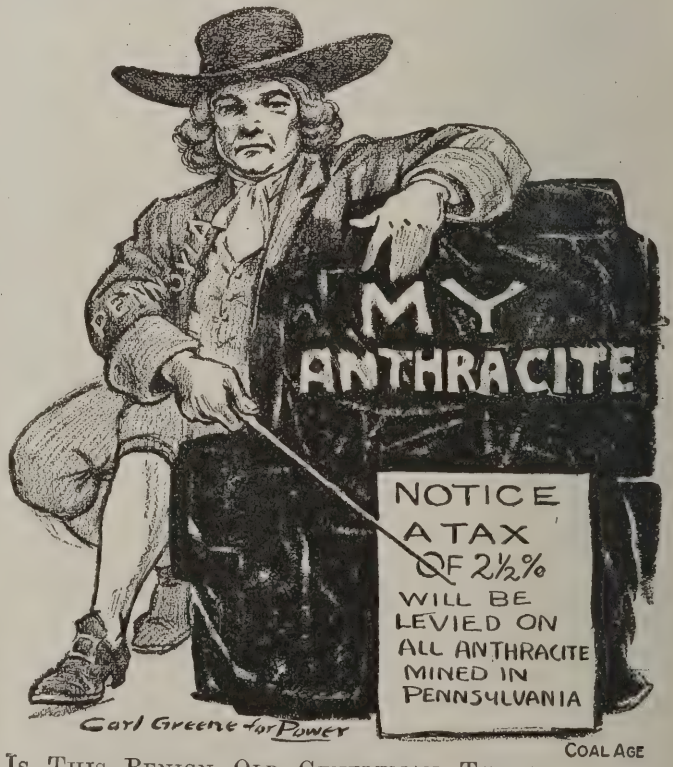
The horsepower once determined, it is only necessary to reverse the operation previously described to read the water gage at which the determined horsepower will deliver various quantities of air.

The scope of this chart does not take into account any features of the fan other than to assume that it operates with a mechanical efficiency of 62½ per cent.

Cleaning Commutators

Cotton waste should never be used for cleaning a commutator, as the loose threads are liable to be caught under the brushes or by the commutator segments. Commutators should have a smooth, dark glaze. When slightly roughened they may be polished with a small amount of vaseline and a little No. 00 sandpaper fastened to a block especially made to fit the curved surface. For a greater roughness coarser sandpaper is effective, but if the roughness is very pronounced and ridges have developed, the commutator should be turned in a lathe.

It is well to apply a little vaseline to a commutator in good condition. Avoid the use of emery cloth. It contains iron and is therefore a good conductor of electricity; hence it is liable to short-circuit the current through adjacent segments. Vaseline is superior to clear oil as a lubricant of commutators. Too much vaseline, however, will give a dirty black appearance and will cause sparking.—*Employees' Magazine.*



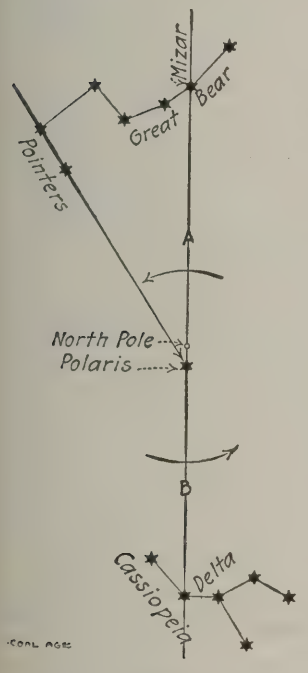
Is This Benign Old Gentleman Turning into a Shylock?

Method of Obtaining Time and Azimuth

By J. A. Macdonald*

The usual method of obtaining the azimuth from Polaris is by making observations at elongation. While the following method is not new, it is not generally known and will be found much simpler in application and fully as accurate as the elongation method. No instrument is required and no nautical almanac or mathematical tables are needed.

This method is based on the fact that Polaris and two adjacent bright stars are in the same vertical plane only a few minutes before Polaris crosses the meridian. It can be used at only one moment in each 24 hours and it requires a fairly clear sky to enable the stars to be sighted behind a plumb line. The two stars that can be used in this observation are Mizar, the middle star in the tail or handle of the constellation known as the Great Bear or the Dipper, and Delta in the constellation Cassiopeia , commonly known as the Little Dipper. The former can be used only when it is below the pole during the night. When it passes the meridian above the pole it is too near the zenith to be of service, in which case the latter star is observed.



Showing Mizar and Polaris on Meridian

The accompanying diagram shows the principal stars of the constellations of Cassiopeia and the Great Bear with Delta Cassiopeia, Mizar and Polaris on the meridian. The following tables show the exact time at which these stars are in the same vertical plane on given dates. The time for other days can be secured by direct interpolation, the daily variation being four minutes. From January to June the observation is made with Mizar, and from July to December with Delta Cassiopeia.

	On line.		On line.
January 20	5.22 a. m.	July 20	5.30 a. m.
February 20	3.20 a. m.	August 20	3.28 a. m.
March 20	1.30 a. m.	September 20	1.26 a. m.
April 20	11.24 p. m.	October 20	11.24 p. m.
May 20	9.26 p. m.	November 20	9.22 p. m.
June 20	7.24 p. m.	December 20	7.24 p. m.

When it has been determined by observations that Polaris is in the same vertical plane with one of these stars it can be shown that it will pass the meridian 7.15 minutes later during 1913. This interval is increasing from year to year at the rate of 0.33 minutes so that in 1914 the interval will be about 7.5 minutes. The observation can be made either indoors or out by suspending an ordinary plumb line and marking the direction of the meridian by setting a second point at the stated interval after the two stars are in the same vertical plane.

The same observation may be used to determine local standard time by the use of the accompanying tables for time, adding four minutes for each degree if the place of observation lies west of the time meridian and subtracting the same for stations east of the meridian.—*Railway Age Gazette.*

The Mine Mule

By J. W. McCabe*

Some people believe that a mule should always be fed as much as he will eat, and have both hay and grain in the manger all the while he is in the barn. Thus no change in his allowance is made whether he works every day or only three or four days a week. The failure to reduce rations with due regard to the time the mule is idle not only tends to increase the cost of maintenance, but is harmful to the health of the animal. The excess hay will be scattered under his feet and wasted and the grain will accumulate in the bottom of the feed box, where it will soon become sour. This bad grain will surely hasten the mule into poor health by causing indigestion. Thus when starting to work, after several days' idleness, the mule naturally develops spinal meningitis or some other serious disease.

How Much Food a Mule Should Receive

A much better way to feed the mule is to give him, during working days, only as much grain as he will eat up clean at each meal. At no time should any more hay be given than he will consume in his one meal at night. A safe rule by which to be guided, with slight variations to suit individual requirements and local conditions, is as follows: One pound each of hay and grain per day for one hundred pounds of flesh. For example: A 1000-lb. mule should be fed 10 pounds of hay and 10 pounds of grain per day. When the mule is idle and is having little or no exercise, the amount of hay should be increased and given twice a day, and the grain ration should be reduced from one-third to one-half, according to his physical condition.

When the ration is composed of corn, oats and timothy hay, without a mixture of nice green clover or alfalfa hay, about one-third to one-half pound of wheat bran should be fed daily, in addition to the above mentioned grain ration. Plenty of good water should always be kept accessible in front of the manger.

Keeping all roads and cars in good condition will add considerably to the comfort of mules, as well as help a great deal toward keeping them in good shape. A sick or crippled mule cannot work and is therefore a dead loss to the company while under the doctor's care.

A mistaken idea which seems to prevail among many drivers and assistant foremen is that in order to secure the best results from a mule while at work, it is necessary to hurry him. Frequently their only reason for this haste is that they themselves may have more time to rest at the bunk, and in order to gain this little extra time, the mule is often overloaded and seriously abused. Some mules will submit meekly to this hard treatment. Others, having strong minds of their own, refuse to permit it and resort to their ever-trusty heels for self-protection; and when the cry goes through the mines, "Another mule has gone crazy," do you wonder why?

Note—From the "Employees' Magazine," January issue.

Gasoline Industrial Locomotive

By S. T. Nicholson*

SYNOPSIS—A general summary of the industrial railway field with particular attention to the mine tramway. A short description is then given of the Vulcan gasoline locomotive, which has successfully met the exacting conditions of underground service.

Long before the advent of gasoline, electricity or compressed air as factors in transportation, a well known railroad man was heartily ridiculed by some of his fellows at one of the early steam-railroad conventions. His mental acrobatics had been of the prophetic sort. He had been sufficiently ambitious to suggest that less than a quarter of a century would find sources of power other than steam as active agents in transportation.

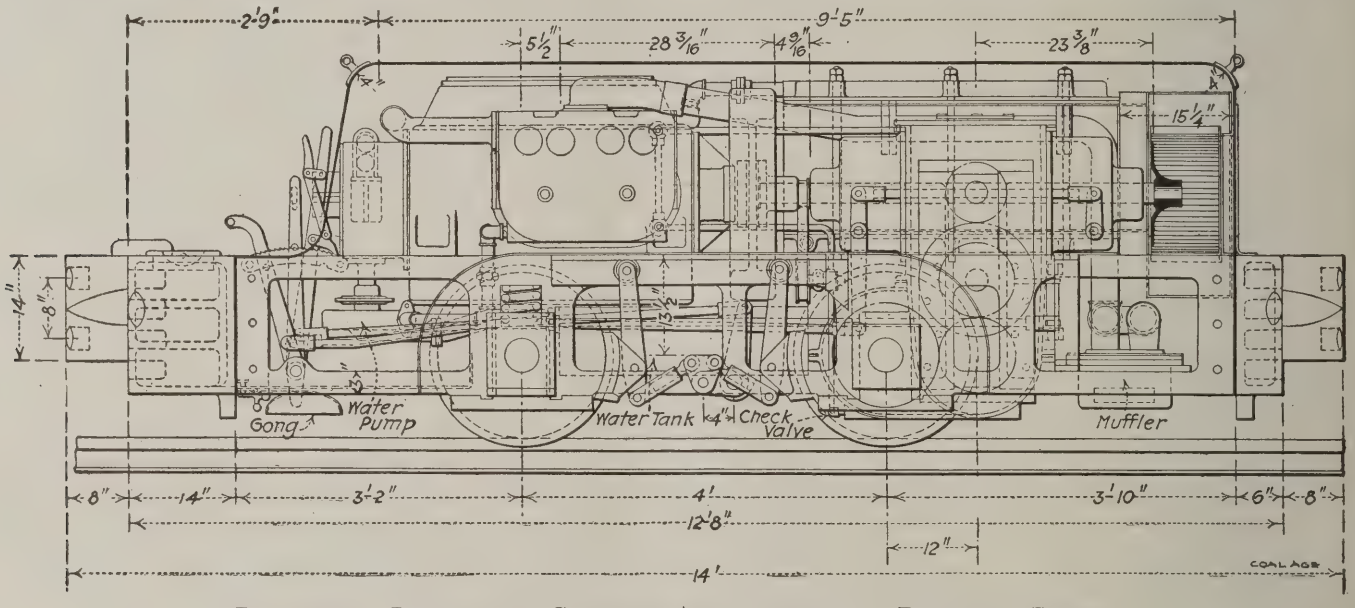


Diagram of Locomotive, Showing Arrangement of Principal Parts

The way of the world has been thus from time immemorial. Yet when a new force or a device hitherto unknown is brought out, when it has passed through its experimental stages, when it has reached the point where its components can be subjected to standardization, and, finally, when it has established a record for commercial success, we have a new economic factor, another power affecting the price of the world's goods.

Locomotives Are the Result of Evolution

The gasoline locomotive is simply another example of the usual process of evolution. Like the steam-actuated tractor, its forerunners were and are still in a much augmented and highly developed form, highway vehicles propelled by a similar force and largely in a similar manner. Steam road wagons with crude upright boilers and unrefined engines preceded the locomotive by many decades. The incongruities of their construction rendered them commercially impossible; the limited knowledge of their day prevented their becoming economic factors. Nevertheless the application of their principles to machines traveling on rails has proved highly successful, and the steam locomotive for the last 80 years perhaps has been an enormous economic power.

That the use of gasoline in railroad work fell short of keeping pace with its utilization for road vehicles—automobiles—has often been a source of wonder; but recent applications of highly developed, standardized gasoline locomotives in industrial transportation have indicated their successful economic usefulness in certain fields where steam locomotives are either impracticable or impossible, and where the cost of electric or compressed-air operation and maintenance is usually incommensurate with the profits of the business.

Comparatively large gasoline locomotives are at present used in standard-gage freight-switching service in some parts of this country and Europe. Their work has been satisfactory, and they are undoubtedly embryonic forms of larger and more flexible future units. Nevertheless industrial railroads and more specifically mine tramroads seem to be of the nature to which such locomotives are best adapted.

Until means are at hand by which internal-combustion locomotives can be produced in a form that can compete with the steam-actuated machine, their development for industrial purposes is of greater interest and somewhat more timely. It is immediately apparent, however, that the gasoline locomotive is in the strict sense a locomotive, not an automobile, and that it requires a locomotive builder to produce it successfully.

The Gasoline Locomotive Is Self-Contained

Like the steam locomotive, the gasoline machine has the fundamental advantage of being an independent, self-contained unit. It has also the additional advantages which are especially potent on industrial railways and in mines, of being less dependent upon a copious supply of water, and absolutely divorced from the coal pile.

Of course, weight is an important element in any tractor, for without it a large pulling effort is unattainable.

*Wilkes-Barre, Penn.

Weight, however, is of two varieties, useful and excess, and as the pull of any tractor is a question of engine power, diameter of drive wheel and several other factors, it follows that the elimination of excess weight (in the case of the steam locomotive a boiler three-quarters or more full of water, and a coal supply of from one-half to two tons) will increase the locomotive efficiency by lowering the center of gravity, reducing wear on the track, and so far as the engine is concerned, transform a relatively greater amount of the power generated by the internal explosion into useful mechanical motion than the steam driven machine can of the heat generated from the coal pile.

Granted that these conditions are true, the efficiency of this type of locomotive will be high. Consequently, its economic status is immediately established, since higher efficiency simply means getting a greater return on a given investment.

There are certain inherent characteristics in any design, even in the underlying principles, of any type of present-day gasoline locomotive which limit its usefulness as a machine of general utility. As those which have attained commercial success stand today, they are essentially slow moving, heavy-duty machines. The form of construction that is generally followed is not conducive to high speed, nor are high speeds desirable on industrial railways.

We therefore arrive at a highly specialized locomotive, capable of developing its greatest power under the most desired or rather the most generally existing conditions. The average industrial or mine locomotive is expected to exert its maximum draw-bar pull on a rough, light track with many curves, some of which are extremely sharp, severe grades, and uncompensated curves on gradients at speeds of from 4 to 12 miles per hour.

Typical Conditions of Operation

A typical case illustrating the conditions with which this form of tractor frequently has to contend is shown in the report of operation of a six-ton Vulcan gasoline locomotive at a mine of the Righter Coal & Coke Co., at Lost Creek, W. Va. Here the conditions of operation absolutely eliminated steam locomotives—although steam-storage or compressed-air machines might have been acceptable if clearances had been greater—and the great cost of an electric system with its danger due to the arcing of the trolley wheel, the sparking between the commutator and brushes and the lack of headroom for the trolley wire precluded electricity also. The report of the demonstrator at the Righter Coal & Coke Co.'s mine is clear and brief, covering the entire situation.

The locomotive works inside the mine, hauling loaded cars from a branch road to the top of the plane over 25-lb. rails. Empty cars are handled on the return trip. The track is uneven and the undulations present grades varying between 1 and 2½ per cent., there being practically no level track. The distribution of grades is about equally favorable and unfavorable to loaded movement. Curves are sharp and frequent.

The weight of the empty cars is about one-half ton each, while the loaded weight is about three tons per car. Fourteen cars have been hauled on a single trip, although the average is 12. The locomotive however has demonstrated that it could handle 20 cars easily, were the capacity of the branch track great enough to hold this number. This is computed on the basis of the above loaded weight per car and a hauling capacity of 64, 42 and 34 tons on grades of 1, 1½ and 2 per cent.; respectively. The locomotives rated tractive effort is 2400 lb., which enables it to haul 114 tons on a straight and level track with frictional resistance figured at 20 lb. per ton.

The length of run from stop to stop in 1800 ft. with a running time of 1¾ minutes. In the average nine-hour day, 275 cars or 30.55 cars per hour are hauled.

This work requires 10 gallons of gasoline, or 0.9 gallon per hour, the equivalent in cars being 27½ per gallon. The quality of gasoline used costs 16c. per gallon, but a better grade with probably a higher heat content can be had for 20 cents.

On the 16c. basis this would place the cost of hauling 275 cars or their equivalent 481¼ short tons at $1.60 per day, or about ⅓c. per ton for fuel only. Of course, interest on the investment, cost of track, car and locomotive maintenance, lubricants and labor, as well as the absence of earning power of the locomotive when the machine is not in motion must be added to the fuel cost before the final expense can be determined. But with the fluctuations of these values in various localities it is simple to estimate the cost on any specific railway, and furthermore, these figures point conclusively to the locomotive's dividend-increasing ability.

Time-Tried Characteristics Are Retained

Quite naturally locomotives of this type can be built in varying sizes and made to incorporate special features



External Appearance of Locomotive

that will enhance their value in specific kinds of service. As a general rule, however, they follow a definite principle and retain as many of the time-tried characteristics of steam locomotives as possible. The cast-steel frames with their pedestal jaws, shoes and wedges and binders are familiar; driving boxes, brake and spring rigging hold to the old form also, except where structural differences make alterations obligatory.

The essential features are a four-cylinder, four-cycle, double-opposed gasoline engine, bolted direct to the frame; a driving shaft with flywheel connected to the transmission shaft by universal joints and delivering power through two multiple-disk clutches. Between these clutches is a train of bevel and spur gears for driving the jackshaft. The rear or main drivers are rotated from this latter through case-hardened spur gearing and transmit their energy to the forward drivers in the usual manner. The gears run in oil and are inclosed in an oil- and dust-proof case.

The magneto is gear driven from the engine shaft. The cylinders are water-cooled and circulation is maintained by a large centrifugal pump. Almost the entire section over the front drivers is devoted to cooling tubes, and these are aided by a large multi-bladed fan mounted on the engine shaft. The entire design savors of great care and thought and a thorough acquaintance with the best gasoline practice.

There is little reason for going deeply into the structural details, since the accompanying diagram, shows the general arrangement clearly. Some features, however, rather more of an engineering and operating than of a structural nature, combine good, common engineering sense with the idea of saving money.

The Machine Is Designed for Hard Usage

It is clear that the designer must have had the rough treatment and hard usage of the mining regions in mind when he put a rugged and foolproof machine on paper. Three points insignificant in themselves are upon second thought among the best economic features embodied in the Vulcan locomotive. The cylinders are horizontal and double-opposed instead of vertical, since in this way the opposite pairs of pistons neutralize the thrust on the crankshaft and the horizontal plane of the cylinders does not encroach on the limited head room.

Another point is found in the change gears, where two integral jaw clutches take the stress of shifting, leaving the gears always in mesh. The strong point of the arrangement is in the placing of the jaw clutches on the high-speed engine shaft, with accessories that lock them in position when the multiple-disk clutches are engaged. It follows, consequently, that the transmission is relieved of all strain when speeds are changed.

The method of reversing the locomotive is novel in that it is done entirely through the two multiple-disk clutches. The process, however, could not be simpler, and is less laborious than reversing a steam or compressed-air machine, for throwing a lever to the rear engages the rear clutch, while moving it forward engages that for forward motion. At the neutral point both clutches are disengaged and the locomotive is stopped.

For convenience in operation the brake, change-speed and sand-box levers are placed on the same shaft as the clutch-reverse lever. With this arrangement, the consequent ease of control is a close approach to effortless labor.

The keynote of design in this locomotive is simplicity; that of its operation, economy plus ability and efficiency. There are, of course, many small points of refinement that are extremely interesting, while the results thus far achieved make it a formidable economic factor. The full report of its operation, cost (maintenance and otherwise), and its economic effect on mining and industrial railways are valuable contributions to the art of industrial railroading.

Reasons for Opposing Anthracite Tax

The bill in equity of the Peoples' Coal Co. of Scranton against the enforcement of the new 2½ per cent. anthracite tax by Archibald W. Powell, auditor general, of Pennsylvania, and Robert K. Young, state treasurer, will be argued in the court of common pleas for Dauphin County within a few days. The Peoples' Coal Co. avers that the act imposing the tax is illegal in eight different ways and as illogical as it is illegal.

The first legal objection to the act is that it is a local and special enactment, and no notice of its passage or proposed passage was given as should have been done according to Article 3, Section 8, of the Constitution of Pennsylvania.

The second legal objection is that the tax violates Section 1 of Article 9 of the State Constitution which provides that all taxes shall be uniform upon the same class of subjects within the territorial limits of the authority levying the tax. Anthracite coal differs from bituminous, semi-bituminous, and semi-anthracite coal in no wise except in the percentage of fixed carbon contained in it, and the line of demarcation is so slight, and the uses to which it is put, so similar as to make any attempt to separate it from other coal, as a subject of taxation, arbitrary, illogical and illegal. All the coals mentioned are mined within the limits of the state of Pennsylvania which is the authority imposing the tax.

Tax Will Go to Townships Where Coal Is Not Mined

The third legal objection to the tax is that it violates the elementary principle of taxation, which requires that its purpose must pertain to the district taxed, and this objection also covers the illogical features of the distribution of the proceeds. The result of the distribution of one half the proceeds to the boroughs and townships of the various counties where coal operations are carried on, pro rata according to their populations, as specified in the act, would be that many boroughs and townships would receive large sums of money from this source when, as a matter of fact, not a pound of coal of any description is produced within their limits.

It is pointed out that if this act were enforced, a number of municipalities in the county of Lackawanna for instance would receive amounts two, three, four or five times as great as their municipal expenditures, though these municipalities do not produce a pound of anthracite or of any other kind of coal. Dalton and Waverly boroughs and the townships of Benton, Covington, Greenfield, Jefferson, Newton, Scott and South Abington, of which the above is true, would receive an estimated aggregate of nearly $20,000. This would result, on the other hand, in only a small amount being appropriated to the municipalities producing the coal.

The fourth legal objection is that the bill is contrary to Article 3, Section 3 of the Constitution of Pennsylvania which provides that only general appropriation bills, may contain more than one subject, which must be clearly expressed in its title. The bill in question provides in its third section that the failure of the operator to furnish reports shall constitute a misdemeanor, punishable by fine and imprisonment, thus introducing a new crime into the criminal code of Pennsylvania without a word in the title of the act to give notice of any such purpose or intention.

Also Violates United States Constitution

The act is also alleged to violate two provisions of the Constitution of the United States. Anthracite is an article of interstate commerce, and Article 1, Section 8 of the United States Constitution provides that Congress shall have the power to regulate commerce among the several states. Furthermore, the Fourteenth Amendment to the Constitution provides that no state shall "deprive any person of life, liberty or property without due process of law."

The act is said to be contrary to Section 18 of Article 3 of the Constitution of Pennsylvania, inasmuch as

it undertakes to distribute as a gratuity to certain communities large sums of money, assessed and collected by the accounting officers of the commonwealth as state taxes, said communities being in no special manner entitled thereto, because the subject matter of the said tax is not situated within their limits. The act contains two distinct and diverse subjects, not clearly expressed in its title, i.e., the provision for raising revenue by taxation and the appropriation of state funds, raised by this taxation, to various municipal corporations. This is an additional violation of Article 3, Section 3 of the Constitution of Pennsylvania.

The Explosion at Ravenwood, Colo.

By Samuel Dean*

SYNOPSIS—This accident seems to prove the efficacy of shale dust as a preventive of widespread coal-dust explosions. It is stated that shale dust is not likely to cause lung troubles. Much depends on having dust-tight cars.

A small explosion, causing the deaths of two men, the result of a blown-out shot of permissible powder (Monobel No. 3), occurred at the Ravenwood mine, near Walsenburg, Colo., on Jan. 17, last.

It appears that the two men were working at the face of the main ninth south entry just off the slope, and had drilled a hole 7 ft. 6 in. deep into the solid coal. Several sticks of Monobel had been seen by the driver near the face before the hole was charged, and the assumption is that the men inserted a quantity of powder which was beyond the charge limit (1½ lb.). Circumstances point to the fact that after lighting the fuse they passed through the last crosscut near the face into the back entry to avoid the concussion of the shot.

The shot, quite naturally, blew out, starting a dust explosion, and both men were afterward found dead in the back entry opposite the last crosscut. There had evidently been much flame as both bodies were badly burned.

Evidence Points to Disobedience

A shotfirer is provided at this mine (which is worked with open lights), and one of the rules is that no holes shall be charged or fired before all employees, excepting the shotfirer, are out of the mine. Miners are not supposed to have any blasting caps in their possession. These two men, who directly caused their own deaths, had procured caps, and their probable intention, in drilling this deep hole, was to fire what is called a cracking shot.

The shotfirer fires, on the average, about 45 shots a night; the majority of these being brushing shots. The rules do not authorize him to charge or fire holes in the coal unless the coal is sheared or undermined.

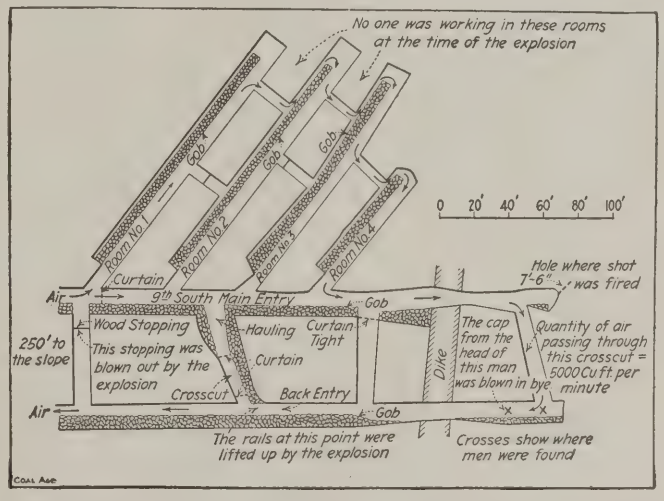
At the time of the explosion (between 12 noon and 1 p.m.), there were 92 men in the mine. And the reason why the explosion did not propagate over a larger area was that there was a quantity of shale dust lying in the entries, which became mixed with the coal dust. This quenched the flame and caused the explosion to die out before reaching the slope.

The shale dust is formed naturally. The coal is only 2 ft. 8 in. thick, and 2 ft. of the top and 1 ft. of the bottom are brushed. Much of the shale from the brushing is gobbed along the sides, and in addition to what is left on the floor, pieces fall down and are crushed by the wheels of the cars and the feet of men and mules.

*Delagua, Colo.

Men in other parts of the mine felt the explosion and hurried out to the slope. A driver standing on a parting on the north side had his cap blown off his head. Some little time elapsed before officials were able to penetrate the ninth south entries on account of smoke and afterdamp.

Back from the faces, and where the explosion stopped, the entries were perfectly dry, and dust on the ledges



Underground Plan of Ravenwood Mine with Descriptive Notes

could be blown away into the air-current. No one in the mine, as far as could be learned, noticed any counter-currents or inrushes of air. But it is quite easy to understand that the minds of people would not be in a condition to make scientific observations at such a time. It was quite plain that there had been an inrush of air toward the faces, but whether this had occurred as the explosion was dying or had opposed the explosive wave when at the height of its power, I am unable to say. However, it may be found to be an easy matter to arrange different apparatus in an experimental mine to prove, or disprove, the "counter-current" theory.

Analyses of the Dust

After the explosion, samples of dust were swept from the floor and sides of the ninth south entry. The following are analyses of the dusts:

	No. 1 Sample Per Cent.	No. 2 Sample Per Cent.	No. 3 Sample Per Cent.
Moisture	6.51	6.19	2.95
Volatile matter	17.08	19.89	19.78
Fixed carbon	42.79	51.98	50.78
Ash	33.62	21.94	26.49
Total	100.00	100.00	100.00

Sample No. 1 was gathered at the face of the ninth south main entry, from around the hole which was shot.

Sample No. 2 was taken from rib opposite crosscut, which measures 12 ft. from face of main entry.

Sample No. 3 was gathered off the roadway from between the rails, at different places, all from within 14 to 20 ft. of face of main entry.

Samples taken further outby on the entry, where there had been more traffic, would have shown a larger ash content. From appearances there was at least 50 per cent. of shale dust in the dust mixture where the explosion stopped.

The following table shows the barometer readings on the day of the explosion, and a few days previous:

Date	Time, Bar.	Time, Bar.
January 14	9 a.m., 24.20	3 p.m., 24.06
January 15	9 a.m., 23.93	3 p.m., 23.84
January 16	9 a.m., 23.92	3 p.m., 23.85
January 17	9 a.m., 23.86	3 p.m., 23.84

This may be an opportune occasion to say a few words regarding the application of incombustible dusts, which are used for the purpose of preventing or stopping explosions of coal dust.

Shale Dust versus Water as a Preventive of Coal-Dust Explosions

A number of water-treated mines have "blown up" violently, causing hundreds of deaths, within the last two or three years, with the result that an increasing number of mining men are giving the use of "stone dust" attention.

To begin with, it may be said that, the terms "rock dust" or "stone dust" are not satisfactory. They give the impression of dusts which are hard and gritty. Shale dust is more suitable, but several different dusts can be used with success, and without any apprehension as to dangers arising from breathing or swallowing them. Boiler-flue dust, or the light brown dust called ash is now being used and is giving satisfaction. It has been found, after a number of years of practical experience with dusts in coal mines, that they are not likely to cause lung troubles.

In place of the term "rock dust," we might use "incombustible dust," as suggested by W. C. Blackett; this covers all the different dusts that are suitable for the purpose.

Where it is proposed to use an incombustible dust, the writer wishes to urge strongly that the applications of dust should be plentiful. It is also important that the man who has charge of the installation of this preventive should be enthusiastic about its merits. It would be very unfortunate to have it applied in such an inefficient manner that an explosion would travel through a treated roadway.

Application of Incombustible Dust Is Not Costly

The efficient application of incombustible dust is not costly. But it is expensive to maintain clean roads in mines where poorly constructed wooden end-gate cars are used, and the coal is soft and friable. Should small coal and coal dust be allowed to accumulate on the roads and exceed the amount of incombustible dust, then a widespread explosion would be possible, and the money spent in "shale dusting" will then be thrown away. In addition, in the event of an accident, this method of prevention would probably receive a condemnation which was not deserved.

In my opinion, the best thing to do first to combat the coal-dust menace is to install rotary dumps. Then set the carpenters to work bolting down the end doors, and making the cars as dustproof as possible. Where crossover dumps are used, the cars are often not completely emptied, and coal is not only sprinkled along the roads by the loaded trips coming out, but also by the empty trips going in. All new cars should be tight, and preferably built of steel. Road cleaning and shale dusting can then proceed and will certainly produce valuable results.

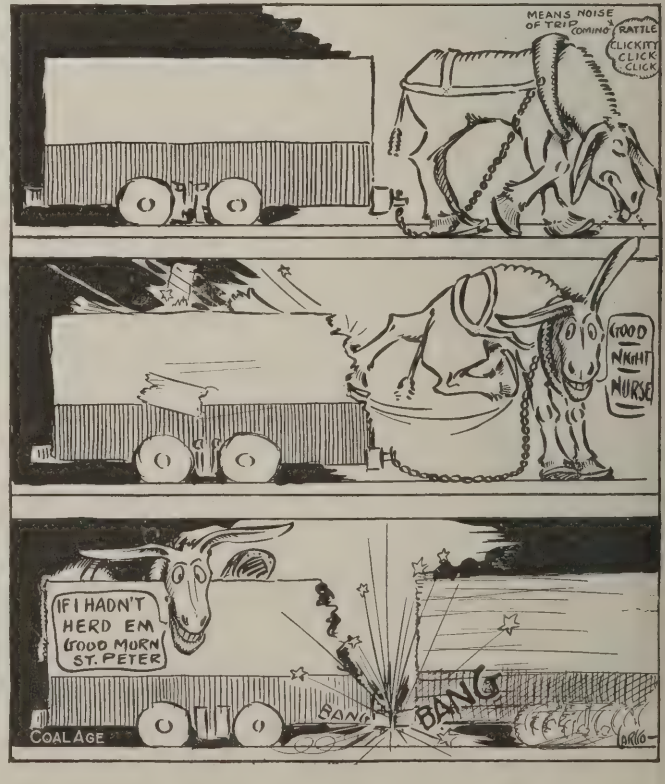
It is practically impossible to keep a mine free from the minimum quantity of dust necessary to propagate an explosion, and the weight of incombustible dust required should be governed by the amount of coal dust present.

Of course, the introduction of all these safety precautions, which we hear so much about, must of necessity be governed by the margin between the cost of production and the selling price. And this margin is smaller in the United States than in any other part of the coal-mining world.

At the coroner's inquiry into the recent explosion at the Vulcan mine (Colorado), the chief state inspector said that he had been unable to carry out the law on account of a lack of funds. It is difficult to imagine a more ludicrous situation—a government inspector unable to carry out the law because the state was short of money. Should a coal operator make any such plea, he would probably be compelled to go out of business.

Some Sagacity!

Many mules have been killed by runaway cars and by the carelessness of trip-riders in sending blind loads down entries and slopes. The sketch below indicates how a W. Va. mule took care of himself and utilized the only means of escape.



The Du Bois, Penn., Convention

SYNOPSIS—Patrick Gilday advocates fines for violation of agreements. The miners are anxious to start co-operative stores.

On Tuesday, Feb. 24, the convention of District No. 2 of the United Mine Workers of America met in the Avenue Theater, at Du Bois, Penn., Vice-President James Purcell presiding. The President, Patrick Gilday, was unable to be present owing to illness.

Passing over minor matters, we come to the report of President Gilday read on his behalf by Charles O'Neill. We wish to compliment him on the boldness of his open advocacy that violations of the agreement between miners and operators be made a matter of penalty. Our readers will remember that this was one of the six demands made by the operators at Philadelphia, where District No. 2 was not represented.

Difficulties in Assessing Fines

This proposal is undoubtedly fair but it is hard to enforce against the operators because no one can tell why they suspend individual men or lay off all their employees whether because of union activity or to promote efficiency or from lack of market to keep their mines running.

It is equally difficult to make such a provision operative against the mine workers because of the poverty of the union and its failure to incorporate and also for the reason that there are so many ways of avoiding an open violation of the terms of the agreement. Unduly protracted holidays may be mentioned as means of creating the effect of a strike without perhaps a violation of the letter of the contract.

Will Public Opinion Favor Even a Fair Scheme?

However, the experiment may be worth trying and the result might prove wholly beneficial even if far less completely effectual than it would appear to be on its face. We cannot say that we are extremely hopeful. The system is one of fines and while it works both ways it has an unpleasant similarity to a practice in certain mercantile establishments and factories of fining those who are guilty of infractions of rules of the house. This practice has died out in America largely. Its existence was marked by no little friction.

Mr. Gilday stated that operators and miners had broken their agreement. We are somewhat disposed to think this true. Of course, it will be readily acknowledged as of force with regard to the mine workers because otherwise why is it acknowledged by their spokesman. Besides everyone knows it is true.

The Claim that Operators Break Agreement

On the other hand, the mine-workers claim that any action taken by the operators to prevent bosses from joining the Union is in violation of the agreement. The operators did not expect to face unions so aggressive that even the bosses would be induced or compelled to join. In former days the tendency was rather toward "class," than toward "industrial unionism" and bosses were considered proper members of a union of their own and were not wanted in the United Mine Workers of America where the other members feared their presence would be a menace rather than an assistance. On the one hand, they might have been disposed to use undue influence and on the other hand to spy for the benefit of the operators.

Consequently, the agreement tacitly overlooks officials of all kinds. If, however, the contract reads so as to bind the company with regard to these men, the operators cannot excuse themselves in breaking it by loosely stating that they did not have it in mind when they signed the agreement. Nor can they excuse themselves by saying that exclusion is reasonable and should be incorporated in the contract. It is only proper that such a proviso should be made just as proposed by the operators at the Philadelphia Conference but this fact would not justify the employers in slipping in a new clause, however righteous, into a contract to which they had already appended their signatures.

The Contract to Be Read in Light of Past Practices

But does the contract so bind the operator. The agreement clearly provides for increased wages for "monthly men" and so possibly in verbal strictness even general managers and vice-presidents may be included. As a matter of actual fact and usage, we believe the companies rarely advanced bosses in accord with the changed wage scale and the union, not regarding these men, as of their own kin made no objection. The agreement is to be read according to the "law merchant," if we may be excused the expression. The actions of both union and operators have been such as to show conclusively that neither party hitherto regarded bosses as subject to union agreements and the meaning of the contract is to be judged by the customary practices in the industry.

The contract applies to all, union and nonunion men, who work for the corporations under the schedule whether their particular employment is named or unnamed but it does not have any bearing on those whom long practice has exempted from the operation of the agreement whether they join the union or not.

Excluded from the benefits of the wage scale because they are bosses, how can they be made to be covered by the contract for the sole purpose of maintaining the unrestricted right of the union to enlist new members. They are either in the contract or out of it, being unnamed. If they are not in the wage scale they are also not in that part of the agreement relating to the noninterference with union activity.

Do Operators Ever Try to Break Contract?

Though we cannot feel that the exclusion of bosses is a violation of the contract, there is probably some truth in the statement that here and there the operators have shown a disposition to break, and in some cases may have broken, the contract. In most cases, however, the situation is like that arising out of the Panama treaty and results from a variant interpretation of an agreemnt signed without due consideration.

In a neighboring district, a man who is as well disposed to laboring men as we are likely to find, wanted to violate the scale agreement, as he related at the Coal Mining Institute of America, and he probably would have taken up the fight to break it, had conditions favored. He was introducing a better system and new machines in his

mines which he declared at the institute enabled two men to undercut 447 tons of coal per day instead of 200 as before. He wanted to provide that those men would earn nearly a half more pay than they were getting but to reduce at the same time the rate per ton paid them. The new machine men were to get 7c. per ton, the old cutter and scraper got 11c.

The union demurred; there was the scale already signed and it would have to stand till the next convention and conference. But the scale will remain just as it was—a deterrent to all who would otherwise scrap their older types of machines and discontinue their more antiquated methods of operation to the advantage of the worker, the consumer and the enterprising operator. We introduce this as an evidence of attempts to change the scale, some of which, however, are not marked by any such ample reason.

Consistency in accepting the scale, good or bad, logical or illogical is to be urged without reserve on all parties and a court to interpret its meaning is much needed.

Fines Involve a Court

The fines proposed lead us inevitably to a board of conciliation and arbitration for without a court how can fines be assessed? And so Patrick Gilday appears to be ready to accept another principle demanded by the operators at Philadelphia. One advantage of such a body would be that it might be given broad powers which would permit it to take under consideration questions of remuneration where a new device assures the workman increased productivity. As a further advantage the arbitral body would place equal burdens on all in a district and make inequalities in interpretation of the wage scale impossible.

Patrick Gilday further recommended that the union give scholarships to young men entering State College. He recommended the mine workers to remain at work after Apr. 1, pending the outcome of the deliberations provided the conference between miners and operators was then in session.

The District Union Had $2.57 per Member Jan. 31

The membership in the district union increased during the past year from 32,755 to 37,993. The highest figure reached was in 1910 when it was 38,649. The total receipts for the year including the previous year's balance were $463,455.14. The expenses were $365,-624.82, leaving on hand, Jan. 31, $97,830.32.

On the second day, a resolution was passed recommending the international president to withdraw the national organizers from district No. 2 and send them to nonunion fields. A resolution was adopted authorizing the district officers to start a wholesale store so that local unions which start coöperative stores may buy their goods at wholesale prices.

Coöperative Stores

We hope that some attempts may be made in this direction. Nothing like capitalism in the union will tend so speedily to convert its members into the friends of capital. If, however, the unions should prove able to undersell the company stores, then these are doomed and few would regret it. This, however, is unlikely and the experiments of the unions in this as well as in benefit associations will broaden their viewpoint as to all forms of capitalism.

Resolutions were passed providing for the disciplining of delegates found under the influence of liquor, instructing the subdistrict officers to see that every mine has first-aid supplies always on hand, commending President J. P. White for not accepting the seventh vice-presidency in the American Federation of Labor and recommending that wires, motors and electric pumps be taken out of mines where dangerous gas exists. Other resolutions offered provided that checkweighmen pass an examination, that companies be required to pay the union for all unchecked coal coming from the mine, and that benefits continue to be paid for two weeks after a strike.

Coal Mining Safest of Big Industries

For the last quarter of a century the news of occasional mine disasters has been given prominent display in the newspapers of the land. In addition to these news displays, there have been reports now and then of serious mine accidents in Europe and Australia. The result has been that the general public now has the impression that mining is the most dangerous of all occupations. But this is not true.

Recently the casualty statistics for persons employed in coal mines, on railroads and in steel mills of the United States, in the year 1911, were assembled for comparison. The year 1911 was taken as a basis because that was the last year for which the Federal authorities had reports for all three industries. It was seen by the comparison that, for each thousand men employed, fewer coal miners were injured than railroad men or steel workers.

Bulletin 69, of the United States Bureau of Mines, shows that in 1911 the number of coal miners in this country was 729,279. Of this number 31,334 were injured more or less seriously. In the same year, according to the "Twenty-Fifth Annual Report of the Interstate Commerce Commission," the railroads employed 1,669,-809, and of this number 126,039 were injured. United States Senate Document 110, Sixty-Second Congress, bears testimony to the fact that 35,764 steel workers were injured of 158,604 employed.

A study of the figures contained in these government documents, shows that there were about half as many coal miners as railroad men employed and that less than one-fourth as many were injured.

It is also shown that, while the mines employed 570,675 more men than the steel mills, the steel mills injured 4430 more men than the mines did.

A reduction of the figures to a common basis brings out the fact that, for each thousand men employed, 42.96 were hurt in the coal mines, 75.48 on the railroads and 225.48 in the steel mills.

Coming Meetings

First National Efficiency Exposition and Conference, Apr. 4-11, Grand Central Palace, New York City. Director of Efficiency Society, 41 Park Row, New York City.

Editorials

Electric Winding Engines

Upon another page, under the caption "Types of Electric Winding Engines," by L. F. Mitten, we print an extremely comprehensive article dealing with the problem of slope and shaft hoisting. This clearly portrays the best practice along this line in American coal mines.

Having spent some years in charge of the design of hoisting machinery for one of the most reliable and successful firms in the United States engaged in the manufacture of this class of apparatus, Mr. Mitten is perhaps as well qualified to speak authoritatively upon this subject as any other man in America. We have no hesitation, therefore, in recommending a careful perusal of this article to such of our readers as are interested in hoisting problems.

Reversing Main Air Currents in Coal Mines

A paper presented by William Clifford, at the meeting of the Manchester Geological and Mining Society, held at Manchester, England, Feb. 10, 1914, and which will be published later in the *Transactions* of the Institute of Mining Engineers, draws attention to the need of reversing the main air currents in coal mines, under certain conditions and at certain seasons of the year, for the purpose of preventing the accumulation of ice in air shafts or in main hoistways used as downcast shafts.

The paper also describes briefly the arrangement of shunting doors for reversing the air current, so as not to destroy the uniformly curved lines of the expanding chimney commonly used when exhausting air from mines by means of centrifugal fans. Mr. Clifford was for a long period the agent for the Guibal fan in the United States. His device, in this connection, consists of a hinged door made to travel in channeled guides built into the sides of the chimney. In other respects, the arrangement of the shunting doors is similar to that used for many years, in the construction of the Beard-Stine fan.

In his paper, Mr. Clifford draws attention to a fact that has too often received insufficient attention; namely, the reduction of the intake area that often results from the accumulation of ice in the downcast shaft, or the main intake, slope or drift openings of a mine. The cold intake air quickly freezes any moisture that may be present in these intake openings. Mr. Clifford refers to this fact as being a chief factor in the explosion that occurred in the Harwick Colliery, near Pittsburgh, Jan. 25, 1904, in which 179 lives were sacrificed. Mr. Clifford states that the fan ventilating this mine was a Capell fan 13.5 ft. in diameter and 7 ft. wide, capable of producing 200,000 cu.ft. of air per min. and reversible, and that it had been run continuously as a blower, without change, for several weeks previous to the explosion, the weather in that time being severely cold. He adds that the accumulation of ice at bottom of downcast shaft had reduced the intake area at this point to 9 sq.ft.

In this paper, Mr. Clifford further draws attention to the important fact that before an air current can be reversed in a mine, the person responsible for its direction must have an intimate personal knowledge of the plan of the mine and the course of the ventilating current, and understand fully the effect that will be produced in respect to the flow of gas-charged currents, in different portions of the mine workings.

In this connection, we would refer readers to the valuable discussion that was conducted some time ago, in COAL AGE, Vol. 2, on the question, Should Mine Fans Be Built Reversible? The discussion extended from Oct. 19, p. 545, to Dec. 21, 1912, p. 880. Thirty letters were published, giving the views of men of large mining practice and varied experience. Although some arguments were presented adverse to the building of mine-ventilating fans reversible, the general consensus of opinion was that the greatest reliability, in respect to the ventilation of large mines, could only be secured by building the fan in that manner.

Mine Visitation

The danger attending the practice, too common in some districts, of permitting visitors to enter coal mines unattended and especially during working hours, has been again emphasized by a fatal accident that occurred at the National mine, Monday night, Feb. 23.

The victim in this case was Nelson Banchrost, 32 years of age, a marble cutter and resident of New York, who was engaged at the time on contract work in Scranton. He had been in Scranton but a week and had never seen the inside of a mine before. In company with several companions, Mr. Banchrost visited the mine and was lowered on the cage, to make a tour of the workings. After watching the miners at work in the chambers, they returned to the foot of the incline and watched the loaded cars going up and the empty cars coming down the plane. In a foolish attempt to cross the track, Banchrost was run down and so badly injured that he died the following night in the hospital, where he was taken.

No one will question the propriety of permitting visitors, at proper times and suitably attended, going into the mines to gain knowledge and experience, or it may be to satisfy curiosity, that they may understand better how coal is taken from Nature's great storehouse. However, mine regulations should be strictly enforced, forbidding irresponsible persons and persons unattended from exploring mine workings or entering the mine for any purpose whatsoever while the mine is in operation. Mine officials should be held to a strict accountability for any violation of these regulations.

It is common practice, in a large number of the anthracite mines, to permit no one to enter the mine without a duly certified pass, designating the time of the visit and the number of persons admitted, and requiring that the visitor be properly attended, although the company assumes no responsibility for his safety while in the mine.

This is as it should be. A mine is truly a dangerous place for one unacquainted with mining practice and conditions; especially during the busy hours of the day when coal is running and every passageway is an avenue of danger.

List of Fatal Coal-Mine Explosions

We publish, in the discussion department of this issue, p. 418, a letter from Prof. E. N. Zern, drawing attention to the difficulties surrounding the work of making a complete list of the fatal mine explosions. In referring to the admirable list of mine accidents, recently published by the Federal Bureau of Mines, Technical Paper 48, Professor Zern mentions a few mine explosions not included in this list compiled by the Bureau.

Since the publication of this accident list, which is properly limited to a fatality of "five lives lost in the accident," we also have noted numerous omissions of important explosions that have occurred in this country and which should be included in such a list. No one can fully appreciate the difficulty of securing a complete list of mine accidents, until he has attempted the work of compilation.

Some years ago, the author of Mine Gases and Explosions attempted to secure from the different state mining departments a complete list of mine explosions in which the fatality was limited to five lives lost and dating back only to 1896. Many of the replies received from the state departments, at that time, revealed the fact that no record had been kept of these fatalities, until very recently.

With a hope of eventually completing, as far as possible, the list of coal-mine explosions, both gas and dust, that have occurred in the United States and Canada up to the present time and that resulted in five or more deaths as a result of the explosion, either at the time or within a period of, say 30 days thereafter, COAL AGE proposes to publish at an early date a more or less complete list of such explosions.

To assist in this work, which will simply be carrying out the work already begun by others, we ask the hearty coöperation of readers and all others interested, directly or indirectly, in coal mining, to send us any information in their possession, or to make any correction or reference to such lists already published. This is a work in which all should heartily coöperate.

The Business Outlook

Although there are many who prophesy a more or less immediate return of the business activity so evident in the coal industry last summer, there actually seems to be little tangible evidence upon which to base such a prediction. It must be conceded that conditions are not normal, probably being at only about 65 per cent. of the average. The situation is particularly acute with the railroads, whose business represents about one-third of the total for the country. Under the pressure of adverse legislation, current reports show decreased earnings, and a generally straitened financial condition. The steel industry, which is closely affiliated with the coal business, has also felt the effects of the abnormal conditions keenly.

Probably one of the strongest optimistic arguments at the present time is the fact that the currency and tariff legislation have finally been enacted, and are now a closed issue, while this is further supplemented by the sanguine reports constantly emanating from Washington. It is also generally true that the economic condition of our country is much stronger than during the Cleveland administration in 1893, but there are many who will recall the disasters of that time with apprehension.

Improvements in mechanical devices, effecting a higher efficiency of labor, have made it possible to cope better with foreign competition; however, there has been but little time in which to prepare for this test which the country is now facing. There is some doubt also as to the practicability of the new currency legislation, although it is generally conceded that it will at least relieve the possibility of any panicky conditions, such as prevailed in 1907.

Without entering into the various merits of the issues now facing the government, it will be agreed that constant agitation must inevitably continue the policy of retrenchment on the part of capital. One cheerful feature of the current situation is the large amount of surpluses accumulating in the banks, awaiting opportunity for permanent investment. To this might be added the recent decision of the Interstate Commerce Commission, granting the industrial roads allowances which, it is said, will increase their revenue $15,000,000 annually; and it is also probable that the commission will ultimately permit a general advance in freight rates. These favorable developments have, at least, caused a feeling of cheerful hope in the conservative element of the business world.

As to the coal business itself, the indications are that anthracite, with its limited supply and close control, will have its customary profitable year. The outlook in bituminous, with its heavy over-production, and consequent keener competition is, of course, more susceptible to conditions in general industrial circles. The labor situation will be a potent factor in determining the ultimate results, and if there is a general suspension in the union fields for a period of six weeks or two months, it is reasonable to believe that a high price-level will prevail over the balance of the year, but with the heavy supply of coal now available at all the distributing centers, the reverse may be expected if this anticipated curtailment fails to materialize.

Prohibition in West Virginia

The mining industry of West Virginia is to be congratulated on the enactment of a state-wide prohibition law, which will take effect July 1, 1914. If this new measure is faithfully carried out, there is sure to be a noticeable improvement in the morale of the men in mining communities. Nothing has been more active in the destruction of character and prosperity in coal camps than the unrestricted sale of intoxicating liquors. Let the operators now provide moving pictures, playgrounds and baths, and the consequent reduction in lawlessness and enforced idleness will show up favorably on the cost sheets. But above all else will be the personal satisfaction and feeling of pride that must come to every man who lends himself to the work of fostering human happiness.

Legal Department

Mining Royalties Dependent upon Existence of Coal

By A. L. H. Street*

SYNOPSIS—The courts incline toward an interpretation of leases as exempting liability for rent or royalties where production is impossible or unprofitable, except where there is an express agreement to the contrary.

The law reports indicate that disputes frequently arise under coal-mining leases concerning the lessee's liability for rent or royalty as affected by exhaustion of coal or failure to find a merchantable seam.

A lease of land for the purpose of exploring for and mining merchantable minerals at a fixed annual rental has been declared by the Michigan Supreme Court to involve an implied understanding that minerals exist in the land, releasing the lessee from liability for rent, on it appearing that no minerals exist. (Blake vs. Lobb's Estate, 68 Northwestern Reporter 427.)

As was said by the Colorado Supreme Court in the case of Colorado Fuel & Iron Co. vs. Pryor, 57 Pacific Reporter 51, the parties to a mining lease are presumed, in the absence of express provision to the contrary, to have contemplated mutual advantages, and unless merchantable coal is found and can be produced at a reasonable profit the lessee is not bound to work the mine. The court accordingly decided that a lessor, in order to show himself entitled to recover on account of the lessee's failure to operate under the lease, was bound to establish not only that the land was underlaid with merchantable coal, but that it could be mined with profit after deducting the royalty.

Colorado Supreme Court Quoted

The court said: "The coal might be merchantable, and yet the lessee be unable to produce it at a profit, after deducting the stipulated royalty, which would be regarded as fair and reasonable for ventures of this kind."

But where a lessee made annual payments to avoid forfeiture of the lease for failure to mine, it was decided by the Iowa Supreme Court in the case of Bloomfield Coal & Mining Co. vs. Tedrick, 68 Northwestern Reporter 570, that on sinking a shaft and ascertaining that, contrary to the supposition of both parties, there was no coal under the land, the lessee was not entitled to recover the payments made. The court rested its decision, however, on a finding that the payments were made to avoid forfeiture of the lease pending the lessee's failure to commence operations, and were not intended as an advance payment of royalties, intimating that the lessee would otherwise have been entitled to repayment.

Lessees in a Pennsylvania case, who claimed exemption from liability for a minimum royalty under an express provision of their leases applicable to beds of less than 2½ ft. in general thickness, were held by the Supreme Court of that state to have had the burden of showing that the coal was of less thickness, it not being incumbent upon the lessors to show that the bed in question had a general thickness greater than 2½ ft. This decision was influenced, however, by the fact that it was conceded that there was merchantable and workable coal in the land. The evidence in the case being conflicting on the question as to the actual thickness of the bed, and there being proof tending to show that the lessees had not made proper examinations to test the actual thickness, the lessors were awarded the minimum royalty. (Holt vs. Kelley, 73 Atlantic Reporter 947.)

In the case of Consolidated Coal Co. of St. Louis vs. Peers, 37 Northeastern Reporter 937, the Illinois Supreme Court, in awarding recovery of a minimum royalty, which was guaranteed regardless of whether mining operations should be conducted, decided that the leasing landowner was not required to prove that there was a seam of workable coal under the land, the lease containing no express warranty on that point.

Unexpected inferiority of coal, making it unsalable, was a "circumstance" beyond the lessee's control within the meaning of a lease which required him to pay royalties on not less than 500,000 bu. of coal, unless prevented from taking and shipping that quantity by some accident or circumstance beyond his control, according to the decision of the Kentucky Court of Appeals in the case of Givens' Executors vs. Providence Coal Co., 60 Southwestern Reporter 304.

Effect of Exhaustion of Coal

Exhaustion of coal in the leased land discharges the lessee from further liability under a clause binding him to mine and ship sufficient quantities of coal to produce $5000 in royalties, unless prevented from doing so by unavoidable accident, or occurrences beyond his control. (Pennsylvania Supreme Court, Bannan vs. Graeff, 40 Atlantic Reporter 805.)

On the other hand, in a recent case where a lease provided for a stated royalty and for a minimum production and a minimum rental on that basis, the St. Louis Court of Appeals held that the lessee could not escape payment of the minimum rental on the ground that the coal had been exhausted, so long as he retained possession of the premises under the lease. (Lennox vs. Vandalia Coal Co., 66 Missouri Appeals Reports 560.) And in an early case, McDowell vs. Hendrix, 67 Indiana Supreme Court Reports 513, a lease providing a minimum payment unless no coal should be found and the lease should be abandoned was held not to release the lessee from liability for such rent so long as he retained possession of the land.

A Pennsylvania lessee, who guaranteed a minimum annual royalty for ten years, was declared liable for the full amount, although the coal seam became unworkable in eight years. (Timlin vs. Brown, 28 Atlantic Reporter 236.)

*Attorney at law, St. Paul, Minn.

Discussion By Readers

High Safety Records

As a subscriber and reader of your valued publication, I have read with considerable interest the article in the issue, Feb. 21, in regard to high safety records, and am pleased to see the interest taken in drawing attention to the decided decrease in fatalities, as compared with production. Whether or not this statement from us will be of any special interest, I wish to give it to you anyway.

We have been mining coal in Muhlenberg County, now, for a little better than ten years, and in that time have produced five million tons of coal with a total fatality of six. Last year our output, at the two mines, Luzerne and Graham, was 661,118 tons, without a single fatality.

I think on the whole the fatality per ton is decreasing, in Kentucky; and the mine operators, as well as the employees are showing much interest in making all possible provision for safety.

C. W. TAYLOR, Vice-Pres. and Mgr.,
W. G. Duncan Coal Co.

Greenville, Ky.

List of Coal-Mine Explosions

In looking over a recent issue of COAL AGE, Jan. 10, my attention was attracted to the footnote at the bottom of p. 47, which stated that neither of the two explosions mentioned in the report of Thomas A. Shaw, State Mine Inspector of Arkansas, is found in the list of fatal mine accidents compiled by the Federal Bureau of Mines (Technical Paper 48, Bureau of Mines, Washington, D. C., pp. 67-71, inclusive).

The completeness of the Bureau's list is appreciated by all, and especially by anyone who has attempted a like compilation. The difficulty in locating and securing correct information on the mine catastrophes of even as recent a date as 1905 can be better estimated when it is said that in some instances explosions wherein as high as fifty lives were lost, were then given much less attention and publicity in the technical mining papers, than now. The incompleteness of state mining reports of a decade ago is well known and these often offer but little help to such investigations. In order that the explosions record, however, may be made still more complete, I beg to submit four such occurrences that are not found in the Bureau's list. They are as follows: Flat Top mine, Littleton, Ala., Dec. 1, 1903, 4 lives lost; Short Creek mine, Short Creek, Ala., Oct. 29, 1908, 6 lives lost; Jumbo mine, Antler, Okla., Nov. 28, 1910, 13 lives lost; Gayton mine, Henrico, Va., January, 1909, 6 lives lost.

E. N. ZERN,
Professor Mining Engineering,
West Virginia University.

Morgantown, W. Va.

[We would draw attention to the fact that the list of mine explosions and other mine accidents, published by the Federal Bureau of Mines and referred to above, is limited to a fatality of five lives lost as a result of the accident. Our correspondent mentions one explosion, that in the Flat Top mine, Littleton, Ala., Dec. 1, 1903, in which only "four lives were lost." This explosion would not properly be included in the Bureau's list.

In the hopes of completing, as far as possible, the list of mine explosions that have occurred in the United States and Canada up to the present time, we are making editorial mention of the matter, and hope to receive, from our readers and all classes of mining men, any information that will aid in completing the tabulated list. See p. 416.—ED.]

The Mine-Run Problem

Letter No. 3—Referring to the article of S. F. Rock, COAL AGE, Feb. 14, p. 296, it seems to me that the method he suggests for solving this problem is not practical, since the proportions of lump coal and screenings vary to such an extent, in different districts and even in different parts of the same mine, that if there were to be established an agreed price for lump coal and another for nut, pea and slack, the result would prove of advantage to some and a decided disadvantage to others. Such a method would, therefore, be no improvement over the present system of paying miners on the basis of screened lump coal. One of the chief objects of the miners, in demanding the mine-run system of payment, is that justice might be secured by *all*.

At the present time, I recall a mine where the coal on the north side was mined in large lumps without shooting, while the percentage of nut and slack would not run above 15 per cent. The conditions of mining in the rest of the workings were about normal, except in two rooms that were narrowed and were being driven to the crop, to provide good natural drainage for the mine. The coal mined in these two rooms was estimated to contain about 50 per cent. of nut and slack, which all passed through the screens and for which the miner received no pay. The average percentage of screenings for the entire mine was about 22.5 per cent., which is somewhat below the average percentage for that district. This is not an imaginary case, but the facts as stated are the result of my observation while employed at the Copperhead mine, near Gore, Ohio, operated by the Hocking Fuel Co., of Columbus.

Mr. Rock suggests that the rate of payment be based on the proportion and price of the two grades of coal produced, lump and screenings. For example, assuming that the average selling prices are $1.65 for lump, and say 50c. for screenings, per ton, if the price for mining lump is 87½c., the mining price for screenings would be obtained by the following proportion:

$$1.65 : 0.50 : : 0.875 : x = 0.265$$

For the sake of illustration, let us apply this rule and assume a miner mines, say 10 tons of coal on the north side of the mine mentioned above; and compare this with 10 tons mined by a miner, in driving one of the places

running to the crop, as mentioned. The earnings of these two men, in mining 10 tons of coal, would then be as follows:

North side of mine, producing 85 per cent. lump and 15 per cent. screenings,

8.5 tons	@ $0.875	= $7.44
1.5 tons	@ $0.265	= $0.40
Total		$7.84

Crop workings, producing 50 per cent. lump and 50 per cent. screenings,

5 tons lump	@ $0.875	= $4.37
5 tons lump	@ $0.265	= $1.33
Total		$5.70

This shows a difference of $7.84 — $5.70 = $2.14 in the earnings of these two men, in mining 10 tons of coal in their several places. While I willingly admit this situation to be anomalous, I believe Mr. Rock would be confronted with difficulties from the start, in attempting to apply his proposed method of payment, practically.

Careful study of the situation seems to indicate that the only proper solution to this question is a flat, mine-run basis of payment. In opposition to this plan, Mr. Rock states that miners will practice "hard shooting," with the result that a larger percentage of fine coal would be produced, and more impurities will be left in the coal. In the study of the question, the Ohio Mining Commission recognized this fact, which is quite generally conceded by all. I believe that experience will teach miners the folly of such practice, which, undoubtedly, would soon result in the adoption of a rule restricting the weight of charge to be employed in shooting coal.

In the meantime, Ohio operators, confronted as they are at present with the necessity of changing their equipment from screens to chutes, and being forced to compete with natural and economic conditions in West Virginia, face a considerable hardship. The estimated cost of making these changes at the mines of Ohio is $1,000,000.

Notwithstanding these facts, it seems only right that miners should be paid for their coal on a mine-run basis. This should have been done before; but, whatever trade adjustments are necessary should be considered in the sense of correcting an existing wrong. We are proud to say that Ohio is the pioneer in such legislation. In passing through a crisis demanding many reforms, such as Ohio is experiencing at the present time, the needed legislation, if not proved unconstitutional, must later be followed by other states. Such was the case in regard to the Workmen's Compensation act, which is now in force in at least 15 states. Let us hope for the final and equal adjustment of these matters that will reduce the hardships for the operator and provide greater justice for the miner.

GEORGE N. LANTZ.

New Straitsville, Ohio.

Longwall Mining Methods

Letter No. 6—My attention was especially attracted by Letter No. 3, in answer to the inquiry on longwall mining. Both Letters Nos. 3 and 4 refer to the longwall-advancing system, instead of the retreating system asked in the inquiry.

Mr. Marson, in Letter No. 3, states that one gateway is provided for each 100 ft. of face, the gateway to be 9 ft. wide, with 6-ft. packs on each side. He uses, also, three rows of posts along the face. In my experience, these gateways are too far apart for safety, for the amount of support shown between them. The 6-ft. gate-side packs are too narrow, and would be thrown into the gateway when the weight comes on them. I consider that gateways 7 ft. wide, with 3-yd. packs; crossroads, 10 ft. wide, with 4-yd. packs; and main roads, 12 ft. wide, with 4-yd. packs on each side, are necessary for safe working, under the conditions given. In such an advancing system, the small gateways should be cut off by the crossroads, at a suitable distance, and new ones started.

As I understand this inquiry, it refers to the retreating system; which consists in driving haulage roads and airways to the line or boundary, and bringing back the coal by the longwall face. The roads being driven in the solid coal, as the face retreats toward the shaft, the roof is allowed to fall completely. In this system, no roads are maintained in the goaf.

In respect to the style of timbering such a longwall face, I would refer Bituminous to Letter No. 1, p. 99, COAL AGE, Jan. 10. All timber is withdrawn as the face recedes. The work is much more simple than when the roads must be maintained in the goaf, as in the longwall-advancing method. I much prefer having the roadways leading to the face 54 ft. apart, as there is less danger to the loaders, and the face can be cleaned up quicker. Wooden rails should be used at the face, and the size of the car should be such that they can be readily handled along the working face.

LONGWALL.

Marianna, Penn.

The Certificate Law

Letter No. 22—I have noted with interest the letter of Wm. Kellum, No. 15, COAL AGE, Jan. 31, p. 217, on The Certificate Law. I fully agree with Mr. Kellum in his statements, especially where he says that a man may possess a first-class certificate and yet be deficient in many points that are essential to the making of an efficient and competent mine foreman.

I have worked in the mines 26 years, and during that time have filled every position from a trapper to assistant mine foreman. For the past 10 years I have been employed in the capacity of fireboss. Having but a fair education myself, I feel the need and realize the importance of every miner making an effort to secure as much education as possible. In my mining experience I have met many men who could not read or even write their own name, but who are first-class mining men, from a practical standpoint, and men whose judgment in practical mining matters can be safely trusted. They are men whom I and many others would not be afraid to follow in any mine where gas is generated.

It is my belief that a man should have this practical experience before he can be trusted with a safety lamp to examine workings for gas where so many lives are at stake. I have known firebosses who hold certificates, but who did not seem to know the importance of cleaning their lamps, but who would go into the mine and proceed to examine for gas with a safety lamp that was so clogged with coal dust and oil that you could not see through the gauze.

In many cases, these men would carry a flame as large as that of an ordinary mine lamp, when making a test for gas. It is needless to say that such men should neither hold a certificate nor be allowed to carry a safety lamp, much less to examine the mine for gas.

I would say, therefore, in conclusion, that practical experience should be considered an essential qualification for every man holding a certificate. No examining board should grant a certificate of competency to a man who has had no practical experience and does not know what is necessary in the handling of a safety lamp.

FIREBOSS.

Huntington, Ark.

Letter No. 23—The recent letters discussing the question of the certificate law have interested me very much. In my opinion, anyone who attempts to handle men and conduct mining operations underground should be a properly certified person. I do not see the need, however, of a law compelling a man to take more than one examination, in the state where he is employed. I do not believe in the interchange of certificates issued in different states.

In regard to residents of another state obtaining certificates of competency in a state other than their own, I believe the state mining law should protect its own citizens. If a man desires to obtain a certificate in another state, let him become a citizen of that state, so that he can study and become familiar with the state mining laws and the conditions in the mines. I consider our Illinois law is right in this respect, in not permitting a man to take an examination, except he is a resident of the state.

In discussing this question, we should remember that the certificate law does not make good mining men. Practical experience is necessary when operating a mine underground, and I would rather trust a really practical man with the responsibilities that rest on the mine foreman than a man who has obtained his mining knowledge from books only. I believe every mine manager (foreman) should keep uptodate by reading mining journals, as we can learn much from the experience of others.

Speaking of examination for certificates of competency, there are many mine managers (foremen) in this field who could not secure a rating in an examination, at the present time; nevertheless, these men are successful in the operation of their mines and are competent to have charge of mines.

COUNTY MINE INSPECTOR.

Catlin, Ill.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

THE DECIMAL SYSTEM

The common system of notation, as previously explained, multiplies the value of a figure **ten** times for each successive place, from the units place to the left. Thus, beginning at units place in a line of figures and counting to the left, the order of notation is units, tens, hundreds, etc., each successive position to the left increasing the value of the figure ten times or multiplying its previous value by ten.

Advantage has been taken of this principle to extend the same notation to the right of the units place. By the same law of notation, beginning at units place and counting to the right, the value of a figure is now divided by **ten,** for each successive place to the right, making the order of notation to the right thus, units, tenths, hundredths, thousandths, ten thousandths, hundred thousandths, etc.

The Decimal Point—The extended decimal system is thus seen to include a notation of units to the left and of fraction units to the right. To divide these two branches of the system a point called the "decimal point" is used. The decimal point is placed immediately to the right of the units place, thus dividing the fractional units on the right from the units on the left.

DECIMAL FRACTIONS

A fraction is a part of a whole. A numerical fraction is a part of a unit or one; its value is therefore always less than one.

There are two general classes of fractions; namely, "common fractions," which have been already described and "decimal fractions."

A **common fraction** is one whose fractional unit is not a decimal part of a unit; or, in other words, is not obtained by dividing one by ten or a multiple of ten; as ½, ⅓, ¼, etc.

A **decimal fraction** is one whose fractional unit is obtained by dividing one by ten or any multiple of ten; as $^1/_{10}$, $^1/_{100}$, $^1/_{1000}$, etc.

Writing Decimal Fractions Decimally—As explained above, in the decimal notation, the first place to the right of the decimal point expresses tenths; the second place, hundredths, etc. Hence, the fractional unit $^1/_{10}$, written as a decimal, is 0.1; the fractional unit $^1/_{100}$ is 0.01; and in like manner $^1/_{1000} = 0.001$; $^1/_{10000} = 0.0001$; etc.

It follows, also, that any decimal fraction, $^7/_{10}$, $^{62}/_{100}$, $^{79}/_{1000}$, etc., may be written decimally thus, 0.7, 0.62, 0.079, etc.; always observing to write the numerator of the fraction, with as many decimal places (places to the right of the decimal point) as there are ciphers in the denominator, if necessary writing as many ciphers immediately after the decimal point as are needed to make the required number of decimal places. To illustrate, the following examples are given:

$$\frac{37,062}{100,000} = 0.37062 \qquad \frac{50,120}{1,000,000} = 0.05012$$

$$\frac{207}{100,000} = 0.00207 \qquad \frac{500}{1,000,000} = 0.0005$$

The Coal Age Pocket Book

It is important to note that when the numerator of a decimal fraction contains fewer figures than there are ciphers in the denominator, it is necessary, in order to write this fraction as a decimal, to prefix ciphers to the numerator so that the number of decimal places expressed will equal the number of ciphers in the denominator. For example $^5/_{100} = 0.05$.

It is evident that any ciphers standing on the right of a decimal can be dropped without changing the value of the decimal. Thus, $0.500 = 0.5$; $0.0230 = 0.023$.

Again, the numerator of a decimal fraction may contain more figures than there are ciphers in the denominator, as in an "improper fraction" previously defined. In that case, all that is necessary to express this fraction as a decimal is to write the numerator as a number and point off from the right, by a decimal point, as many decimal figures as there are ciphers in the denominator of the fraction. For example, the following improper decimal fractions expressed as decimals are

$$\frac{389}{100} = 3.89; \qquad \frac{65}{10} = 6.5; \qquad \frac{4500}{100} = 45.00 = 45$$

Rule—To express a decimal fraction as a decimal, first cancel any ciphers at the right of the numerator and as many in the denominator of the fraction. Then write the remaining numerator as a number and point off from the right as many decimal places as there are ciphers remaining in the denominator, if necessary prefixing ciphers to the number until the required number of decimal places are obtained. The result is the desired decimal value of the fraction.

To Express a Decimal as a Fraction—The operation is the reverse of that just explained and is as follows:

Rule—To express a decimal as a fraction, write the given decimal as a number, omitting the decimal point and any ciphers immediately following the point and preceding this number. Taking this for the numerator of the required fraction, write beneath it for the denominator one with as many ciphers annexed as there were decimal places in the original decimal. Finally reduce this fraction to its lowest terms.

The above rules, each, apply alike when an improper decimal fraction is to be reduced to a whole number and a decimal; or, vice versa, when a whole number and a decimal is to be reduced to fractional form. In the latter case, simply drop the decimal point and write the result over one with as many ciphers annexed as there were decimal places in the number.

To Express a Common Fraction Decimally—Whether the given fraction is a proper or an improper fraction the operation is the same and is as follows:

Rule—Proceed to divide the numerator by the denominator, as in the process of division; only write as many decimal ciphers on the right of the dividend as desired and separated from it by a decimal point. Proceed as in the division of decimals. The quotient obtained will be the required decimal value.

Inquiries of General Interest

Study Question--Hoisting Problem

We have been studying the answer to the third question, COAL AGE, Vol. 4, p. 357. The question reads as follows:

What kind and size of hoisting engine would you install to hoist 1200 tons of coal from a shaft 400 ft. deep, in eight hours, with a steam pressure of 70 lb. gage? The weight of coal in each car is 3000 lb. Allow 20 per cent. for resistance of engine, ropes and pulleys; also make allowance for the time lost in caging.

The answer to this question states that the size of duplex direct-connected engine required is 16x18 in., the engine running at a speed of 200 r.p.m. It is found that the maximum speed of hoisting, in this case, is 20 ft. per sec., or $60 \times 20 = 1200$ ft. per min.

In order to give this speed of hoisting when the engine is running at 200 r.p.m., the circumference of the winding drum would have to be $1200 \div 200 = 6$ ft., and the diameter $6 \div 3.1416$, which is less than 2 ft. But, the hoisting rope being 1 in. in diameter, would it not be better to design this engine with a longer stroke and running at a lesser speed, so as to provide a drum having a larger diameter?

* * *

In the same connection, in studying the answers given to a number of questions asked at different state examinations, I notice that it is sometimes stated that, in a two-cylinder engine with the cranks set at right angles, so that while one cylinder is exerting its full force the other is on dead center and doing no work, the power of such an engine is measured by one of its cylinders only.

I fail to understand how the combined power of two cylinders, the cranks being set at right angles, can only equal the power of a single cylinder. I readily understand that it is necessary to have each cylinder strong enough to start the load off the bottom, under any and all conditions, assuming, for instance, that one crank is on dead center. But, it does not appear to me strictly correct to say, "The horsepower of such an engine is measured by one of its cylinders only." If I am in error, please put me right.

S. A. DRIVER,
Mining Engineer.

Warrior, Ala.

We are glad to have our correspondent draw attention to the oversight in the answer to the question quoted above. The difficulty, however, is not in the speed of the engine, since, in order to obtain the highest efficiency of a common, slide-valve engine, it should be designed on a piston speed varying from 600 to 800 ft. per min. The speed of the engine, as calculated in the answer to this question, namely 200 r.p.m., is, therefore, correct.

The oversight, in answering the question, consists in the fact that a geared, or second-motion engine, should have been used. In hoisting practice, the engine is under better control in hoisting from deep shafts, at a fairly high rate of speed, when a second-motion engine is employed. This gives a lesser speed of the winding drum, while the speed of the engine is sufficient to yield a good efficiency.

It is true that regard must always be had to the relation between the diameter of the rope and that of the drum. In the use of steel ropes, the diameter of the winding drum should not be less than sixty times that of the rope, in order that the bending stress in the rope when wound on the drum shall not be excessive. In special cases, it is necessary to calculate the bending stress in the rope, for the size of drum employed, in order to ascertain that the rope is not strained beyond the safe elastic limit of the steel. Ordinary practice, however, assumes that it is safe to make the diameter of the drum or sheave, sixty times that of a steel rope, having six strands and 19 wires in each strand.

Using, in this case, a 1-in. cast-steel, 6-strand, 19-wire rope, the required diameter of the winding drum is $60 \times 1 = 60$ in., or 5 ft.; and its circumference, $5 \times 3.1416 = 15.7$ ft. The required speed of the drum, for a hoist or rope speed of 1200 ft. per min., is then $1200 \div 15.7 =$ say 76 r.p.m. The engine running at 200 r.p.m., the required ratio of gearing is 200 : 76 = say 8 : 3. That is, for every three teeth in the pinion, there should be eight teeth in the drum gear. It would be even better to use, in this case, a 6-ft. drum and a ratio of gearing of say 25 : 8; that is, for every eight teeth in the pinion gear, there would then be 25 teeth in the drum gear. In more exact calculation, in practice, allowance must also be made for the diameter of the rope increasing the effective diameter of the drum When, for example, a rope 1 in. in diameter is wound on a drum, 6 ft. or 72 in. in diameter, the effective diameter, sometimes called the "diameter of winding" is equal to the diameter of the drum plus the diameter of the rope.

In answer to correspondent's second question, it must be remembered, as he has stated, the lifting power of a single cylinder of a hoisting engine must be such as to pick up the load from the bottom, without difficulty and when the other engine is on dead center. This lifting power is quite separate from the actual horsepower of the engine. In most cases, when the horsepower of an engine is calculated for a single cylinder only, the lifting power of that cylinder under full steam pressure will be sufficient to pick up the load readily when the other engine is on dead center. This is owing to the initial cylinder pressure being greater than the mean effective pressure due to expansion of the steam after cutoff.

It is incorrect, however, to state that the horsepower of a duplex engine is measured by one of its cylinders only. The power of a duplex engine is always double the power of a single engine of the same size and running at the same piston speed. However, in hoisting practice, it is essential to have a surplus power and, for this reason, the required size of a hoisting engine is generally estimated on the power of a single cylinder, which gives a sufficient lifting power, as just stated.

Examination Questions

Mine Managers' Examination, Held at Springfield, Ill, Feb. 9, 1914

(*Selected Questions*)

Ques.—A mine is ventilated by three splits of air, *A*, *B* and *C*, which take, respectively, 2500, 1500 and 2000 cu.ft. per min., making a total of 6000 cu.ft. of air in circulation. What will each split take if the total circulation be increased to 75,000 cu.ft. per min.?

Ans.—Assuming that this increase, in the total circulation in the mine, is caused wholly by an increase in the ventilating power or the power on the air, the quantity of air passing in each split will be increased in the same ratio, namely, 6000:75,000; or 1:12.5. The circulation of air in each split is, therefore, as follows:

Split A, $2500 \times 12.5 = 31{,}250$ cu.ft. per min.
Split B, $1500 \times 12.5 = 18{,}750$ cu.ft. per min.
Split C, $2000 \times 12.5 = 25{,}000$ cu.ft. per min.

Total, 75,000 cu.ft. per min.

Ques.—A barometer registers 30 in. at the surface; what will it register at a point 1890 ft. below the surface?

Ans.—Ignoring any increase or decrease of ventilating pressure in the mine, caused by the action of a blower or exhaust fan, the increase of barometric pressure, due to the depth of the shaft, may be taken as, approximately, 1 in. of mercury for every 920 ft. of air column; which gives, in this case, $1890 \div 920 =$ say 2 in., making the barometric reading, at the foot of the shaft, in this case, $30 + 2 = 32$ in.

Ques.—Name three gases found in coal mines and that are dangerous. What are their chemical symbols and comparative weights?

Ans.—The three dangerous mine gases, commonly found, and their respective molecular weights are: Methane or marsh gas (CH_4), molecular weight, 16; carbon monoxide (CO), molecular weight, 28; carbon dioxide (CO_2), molecular weight, 44.

Ques.—If 10,000 cu.ft. of air are passing per min., through an airway 8x10 ft., under a pressure of 13 lb. per sq.in., what is the estimated length of the airway?

Ans.—First, write the formula for the unit of ventilating pressure, in terms of the quantity of air in circulation,

$$p = \frac{klOq^2}{a^3}$$

The perimeter of an 8x10-ft. airway is $2\ (8 + 10) = 36$ ft.; the area, $8 \times 10 = 80$ sq.ft. Substituting these and the given values in the above formula gives,

$$13 = \frac{0.00000002\ l \times 36 \times 10{,}000^2}{80^3} = \frac{9\ l}{64{,}000}$$

and

$$l = \frac{64{,}000 \times 13}{9} = 92{,}444+\ ft.$$

Ques.—If a mine-ventilating fan, running at 80 r.p.m., gives a water gage of 3.75 in., at what speed will this fan give a water gage of 1.82 in.?

Ans.—Assuming the conditions in the mine remain unchanged, and ignoring the slight change in the efficiency of the ventilator, the speed of the fan is ordinarily assumed to be proportional to the quantity of air circulated, on which basis the speed of the fan would vary as the square root of the ventilating pressure. In other words, the speed ratio is equal to the square root of the pressure or water-gage ratio. This assumption gives, calling the required speed of the fan x,

$$\frac{x}{80} = \sqrt{\frac{1.82}{3.75}} = \sqrt{0.4853} = say\ 0.7$$

$$x = 80 \times 0.7 = 56\ r.p.m.$$

In actual practice, however, the fourth power of the speed of the fan is found to vary, approximately, as the fifth power of the quantity, which makes the speed ratio equal to the eighth root of the fifth power of the water-gage ratio. This calculation can only be made satisfactorily by the use of logarithms, and gives for the required speed of the fan, in this case, say 51 instead of 56 r.p.m.

Ques.—If the ventilation of a mine was insufficient, and you could not increase the power, how would you increase the circulation of air in the mine?

Ans.—Proceed to clean up the airways by loading out all falls of roof and other rubbish; enlarge all breakthroughs, straighten the air courses and shorten, as far as practicable, the distance the air must travel. Split the air current wherever it is possible to do this without reducing the velocity of the current below that required for good ventilation and the removal of the gases that accumulate in the workings. Remove every unnecessary obstruction in the air courses and avoid sharp angles in all airways, or obstructing the roads and air courses by standing loaded cars in them.

Ques.—How much more resistance will a current having a velocity of 600 ft. per min. meet, than one with a velocity of 500 ft. per min., the dimensions of the airway being the same in each case?

Ans.—For the same dimensions of airway, the resistance varies as the square of the velocity of the current; or the ratio of increase is equal to the square of the velocity ratio, which is, here $600^2 : 500^2 = 6^2 : 5^2 = 36 : 25$. This shows an increase of $\frac{(36 - 25) \times 100}{25} = 44$ per cent.

Ques.—The pipe line in a slope is 144 sq.in. in area and 2000 ft. long; the slope dips 1 in 10. What is the presure per square inch, and the total pressure on the pipe, at the bottom of the slope?

Ans.—The vertical head, for this length of pipe, is $2000 \div 10 = 200$ ft. The pressure per square inch, due to this head of water, is $200 \times 0.434 = 86.8$ lb. per sq.in. The total pressure, for the entire sectional area of the pipe is, then, $144 \times 86.8 = 12{,}499.2$, say 12,500 lb., or 6¼ tons.

Coal and Coke News

Harrisburg, Penn.

A report covering the cost per mile of hauling anthracite coal from the mines to Philadelphia as compiled by Price, Waterhouse & Co., accountants is now in the hands of the Public Service Commission. The Commission will hear arguments on the question of freight rates at the capitol on Mar. 24, and meanwhile it is refusing to discuss findings.

From an authentic source it was learned that the accountants had not only reported the cost per ton per mile, but that the figures of the report were so low that the railroads would vigorously combat them. It was said that the figures were less than the cost estimated by experts who testified before the old State Railroad Commission. Furthermore, it was said, the accountants' figures would compare favorably with those introduced by the Interstate Commerce Commission in regard to the Central R.R. of New Jersey at a recent hearing in Philadelphia. The Interstate Commerce Commission found that the average cost to the New Jersey Central reduced to the per ton mile basis would be 3.3 mills.

The employment of the New York accountants by the Commission really grew out of a statement made by Wharton Baker, a veteran financer, who declared the railroads could ascertain the cost per ton per mile if they wanted to. The railroad men, at the Commission hearings, had ridiculed the idea and said it could not be done. Mr. Baker made an affidavit that he had seen such statistics in possession of the Philadelphia & Reading Ry. Co. Then the Commission agreed to put the accountants at work.

Rates now charged by the railroads on hauls, from the Lehigh region to Philadelphia are $1.86; to Germantown, $1.96; to Chestnut Hill, $2.06. Experts had complained that it should not exceed 62 cents. The Interstate Commerce Commission figures showed that it cost 59 cents a ton from the Wyoming region to tidewater at New York, or 3.3 mills per ton per mile. On this basis the cost of hauling a ton of coal from the same district to Philadelphia would be 51.38 cents and the cost of assembling was shown to be 5.2 cents. The total rate charged by the railroads is $2.10.

AGITATION FOR ORGANIZATION

The agitation for organization which is now going on in the anthracite region by that class of unorganized labor; namely, assistant mine foremen and fire bosses is worthy of more than passing thought.

That there will be opposition not only from the coal companies, but from others in the ranks whose interests seem to be identical with those of the companies, toward the organization of the fire bosses into a branch of the United Mine Workers, is becoming evident every day.

It is asserted by some coal operators that with the foremen allied with the union, the law of the latter will prevail, and that the foremen cannot be considered servants of the companies to carry out all orders issued.

At the meeting of the tri-district board of the United Mine Workers of America, held at Wilkes-Barre on Feb. 28, no definite action was taken to admit these men to the union, either as a separate organization or as individuals. In fact the by-laws and the constitution of the organization practically stipulates that these men shall not be admitted to membership.

Charges were also preferred at this board meeting that certificates to foremen and assistant foremen have been issued to men not qualified for the positions. The miners for some time have been complaining about the powder furnished them, and have appointed a committee to take this question up with James E. Roderick, chief of the Department of Mines and Dr. Holmes of the Federal Bureau of Mines, and there is a possibility of compelling the companies to stamp powder kegs with the grade and percentage contained. It was charged by men from the lower fields that some of the companies had refused to stamp the kegs.

PENNSYLVANIA

Anthracite

Drifton—The Lehigh Valley Coal Co.'s stripping work in the vicinity of Freeland and Drifton has been suspended until spring, due to the cold weather.

Forest City—The report of Benjamin Maxey, state mine inspector of the 21st district, which comprises Sullivan, Wayne, Susquehanna Counties, and a portion of Lackawanna County, shows 22 men were killed during 1913. Eleven wives were made widows and 31 children were left orphans as a result of these accidents. The tonnage for the year was 3,145,662 thus making one fatal accident for every 142,994 tons of coal mined.

Mahanoy Plane, Penn.—The contract for the erection of the Lawrence breaker has been awarded to Wheeler-Reilly Construction Co. The structure when completed will be one of the largest in the anthracite coal region and is being erected by the Maderia-Hill Coal Co.

Lattimer—The Pardee interests around Harwood, have passed into the hands of the Lehigh Coal & Navigation Co., and it is stated that the mines will no longer be operated for marketing purposes. The remaining coal will be used at the Harwood power plant.

Edwardsville—No further trouble is expected from the fire which broke out in No. 3 shaft of the Woodward Colliery which broke out about Feb. 24. The officials of the Lackawanna Co. report that the fire has been sealed up with a firewall in the Hillman vein and this wall will not be removed until the fire is extinguished.

Wilkes-Barre—A miner and his laborer in the Pettebone Colliery of the D. L. & W. R.R. Co. of Dorrancetown recently had a narrow and fortunate escape from death. After completing their day's work they found themselves imprisoned by a mine fire. Fearing an explosion of gas they retreated far into the slope, where lying flat on their faces they remained for about an hour and a half while a rescue corps fought the fire.

Bituminous

Philadelphia—Unable to reach an agreement upon the wage scale, the joint conference of operators and miners from Western Pennsylvania, Ohio, Indiana and Illinois adjourned on Feb. 26. It is announced that this action does not necessarily mean a strike, as the two sides may get together in another effort to reach an agreement.

Greensburg—According to the report of Chauncey B. Ross, Inspector of the 2nd Bituminous District, embracing much of Westmoreland County, the Jamison Coal & Coke Co. is the largest producer of coal and coke in the district. This firm produced coal to the amount of 9,037,469 tons in 1913, and manufactured coke to the amount of 2,716,148 tons. In the district were 57 mines, 56 of which were in operation There were 33 fatal accidents underground and four outside.

Somerset—According to the report of inspector Fletcher W. Cunningham, the death toll in the coal mining industry in the 20th Bituminous District including the greater part of Somerset County during 1913 was one human life for every 265,738 tons of coal produced. The total production of the county, part of which lies in the 24th Bituminous District was 9,172,389 tons.

Waynesburg—Figures compiled in the offices of the County Commissioners of Greene county show that there are undeveloped in 17 of the 18 townships of the county 340,000 acres of coal. Of this amount 274, 699 acres are in the hands of investors and 65,301 in the hands of farmers.

Lilly—A single stockholder has petitioned for a receiver for the Lilly Coal Co. There is no financial disability, but internal dissatisfaction.

WEST VIRGINIA

Fayetteville—After all the evidence had been submitted to a jury in the case of John M. Henson vs. the Quinnimont Coal Co. attorneys for the defendant asked the court to direct a verdict in favor of the plaintiff in order that the case might be appealed to the Supreme Court. Henson was a check weighman. Certain of the miners protested to the company against having his pay taken from them, and the company therefore refused to pay him on their checks. Henson brought suit to recover and the case will now go to the Supreme Court in order to have the law settled.

Charleston—It is expected that a permanent organization of the operators along the line of the Chesepeake & Ohio

Ry. will be perfected at a meeting to be held on Mar. 7. This organization will then be sufficiently strong in numbers and financially to secure at least the shipping rights of each member. The principal idea is to prevent the delays in shipment arising upon various roads connecting the Chesapeake & Ohio with the Great Lakes.

A delegation representing the Kanawha Coal Operators Association called on the Public Service Commission recently for the purpose of hearing interpretations on parts of the Workmen's Compensation Law. The operators submitted a list of questions covering conditions such as are most frequently met with in the occurrence of accidents in and about the mines. Answers to these were given verbally and in writing. The operators now declare that they have a more lucid understanding of the working of the new legislative act.

TENNESSEE

Nashville—The recent order of the Interstate Commerce Commission requiring reciprocal switching of coal in Nashville yards between several roads has resulted in a considerable stimulation of activity in the handling of rail coal, as it means a saving of 10 to 20 cents a ton. Applications have been made by the railroad involved for an injunction, however, and it is possible that the old rates and charges will be again placed in effect, pending prolonged litigation.

KENTUCKY

Burlington—Options recently taken by the Deep Water Coal Co. on properties in Hopkins County will be closed soon. Steps are progressing as rapidly as the nature of the work will permit for abstracts to be drawn of certain working properties and also some undeveloped fields of mining rights. The taking over of the operating properties and the development of the new ones, will mean much to Hopkins County.

Pikeville—Six modern and well-equipped coal operations are now working on full time on Marrowbone Creek. The Allegheny Coke Co., which succeeded the Mitchell Coal Co., operates 150 ovens, which convert its entire output into coke, which is marketed and consumed within a radius of 200 miles of the mines. Nine thousand tons of coke were shipped during last year after June 1, with only a part of the ovens completed. The company contemplates doubling its capacity this year, using 300 ovens, and getting out a correspondingly increased amount of coal.

Henderson—Several coal mines in this vicinity have been flooded recently, the snow and rain which fell during the past two weeks, followed by thaws, resulting in putting a number of streams out of their banks and raising the Ohio River almost to flood stage.

Frankfort—A bill has been introduced in the Kentucky legislature, and referred to the committee on Mines and Mining, requiring corporations paying employees in scrip to redeem the same in lawful money on demand. It is significant that the bill was referred to the mining committee, although coal companies were not named in it. It is stated, however, that few companies in Kentucky pay in scrip.

OHIO

Coshocton—The mining tools, mules and other personal property of the Daily Cannel Coal Co. were recently sold to satisfy a claim for lumber furnished.

Salem—About 80 men entombed in the Peerless mine, near here, by a cave-in worked from about noon, Feb. 24, until the morning of Feb. 27, when they finally dug their way out. A runway trip heavily loaded, broke down timbers supporting the roof, which caved in, blockading the mine entrance.

INDIANA

Indianapolis—A suit has been filed in the Federal Court here by the J. B. Arpin Coal Co., of Brazil, asking $10,000 damages from the Browning Manufacturing Co. and the Browning Engineering Co. because, as alleged, a steam shovel failed to come up to guarantee, making it necessary for the company to cancel valuable contracts.

The Indiana Supreme Court affirms the judgment of a lower court for $25,000 which Benjamin Simpson obtained against the Big Four railroad. He owned a farm in Clay County under which was coal, the upper vein lying within 40 ft. of the surface, and possessing a good mine roof. In taking an additional strip of land for double tracking the railroad company lowered the track grade 30 ft. The roof of the mine caved in and the mine became flooded and ruined. Simpson began suit for $150,000 damages.

ILLINOIS

Springfield—The Pittsburgh Coal Co. was recently granted a deficiency decree for $2,787,837.50 against the Illinois Collieries Co. This was granted on the evidence that the Pittsburgh Coal Co. owned that amount of the bonds of the bankrupt Collieries Co., as against $195,175 held by all other bond holders. The Collieries Co. was recently disposed of at receiver's sale for $126,000. The property consists of eight mines in central Illinois.

Canton—According to the report of the State Mining Board covering the fiscal year from June 30, 1912, to June 30, 1913, a total of 3672 men were employed in the 129 mines of Fulton County within the period in question. A total of 2,154,799 tons were produced by hand mining and 378,220 tons by machinery. During the period covered, two men were killed and 18 injured in Fulton County mines. Fourteen new mines were opened and 18 mines abandoned, making a net loss of four operating mines.

Taylorville—The mine of the Springfield Coal Mining Co., which was closed when the concern went into the hands of a receiver, was recently reopened with a force of 600 men.

Peoria—The Illinois division of the United Mine Workers of America on Feb. 27 passed a resolution condemning the National Guard and urging that local unions do everything in their power to keep their members from affiliating themselves with that organization. The resolution enumerates that in every industrial struggle the state militia has opposed union labor, and all labor organizations should do all they can against the National Guard in an effort to defeat its purpose.

ARKANSAS

Russellville—The Russellville Anthracite Coal Co.'s mine resumed work recently, after an idleness of several weeks, due to lack of orders. There has been no labor trouble in the Russellville district for two years or more.

OKLAHOMA

Oklahoma City—Evidence in the complaint of the Farmers Fraternal, Economic and Business Association against all coal companies operating in the state, asking for an order directing the latter to sell direct to the consumers, was recently heard by the Corporation Commission. About 40 coal companies were represented in the hearings, and the order governing the case is expected within a few weeks.

Bartlesville—Considerable mystery appears to surround the results of the prospecting for coal on the leases recently taken by A. M. Parsons, west of Copan. Several prospect holes have been put down with a core drill, but the drillers have so far failed to enlighten anyone as to what has been found.

Pahuska—It is believed that northern Oklahoma will be soon enriched by the development of coal deposits that until recently were known only to persons engaged in drilling oil wells. This coal is bituminous of excellent quality, the veins ranging as high as 8 ft. in thickness and lying at a depth of from 70 to 100 ft.

COLORADO

Trinidad—William Diamond, local treasurer of the United Mine Workers, was arrested Feb. 26, charged with aiding deserters from the militia and having government property in his possession. It is alleged that Diamond had uniforms for which he had exchanged citizens' clothes with absconding militia-men. He will be turned over to United States authorities.

FOREIGN NEWS

Paris, France—At a meeting held Mar. 1, of the National Council of Miners' Unions, it was decided to call off the strike of the coal miners begun in the southern coalfield on Feb. 24. The National Council requested the various organizations to have their men resume work Mar. 3.

Brussels, Belgium—Nine coal miners were drowned Mar. 3 in a mine at Bracquegnies, in the Province of Hainaut, by a subterranean stream bursting into the galleries. The danger signal was sounded throughout the mine, and the hundreds of men below hurried to the surface, but nine of those working a long distance from the shaft were caught in the rush of water and were drowned.

PERSONALS

L. P. Miles, of Memphis, Tenn., is reported as contemplating the purchasing and development of 25,000 acres of coal land in the Arkansas field.

Walter L. Keen has been elected vice-president of the Solvay Collieries Co. in place of Dr. L. P. Jones resigned. J. C. Rawn, who resigned the position of general manager of the same company, has been elected consulting engineer.

John C. C. Mayo, one of the best-known coal operators in Kentucky, who has been seriously ill for some time with Bright's disease, is said to be improving at his home at Paintsville, Ky., and his physicians now predict his recovery.

A. P. Devinnish, formerly connected with the W. J. Hamilton Coal Co. will be sales manager of the Hocking Valley Products Co., of Columbus, in the place of T. C. Collins, resigned to take up similar work with the W. J. Hamilton coal company.

B. F. Nigh, secretary of the Michigan-Ohio-Indiana Coal Association has about completed the work of collecting copy for the annual year book of the organization which will be ready for distribution about Apr. 1. It will contain much valuable information relative to the trade in the three states.

Mike Davasconick, one of two coal miners, who were entombed by a cave-in at the Cannon mine of the Pacific Coal Co., at Franklin, Wash., for nearly a week, was finally rescued alive, and, although much weakened from lack of food, the mine physicians say that there is every prospect that he will soon recover his normal strength.

John Nugent was recently given a judgment of $709 against Sam Dixon, and the various companies of which he was general manager, at the conclusion of the case. Nugent, as state labor commissioner, had a contract with the defendants under which he was to induce miners from England, Scotland and Wales, to accept work for the defendants. He claimed that his employers had not settled in full with him for this service.

OBITUARY

Andrew Horatio Reeder, on Feb. 26, died at the Hahnemann Hospital, Philadelphia, Penn., and was buried at Easton, Penn.

Mr. Reeder was born Sept. 9, 1869, at Easton, Penn. He graduated with honors at Lafayette College in the class of 1890 and took a post-graduate course of one year at Lafayette. He was chief engineer for Senators J. G. Davis and Elkins. Later he took charge of the Carnegie coal properties known as the H. C. Frick Coke Co., at Uniontown, Penn. He was also connected with Mr. Fitzpatrick in building and operating the Shamrock plant in the Connellsville region. Later he sold out his interest with Mr. Fitzpatrick and became an expert consulting engineer and in that capacity was employed by the Virginia Iron, Coal & Coke Co. to inspect and make recommendations in connection with its Toms Creek, Va., plant. He became general superintendent and remained in charge of the plant for 18 months. He left Toms Creek to become general manager of the Crows Nest Pass Coal Co. at the request of James J. Hill. He left the employ of the Crows Nest Pass Coal Co. to become general manager of the Stonega Coke & Coal Co., and allied coal, coke and railroad interests at Big Stone Gap, Va. Later he became vice-president and general manager and held this position at the time of his death.

In the year 1895 he married Elsie Longstreet Eckhard, who is a daughter of Dr. Leighton W. Eckhard, of Philadelphia, secretary of the Pennsylvania Bible Society. He is survived by the widow and two children, Andrew H. Reeder, Jr., and Elizabeth Bayard Reeder.

He was a director of the Virginia Coal & Iron Co., Stonega Coke & Coal Co., Virginia Wholesale Co., the First National Bank of Appalachia, Va., and the Interstate R.R. Co.

CONSTRUCTION NEWS

Gatliff, Ky.—The Gatliff Coal Co. is contemplating the installation of an electric-lighting system for its several mining camps. It will furnish current from its own power plant.

Providence, Ky.—The Providence Coal Co. is having several old buildings torn down, and will replace them with a handsome brick structure which will be used for its offices.

Bakertown, Penn.—The Dravo Construction Co., of Pittsburgh, has just been awarded the contract for the construction of two concrete-lined shafts for the Ford Collieries Co., on its property in Allegheny County.

Canonsburg, Penn.—The Pittsburgh Coal Co. is pushing work on the mine which it is preparing to open at a point on the montour R.R., between Hills Station and Thompsonville. The shaft is now down about 150 ft.

Fayetteville, W. Va.—Work will soon start on a new tipple for the New River Co. at Scarbro to take the place of the one recently destroyed by fire. It is probable that this new structure will be built of steel and that it will be enlarged and improved in many ways.

Jackson, Ky.—The Wolf Valley Coal & Lumber Co. is starting a first-class coal operation near Quicksand, 5 miles from here, and will be ready to begin the shipping of coal within two weeks. Over 100 houses are practically complete, and 100 more are to be built.

Big Stone Gap, Va.—The Stonega Coke & Coal Co. has placed with the J. S. Webster Co., of Middleboro, Ky., and Knoxville, Tenn., representing the Webster Mfg. Co., of Tiffin, Ohio, an order for $12,000 worth of conveying machinery, screens and other tipple equipment for its plant at Keokee, Va.

Williamson, W. Va.—The Tug River R.R., a branch of the Norfolk & Western, will be built from Naugatuck across Tug River and into the coal fields of Blackberry Creek, Pike County, Ky., a distance of 18 miles, construction to be started Mar. 1. A number of coal companies will make developments along the new line.

Hazard, Ky.—The Himyar Coal Co. recently organized here, is getting well under way on a coal operation on the Old Combs coal-land tract three miles above here on the Lexington & Eastern R.R. By Apr. 1, the company expects to be shipping from 30 to 40 tons a day. A first-class electrically equipped plant is being installed.

Point Pleasant, W. Va.—Plans for an extension of the Virginian R.R. by a direct route from the Ohio river to Toledo have been prepared by a firm of Columbus, engineers. The proposed route extends from a point near Point Pleasant, W. Va., in almost a direct line to Toledo. The proposed route is 90 miles shorter than that traversed by any other road from the Ohio river to the Great Lakes.

Whitesburg, Ky.—The Mineral Development Co. makes the announcement that it will start immediately the development of a large coal-land tract in the Colly Creek and Kentucky River sections of the coal fields. Several million dollars will be expended in the development. Two industrial cities, it is announced, will be built. J. L. McCormick, Big Stone Gap, Va., will be at the head of the new development.

NEW INCORPORATIONS

Bicknell, Ind.—The Linn Coal Co. has reduced its capital from $30,000 to $10,000.

Altoona, Penn.—The Munster Coal Co. has been organized here with a capital of $6000.

Coal Hill, Ark.—The Peoples Coal Co. has been incorporated here with Martin Rafter, president, and M. W. Rafter, secretary.

Coalton, Ohio—General offices of the Twin Ada Coal Co. have been removed from Jackson to Coalton, Ohio and combined with those of the Harper Coal Company.

Melbourne, Mo.—The Melbourne Coal Mining Co. has been organized with a capital stock of $3000. The incorporators are B. S. Moulton, A. L. Chambers, and Lewis M. Davis.

Austin, Tex.—The Strawn Coal Co. has been organized at Fort Worth with a capital stock of $500,000 which is all paid in. The purpose of this company is the mining, production and marketing of coal and other minerals. The business is to be transacted in Tarrant, Palo Pinto and other counties, while the principal offices will be in Fort Worth. The incorporators are W. Burton, Paul Waples, L. H. McKee, John L. Johnson and A. Deffebach.

Columbus, Ohio—The Seidenfeld-Hammond Coal Co. has been incorporated with a capital stock of $10,000 to en-

gage in the coal brokerage business. The incorporators are Charles Seidenfeld, E. H. Hammond, Louis M. Seidenfeld, Mary Hammond and W. B. Cockrell.

Charleston, W. Va.—The Lincoln Coal Mining Corporation, of Fairmont, has been organized for the purpose of acquiring coal, oil and gas land and developing the same. The authorized capital stock is $150,000, of which $500 has been subscribed and $100 paid. J. H. Ritchie, J. R. Burns, Chas. S. Windsor, W. C. Devault and C. L. Frost, all of Fairmont, are the incorporators.

Viper, Ky.—The Big Bend Coal Co. has been organized here by J. H. Justice, D. T. Rigby, C. H. Barrowman and B. F. Kaylor with a capital stock of $50,000 for the purpose of starting a coal mining development on Maces Creek. The mining plant will be reached by a short line branch of the Lexington & Eastern R.R. It is expected that the development will be started immediately. J. H. Justice will be manager.

Pineville, Ky.—The Asher Coal Mining Co., of Wasioto, has filed articles of incorporation at Frankfort, with a capital stock of $593,000. The incorporators are T. J. Asher, Robert Asher, H. H. Asher, G. M. Asher, M. Brandenburg and A. J. Asher, Jr. The company owns mines at Tejay, Varilla and Colmar, in the Pineville district, which are now operated by the Southern Mining Co., and controls a large acreage in Harlan County.

INDUSTRIAL NEWS

Hopkinsville, Ky.—Henry Wimberg, of Evansville, Ind., has sold the Waverly coal mine to R. C. Arnold, of Cass County, Mich., the price paid, it is understood, being $42,000.

Washington, D. C.—The Pennsylvania Coal Pillar Law of 1891 requiring pillars to be left along the boundary line of adjoining coal properties was recently upheld as constitutional by the Supreme Court.

Indiana, Penn.—The Operators' Coal Co., of Johnstown, has filed deeds of the purchase of, approximately, 5000 acres of land in East and West Wheatfield townships. The price of this property is placed at $240,000.

Pittsburgh, Penn.—The Epping-Carpenter Co. has just completed an extension to its foundry and machine shops, which enables it to properly care for an increasing business. This is remarkable considering the extreme inactivity in the mine-pump business at the present time.

Frank, Alta.—The big coal mine owned by the Canadian Coal Consolidated Co., which went into liquidation some months ago, has been acquired by a French company composed mainly of the bondholders of the old firm. New capital to the amount of $400,000 has been secured and the mine will shortly be re-opened.

Pittsburgh, Penn.—The Concordia Safety Lamp Co. has established offices in the Manufacturers' Building, this city. The specialty of the new firm will be electric safety lamps and accessories, the equipment of electric-lamp cabins and the general lighting of mines. R. Koch is engineer in charge and William Dominick is sales manager.

Pittsburgh, Penn.—A large pumping boat, the property of the Monongahela River Consolidated Coal & Coke Co., was practically destroyed by fire Feb. 27, entailing a loss of $3000. The boat was moored on the south bank of the Monongahela river near the Point Bridge, and, before the fire was extinguished, was burned to the water's edge.

Philadelphia, Penn.—J. B. Kennerly, a coal operator and shipper, with offices in Philadelphia, has filed a voluntary petition in bankruptcy, giving his liabilities as $603,032 and his assets as $6895. He has been engaged in mining and shipping coal from the Beccaria mine at Glasgow, Penn. E. F. Hoffman has been appointed referee in the case.

Huntington, W. Va.—The Banks Supply Co. has been appointed general agent in this district for the Epping-Carpenter Co. This connection is a valuable one for the supply company, owing to the completeness of the line of mine pumps built by the Epping-Carpenter Co. and the possibilities offered for handling this trade in this immediate vicinity.

Franklin, Penn.—To meet the constantly increasing business of the Lake Erie, Franklin & Clarion R.R., the president of the road on Feb. 28, announced that he would place an order for 100 fifty-ton steel coal cars at an early date. Orders for other new equipment have been placed and it is possible that the road will place another order for coal cars in the near future.

Peace River Crossing, Alta.—An important discovery of coal has been made in the Peace River district, Alberta, where there has been a great influx of settlers. An experienced prospector named Edwards, from Colorado, has located a seam of coal about seven miles from Peace River Crossing, which it is anticipated will be of much advantage to the people of the province.

Waynesburg, Penn.—The report is current here that J. V. Thompson, of Uniontown and associates have closed one of the biggest coal deals ever consummated in Green County. It is alleged that they have sold to H. C. Frick 10,000 acres of coal land in Perry Township at $600 per acre. The tract surrounds the town of Mount Morris and is 8 miles from the Monongahela River.

Victoria, B. C.—A motion of lack of confidence in the conservative ministry was introduced by John Place, of Nanaimo, on Feb. 16, in the Legislative Assembly of British Columbia, and the premier, Sir Richard McBride, replied to the criticisms of the mover. The cause for this action, intended to overthrow the ministry, was the alleged mismanagement of the situation arising out of the Vancouver Island strike.

Connellsville, Penn.—According to the mine inspector's report for the year, 1913, a total of 5,282,264 tons of coal were mined in Jefferson county and 9,065,553 tons in Indiana county. This latter tonnage exceeds by nearly 2,000,000 tons, the production of 1912, while that of Jefferson county is one-half million tons greater than in the preceding year. There were 60 fatal accidents in Indiana, Armstrong, Clearfield and Jefferson counties.

San Francisco, Calif.—The sale of Japanese coal to foreign counties is steadily increasing, one interesting feature of the trade being the demand for the better grades of this fuel on the Pacific Coast. The output of the Fushun mines, in southern Manchuria, has gone as far south as Colombo and India, at the same time the Japanese exporters have largely monopolized the markets in the territory around the Malay Peninsula and in the Philippine Islands.

Philadelphia, Penn.—The injunction proceedings brought in the Court of Common Pleas No. 5 by the Eastern Pennsylvania Co. against the Lehigh Coal & Navigation Co. to restrain the latter from shutting off a water supply from its canal, resulted in a dismissal by the court of the plaintiff's suit. The injunction was contested on the grounds that the power company had no right to a supply of water for condensing purposes, but only for the direct generation of power.

Pittsburgh, Penn.—The Epping-Carpenter Co. has been awarded the contract for 15 large power and centrifugal mine pumps by the New River Co., McDonald, Penn. Randolph & Means, Oliver Bldg., Pittsburgh, Penn., are the consulting engineers. This is the first important high-class installation of efficient deep-mine pumps in the New River district. It embodies a number of novel engineering features that will be of considerable interest to coal operators and mine engineers.

Toronto, Canada—A charter has been obtained by the Pacific, Peace River & Athabasca Ry. Co., for the construction of a line 1500 miles in length, from the mouth of the Nass River, north of Prince Rupert, B. C., eastward through British Columbia and the Peace River country to Prince Albert, Sask., which will open up an extensive coal and mineral area. The chief promoter is D. A. Thomas, of Cardiff, Wales, who proposes to tap the coal deposits more particularly the smokeless-coal areas of northern British Columbia, for the supply of the British navy on the Pacific Coast.

Washington, D. C.—It has been suggested that the situation which might be created, should the plans of various representatives from Pennsylvania, Kentucky, West Virginia and Virginia, to have American coals handled exclusively on the Panama Canal Zone materialize, would cause possible international complications. The plan suggested is to handle American coal only to the exclusion of that of all foreign countries. Under no circumstances, however, will anyone, except the United States, be permitted to control the bins or own any machinery used in coaling ships, as this government has built and owns adequate apparatus of this type.

Hazard, Ky.—At the instance of the leading coal operators and other business men in this vicinity, a bill has been introduced in the Kentucky legislature for the purpose of making Hazard a city of the fourth class, as the town now has more than 3000 inhabitants, with fine business buildings, a $30,000 school, a water-works system, and other metropolitan features. The desire for other improvements, which can be handled much more easily by a city, is responsible for the bill referred to, and it is expected that there will be no opposition to the enactment of the measure.

Coal Trade Reviews

General Review

Heavy snow storm fails to create any activity in the wholesale trade. General tendency is toward lower prices and there is considerable anxiety over the future. Adjournment of the Philadelphia conference stiffened up the market in some districts.

The heavy storm the early part of the week created some uncertainty in the hard-coal market. Prices are fluctuating sharply, and all prompt cargoes available are commanding premiums, due to the slow movement. Although the tendency is undeniably toward a lower price level, the recent severe weather has undoubtedly served to clean up the winter stocks which dealers were beginning to look forward to carrying over into summer. While this will not serve to stimulate immediate business, it will create a more active market when the discount goes into effect.

The bituminous market experienced practically no benefit whatever from the storm while the return of warmer weather has developed further weak spots, and there is a good deal of anxiety over the future. In spite of attractive bargains being offered, the business is unsatisfactory, although some small improvement is noted in the jobbing trade with quotations fairly steady. Reports regarding contracts for the new year are of a conflicting nature. A number of contracts are said to have been closed at concessions on last year's prices, but a more authoritative statement is to the effect that one of the largest bituminous companies has covered practically its entire tonnage on the same basis as last year; in spite of the relatively profitable figures of last year, there seems to be a tendency on the part of the operators to hesitate over closing at these prices, regardless of numerous opportunities to do so.

Quotations are being more stiffly held in the Pittsburgh district, due to a heavier consumption as a result of the colder weather, and also a slightly increased demand from manufacturing sources; operations still continue heavily curtailed, however. A generally better feeling in trade circles, together with the proximity of a possible suspension, has strengthened up the situation in Ohio, and caused an increase in the demand all along the line. The colder weather has enabled dealers to clean up their stocks, while demurrage coal has disappeared almost completely.

The freezing weather has grealy handicapped handling coal at the Hampton Roads piers, with the result that shipments were only fair last week, though increasing toward the end; spot sales continue light, although it is believed that the circular is being firmly held.

A materially stronger situation is noted in the Middle Western market. Mines are only waiting an improvement in transportation conditions, which were nearly demoralized by the recent heavy storm, until they open up full blast. The market was particularly benefited when it was known that the delegates to the Philadelphia conference had failed to reach an agreement and adjourned. This resulted in considerable heavy buying for storage purposes, which, if continued, will create an advance in prices. The renewed activity has injected a better tone generally into the trade, and there is a more hopeful outlook on contracts for the new year.

EASTERN MARKET

BOSTON, MASS.

Soft spots in bituminous appear with the milder weather. Contract basis also shaded. Buyers not much aroused over possibility of suspension in Pennsylvania. Favorable prices held on preferred Pennsylvania grades. Georges Creek firm. Anthracite demand good. April prices announced.

Bituminous—Some soft spots have appeared with the slump in the weather. Certain of the Hampton Roads shippers are shading prices radically in order to make spot sales, as low as $2.70 having been quoted f.o.b. for some of the brands. The contract figure has also been shaded in several instances, and there is a good deal of anxiety over the price outlook. Some fair sized mill contracts have been placed the past week and in each case it is believed at a material concession from $2.85. Obviously the curtailment has not been heavy enough. There is an evident determination on the part of some of the New River shippers to regain tonnage they have lost in other seasons and the campaign is expected to get pretty active in the course of the next few weeks.

Distribution business at points like Boston and Providence continues to show improvement. The smaller consumers find their reserves much depleted by the severe winter and there is a steady demand that keeps quotations on a satisfactory basis.

The possibility of a suspension in the Pennsylvania districts Apr. 1, is not having much effect on the market here. Buyers apparently reason that there will be plenty of coal in any event and they decline to be hurried.

Only a small tonnage of the Pennsylvania grades is coming forward for the tide-water market, and this is pretty well restricted to the quality coals. A better movement is looked for during March, especially if the labor situation looks at all threatening. The favored grades are holding well up on price and $1.50@1.60 at the mine is frequently heard as a season basis. If the mining dispute is settled early these coals will probably hold the tonnage they have gained the past two years.

There is no news on Georges Creek. While output is under curtailment shipments are being made regularly to all points and with prices characterisitically well maintained.

The loss of another coal schooner this week serves to call attention again to the rapid passing of this type of coastwise transportation.

Anthracite—Orders are fairly plentiful for March. Stocks are low in all directions and the outlook is excellent for spring business. The Maine ports that open to navigation early in April are already having supplies railed in from Portland.

Certain of the companies have already announced April prices. Those shippers who did not last year assess the Pennsylvania state tax are now adding a flat 10c. to their last year f.o.b. basis. With a 50c. water freight, upper New York ports to Boston, the price delivered alongside Boston will therefore be $5.35 for stove and egg, $5.60 for chestnut, and $5.10 for broken. Loading at New York has been slow, both on account of ice at the piers and an actual shortage of sizes like broken and stove.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.60	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.85	2.92@3.02	
New York*	2.50@3.05	2.80@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.70@2.85
Boston†				3.73@3.83
Providence†				3.68@3.83

*F.o.b. †On cars.

NEW YORK

Heavy storm ties up transportation the first of the week. Anthracite prices erratic. Surpluses being cleaned up. Bituminous continues heavy.

Anthracite—As a result of one of the worst snow storms in a quarater of a century, occurring just as New York was recovering from the effects of another storm of severe proportions, the hard-coal market is fluctuating uncertainly. Fortunately the latest storm was not accompanied by particularly low temperature. Prices were erratic and fluctuating over a wide range during the early part of the week, spot cargoes being particularly short and commanding a premium. With the crack trains on all the trunk lines running fifteen hours late and all passenger service cancelled over twenty-four hours on the Pennsylvania R.R., the movement of coal was naturally at a complete standstill.

One of the chief advantages of the severe weather on the wholesale trade will be to promote a greater activity in the domestic business after the Apr. 1 discount goes into effect.

The recent heavy demand upon dealers and jobbers will clean up stocks which dealers feared they would have to carry over. Work in the mining regions was restricted somewhat by the holiday last week and some companies also curtailed still further, but mining will probably be up to the full limit of the car supply throughout the current week; with the congested condition of the railroads, however, this will not amount to the full rated capacity by any means.

Although official announcement has as yet not been made, it is understood generally that the circular price on the upper port junior grades, that is those below pea coal, will be advanced 5c. per ton when the new circular goes into effect Apr. 1, this increase being made to carry the new 2½% Pennsylvania state tax. The companies are also notifying many of the large consumers that their allowances on contracts for the steam grades will be materially cut during the new year, this probably being done to secure additional tonnages to apply in the more profitable line trade. The market was exceedingly erratic and uncertain over most of the week, but is probably quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00	$4.60@5.10	$5.05	$4.55@5.05
Egg	5.25	5.25@5.35	5.30	5.10@5.30
Stove	5.25	5.20@5.35	5.30	5.15@5.30
Chestnut	5.50	5.45@5.55	5.55	5.35@5.55
Pea	3.50	3.60@3.75	3.50	3.35@3.75
Buckwheat	2.75	2.75@2.90	2.70@3.45	2.50@2.90
Rice	2.25	2.25@2.35	1.95@2.20	1.90@2.20
Barley	1.75	1.75@1.85	1.70	1.60@1.80

Bituminous—If the recent storm had occurred two months earlier it would have had a beneficial effect on the soft-coal market. As it is, it has only served to cause a great deal of trouble with delayed shipments and other difficulties of all kinds in transportation. In fact, conditions are so unsettled that some operators are encountering both embargoes and demurrage, a rather unusual situation. Operations in the mining fields were, of course, up to the full limit of the car supply during the entire week, but this was far from being the full capacity of the mines. However, there would not have been sufficient demand to justify full operation in any event, and the curtailed production is not liable to result in a shortage.

Some activity in contracts for the new year is being noted, one of the largest companies in the local market having covered most of their production for the year. It is claimed that this business was done at the same relatively high price level as last year; in fact it appears that all companies could contract on this basis if they so desired, but prefer to hold off for the time being.

Prices are fluctuating over wide range as a result of the delays in transportations, but are still nominally quotable on the same basis as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.75@2.80; best Miller Pennsylvania, $3.10@3.15; George's Creek, $3.15@3.25.

PHILADELPHIA

Improved conditions still continue in anthracite. Tidewater business flat, but local demand satisfactory. Bituminous shows little improvement. Demurrage coal cleaned up and curtailed operations keeping output within requisitions. Prices erratic, with tendency to lower levels.

Anthracite—Conditions favorable to the consumption of anthracite still prevail in this locality. All the dealers report trade satisfactory, with duplicate orders coming in, deliveries rather uncertain, owing to the streets being filled with ice and snow. Both the wholesale and retail trade look forward to an unusually satisfactory March. Many dealers have disposed of stocks, which they were fearful of being compelled to carry over into April, and as a result, the wholesale market reflects this in an increased demand. The heavy storm early in the week delayed deliveries and enforced curtailment of work at the mines, owing to the men not reporting for work. The steam sizes are in particularly good demand.

Bituminous—There has been no marked improvement in the bituminous situation. It is understood that most if not all of the demurrage coal has been disposed of, at prices which will about pay demurrage, leaving little for the coal. Owing to curtailed production, the output is being absorbed, in most cases, but it is usually the case that the order must be in hand, before the coal is started to cover it.

BALTIMORE

Soft-coal conditions still unsatisfactory. Anthracite domestic sales large, but light on manufacturing.

The bituminous market here remains unsatisfactory from almost every angle, although there is a note of encouragement in inquiries concerning contract business for the year to come. Spot demand is poor despite attractive bargains that are offered. Considerable coal is reported on track that is not covered, and the outlook for more congestion at tide and on mine sidings is apparent even to the causual observer. Pennsylvania steam coals of the better varieties are in the best demand. Highest grades are only bringing from $1.20 to $1.25, however, and the scale runs down to 90c. in some cases. West Virginias are weak, the better class steam coals being offered at 85c., while gas fuels of the state are down to from 65 to 80 cents.

Loading at the local piers for foreign delivery has been fairly steady. The first part of the week saw considerable trouble in making the loading points by reason of unusually heavy ice in the approaches. Trouble with frozen coal in the cars proved a handicap during the entire week.

The largest anthracite sales of the winter were probably recorded. Every householder seemed to be short of fuel at one time. Those who had depended on going through a warm winter on a shortened supply, were disappointed when the 8° temperatures arrived. All classes of fuel were in call, and there was trouble with delivery between yards and houses, because of urgency of orders. Fortunately there was little or no trouble in the handling of supplies from mine to yards.

An element of much interest to the trade was the announcement that the Baltimore & Ohio R.R. expects to build another giant coal pier here, to be constructed of steel.

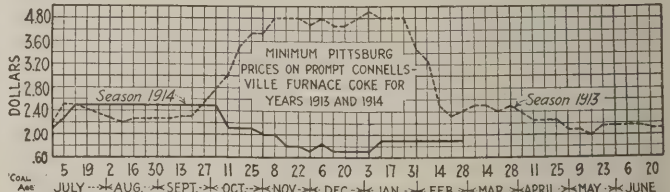
CENTRAL STATES

PITTSBURGH, PENN.

Almost certain prospects of mining suspension for six weeks or longer. No agreement at Philadelphia and no second conference arranged. Coal demand improved by cold weather, producing firmer prices but no heavier operation. Coke slightly firmer. Some stock coke moved.

Bituminous—Last December these reports indicated the prospect that there would be a suspension of mining for six weeks or longer, after the termination of the present wage scale, Mar. 31. There is no reason now to depart from that view. Recently there seemed to be prospects of "continuous operation" pending settlement, but the operators have proved firm in their stand that continuous operation must be coupled with an agreement to submit all the issues to arbitration if an agreement cannot be reached by conference, and it now seems clear that the miners will not submit to this condition.

On the one hand the miners do not want arbitration while on the other hand the operators do not want continuous operation if it is coupled with the prospect of a strike or suspension later, for that would throw such suspension into the lake-shipping season. The Philadelphia conference has adjourned without accomplishing anything, just as was expected. A further conference has not been arranged and it is not even known where it will be held, except that it will probably be at Pittsburgh, Cleveland, or some other point in or near the districts affected, rather than in the East.



The operators appear to be absolutely determined that there shall be no advance in wages, also that the checkoff be discontinued, while as to the Pittsburgh district the attitude is firm that payment must be on a screened and not a mine-run basis. The lake shippers insist that they cannot have the mine-run basis when they are in competition with the nonunion districts for this trade.

The coal market has improved somewhat, chiefly on account of extreme cold weather throughout the consuming markets served by the Pittsburgh district. There is a slight increase in demand from manufacturers and there are some signs of slightly greater demand from railroads, the latter for stocking purposes against a suspension. Mining operations have not increased, being still at 50 to 60% of capacity, but prices are more stiffly held, and the market for spot shipment is quotable at the full circular basis. Some of the operators are beginning to negotiate for contracts for the year beginning Apr. 1 and on this account are particularly interested in seeing prices maintained. The cold weather and heavy snow have interfered somewhat with railroad movement, but in general merely to lengthen the movement rather

than to curtail loading, though here and there slight car shortages have been reported. Circular prices remain: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The Maryland Steel Co. is understood to have purchased 10,000 tons of March furnace coke from each of two interests at $2, and to be in the market for second-quarter coke, but unwilling at this time to pay prices asked, generally above $2. There is a little more March coke to be bought by a few consumers, but negotiations have been proceeding slowly. A few lots of prompt coke have sold at $1.90 and $1.95, but as a rule prompt coke of standard grade is $2. The extreme cold weather and heavy snow has delayed delivery of coke and an unusually large tonnage is in transit, but this condition has not caused much increase in demand for prompt. There has been an increase in the offering of soft coke and high sulphur coke, at considerably below $2. The market stands quotable as follows: Prompt furnace, $2; contract furnace, $2@2.10; prompt foundry, $2.40@2.60; contract furnace, $2.40@2.60, per ton at ovens.

The "Courier" reports the production of coke in the Connellsville and lower Connellsville region in the week ended Feb. 21 at 303,160 tons, an increase of 2910 tons, and shipments at 324,170 tons, an increase of 23,920 tons. The preponderance of 21,010 tons in shipments over production is attributed to the movement of 20,000 tons of stock coke by the H. C. Frick Coke Co., the Steel Corporation subsidiary, as this latter is continually blowing in additional furnaces.

BUFFALO

Anthracite still strong, but not expected to continue so. Bituminous doing somewhat better. Coke still slow.

Bituminous—There is something of a stir in bituminous coal. The demand is not brisk, but slack is moving quite satisfactorily. Consumers are buying heavily of slack, and seem willing to pay a good price for it. The meetings to be taken up at once at DuBois in the Allegheny Valley are expected to further emphasize the fact that the miners and operators are not going to reach an agreement right away. This is really what the operators want and the Buffalo trade is so sure that nothing will be accomplished that they are ignoring the meetings. The plan is to shut down on Apr. 1 anyhow. Even if there are no disputes with the men there are always many repairs to make which will keep the mines idle until there is again something in coal.

It is not likely that the improved demand for coal will oblige many of the mines to remain at work and the consumers are beginning to realize that coal will be decidedly scarce if the operators stick to their present plan long enough. It is in reality the only chance of bringing prices back to a paying basis.

Bituminous prices are somewhat stronger on the basis of $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, with the latter much more active than the sizes. There is a fair demand for Allegheny Valley coal, with slack about on a par with Pittsburgh and sizes about 5c. lower.

Coke—All effort to create a stir in the coke market has failed. The demand is not equal to the natural supply and the members of the trade say that the furnaces must run more actively than at present before there is any improvement. Prices continue to be based on $4.50 for 72-hr., Connellsville foundry, with stock coke rather scarce.

Anthracite—The demand is good. Shippers do not report such a rush as took place at the beginning of the cold spell, but February will be recorded as a good anthracite month, making up in large measure for the slackness in the early part of the winter. There is no movement in coal loading in the harbor. The shippers have no surplus and may not do any further loading until well into March, especially if there is prospect of a considerable surplus at upper lake points on May 1.

COLUMBUS

Buying increasing and price-list well maintained. Tendency on the part of large steam users to stock up. Predictions of a suspension running from 30 to 90 days. The severe snow-storm delays the movement.

There is a better feeling in coal circles generally, due to the increased demand for all sizes and the proximity of the expected suspension. Prices at the circular figures of Jan. 15 are holding well and there are few cases of cutting to dispose of stocks; demurrage coal is gradually disappearing from the market. Operators are expecting a better trade from now on, especially for stocking purposes.

It is almost a foregone conclusion that there will be a suspension of from 30 days to three months and this fact is beginning to be realized by large steam users. As a consequence they are placing orders for stocking purposes and this business is expected to be one of the big features during March. Railroads have already stocked up and are gradually accumulating surpluses for at least 60 days.

The domestic demand is one of the features of the market. Dealers have been enabled to move their large stocks and in some cases were compelled to place small additional orders. While they are still inclined to "clean up" rather than to stock up, still they have been compelled to buy to a certain extent. They have had a good demand for the better grades such as Pocahontas and re-screened varieties. The icy streets have made it difficult for dealers to make time in deliveries. This fact has mitigated against a larger volume of trade.

Operations have increased, but congestion on all coal-carrying railroads has had a bad effect. The Hocking Valley reports about 70% of normal and the domestic fields of Jackson and Cambridge report about the same. In eastern Ohio where the car shortage, caused by the severe snow storm was the worst the output was only about 55 to 60%. In the Pomeroy Bend field it was about 85%.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50 @ 1.40	.....	$1.50 @ 1.45	$1.50 @ 1.40
¾ inch	1.35 @ 1.30	$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.30
Nut	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.80 @ 0.75	.....	0.85 @ 0.80	0.75 @ 0.70
Coarse slack	0.70 @ 0.65	1.00 @ 0.95	0.75 @ 0.70	0.65 @ 0.60

CLEVELAND

A recurrence of stiff winter weather and light receipts of coal gave the market a stronger tone. Fairmount operators have sold large tonnages at low prices the last week for delivery up to Apr. 1. Semibituminous domestic coals are in good demand.

The rough weather of the last two weeks caused a lighter production of coal in Ohio, which was felt at the opening of this week.

Middle district operators are holding coarse coals at an advance of 10c. over the spot market, while No. 8 operators are asking $2.05 f.o.b. Cleveland, for three-quarter coal. Ohio producers are looking for higher prices up to Apr. 1, when they fully expect the mines to close temporarily.

Fairmount operators have sold large tonnages of three-quarter coal for delivery during the next thirty days at 75c. at the mines or $1.90 f.o.b. local yards. The West Virginia agencies are so anxious to sell that they have given options on tonnages of 75,000 to 100,000 tons for shipment in equal weekly amounts up to Apr. 1. The options were for a week and expired Mar. 1.

The demand for Pocahontas lump and egg is brisk and retailers have been running low on these coals. Hard coal is plentiful, but not so much so as to become a burden on the market. Dealers are taking just enough to fill immediate orders. The demand for anthracite will not be heavy until the last of the month when shippers will begin to place coal at the summer circular. The old stocks will be well cleaned up.

Spot sales Monday were 5c. higher on many grades of coal as compared with Friday and Saturday of last week. Spot sales at the opening of the week were as follows:

	No. 8	Middle District	Pocahontas
Lump, 1¼ in.	$2.00@2.05	$2.00@2.20	$3.60@3.65
Lump, ¾ in.	2.00@2.05	1.95@2.05	
Egg	.....	.....	3.60@3.65
Mine-run	1.90@1.95	1.85@1.90	2.75
Nut	1.95@2.00	1.95@.200	
Slack	1.95@2.00	1.85@1.90	2.60

DETROIT

Colder weather has cleaned up the surpluses. Movement somewhat delayed.

Bituminous—There is little free coal on track and the surplus is reduced to the minimum. The movement during the past week has been heavy, although the situation cannot by any means be described as active there is nevertheless a large number of inquiries which will result in a heavy volume of business. Cars are in full supply, but the movement from the South has been temporarily delayed by the heavy weather.

The colder weather arrived too late to be of any great benefit to operators, the spring discounts now being too near at hand, but nevertheless it is resulting in a sharp decrease in the supplies of domestic coal on hand. With the market heavily congested with coal this is coming as quite a relief. Steam coal seems to be about holding its own at a relatively low level. One of the adverse conditions in the local situation is the tendency on the part of some agencies to force business by offering ridiculously low prices. Such a condition usually prevails with the approach of the spring discount period, but it seems to be particularly aggravated at the present time. Slack coal is under particularly heavy pressure.

Anthracite—With large consumers compelled to wait their turns for shipment, the situation in anthracite has taken a decided turn for the better, and indications are that the jobbers will now be able to clean up their winter supplies, and may even be forced into the market again before Apr. 1.

Coke—The coke market has improved, Connellsville now being quoted $3, Solvay $3.25, and gas house at $2.90, all f.o.b. ovens.

HAMPTON ROADS

Week's dumpings fair. Some slight improvement in demand both coastwise and foreign.

Shipments from Hampton Roads have been fair, the heaviest movement being made toward the end of the week. Weather conditions have greatly handicapped dumpings at the piers the coal being badly frozen in the cars and requiring considerable extra labor to get it out.

Spot sales still continue light and while there have been a few large sales suppliers decline to say at what price shipments were made. It is claimed, however, that there has been no cut in the circular price of $2.85 per ton on the run-of-mine Pocahontas and New River.

Export shipments for the week have been to Genoa, Rio de Janeiro, Havana, Kingston, Canal Zone, Bridgetown, Cerea and Dakar.

While figures showing dumpings for the various piers are not yet obtainable the indications are that the dumpings for February, 1914, will fall behind the 1913 figures. It is probable that the Virginian Ry. will fall off about 45,000 tons while the Chesapeake & Ohio Ry. will practically hold its own. It is expected the Norfolk & Western will fall behind to some extent but hardly as great as the other two roads. Some of the dumpings which will be made early in March should really be credited to the February account as vessels have been delayed by the bad weather and have run over into that month when they were actually due in February. The demand, too, on account of the mild winter, has been lighter than last year.

LOUISVILLE, KY.

Continued wintry weather and active domestic demand have brought the retailers into the market. Prices have not advanced, the average still ruling below circular quotations.

With unbroken winter weather lasting two full weeks, the active demand experienced from domestic consumers has resulted in a reduction of retail stocks to a point where dealers have been forced to order fresh supplies, for about the first time this winter. Retailers waited until the last possible moment in the hope that the weather would break, but were disappointed in this, and the demand for coal has been rather urgent. The operators have, therefore, again been able to resume full-time operations, and heavy shipments are the rule. Agents and traveling salesmen find orders plentiful.

While the regular circulars for March delivery have been issued, it would be difficult to find anybody who takes these prices seriously. No advance over the low prices which have prevailed lately has been made, the situation being somewhat too delicate to risk scaring the retailer off, although with the domestic demand as heavy as it has been recently, the buyer would not be inclined to quibble about prices.

The steam market is about stationary, although the greatly increased quantities of screenings now available will probably affect the market adversely. This is not evident as yet, however, the better grades of screenings being in fair demand at 75 to 85c. The renewed supply of screenings has rendered practically unsalable the mine-run coal on tracks in Louisville. This grade was shipped in to fill the gap caused by the scarcity of screenings, as well as to give the mines something to do.

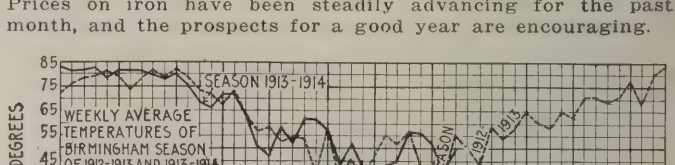
SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM, ALA.

Steam and domestic coal improved slightly. Furnace and foundry coke quiet and blacksmith normal. Large sales of pig iron.

Due to the real winter weather this past week, accompanied with snow and sleet as far south as the Florida line, domestic lump coal shows some improvement, both in the volume of business and prices. Steam coal, while slightly better than for the past two or three weeks, is still far from being satisfactory, and while the prices are remaining about stationary, the orders are not coming in as fast as could be expected at this season. Blacksmith coal seems to be holding its own in a satisfactory manner. Both furnace and foundry coke are quiet, with small sales.

Furnaces again report a large tonnage of iron sold, with prices pushing the $11 mark for 2 Foundry, f.o.b. Birmingham. Prices on iron have been steadily advancing for the past month, and the prospects for a good year are encouraging.



NEW ORLEANS

Coldest weather of winter brings wave of good business. Reduced prices still apply. Large consumers believe bottom has not been reached and are withholding purchases.

Descent of the coldest weather of the winter last week helped materially in the moving of the large piles of coal, which, it was feared, would have to be carried over. Stocks are still too large for this season and the recent price cut is still in force; the fact that the larger consumers do not believe that the bottom has been reached is retarding any heavy purchases of coal at this time.

Never before has the efficiency of motor-driven delivery been proven so satisfactory. With the coming of the cold weather orders appeared in such numbers that no dealer was able to handle all the business promptly, but those having auto trucks saved a good percentage of their costs owing to the rapidity with which the deliveries were made.

This late in the season the cold weather came as a surprise and most of the orders were small; it was not unusual to have to deliver three separate orders to the same house. Orders were accepted only on the basis of sidewalk delivery. During the past two weeks more coal has been delivered in the city than ever before in the same length of time.

INDIANAPOLIS

Snow blockade interferes with freight traffic on railroads, causing mines to fall behind on orders. Situation being rapidly relieved. Severe weather cleaned up stocks of Indiana coal, but Eastern supplies hold out. Railroads and factories stocking up. Prices generally unchanged but satisfactory. Demand for screenings and steam grades not well supplied.

Indiana mines will run full schedule as soon as railroads can handle mine shipments. The blockade by the heavy snow has been such as to almost shut off freight traffic. Mines have plenty of orders. Retail yards have been well cleaned up of Indiana coal during the zero temperatures of the last two weeks. The mines are far behind orders, but expect to catch up rapidly when the car situation is relieved, as the roads promise to give this traffic special attention. Users of screenings and steam grades have been rather scantily supplied.

During this stress of heavy consumption, the demand for Eastern coal has been satisfactorily filled, due to the large stocks piled up in the fall. Indiana coal cannot be stored this way and it has been difficult for retailers to keep up supplies. Railroads and other large consumers of steam grades have continued to stock up against any shut-down, should the operators and miners fail to reach a wage agreement. February was by all odds the best coal month of the season, but March promises to be equally as good. Prices have not been advanced, but mines are getting top figures. Where a buyer has to go to the open market he has had to pay a slight premium the last few weeks. Generally speaking there has been no quotable change either at the mines or yards.

CHICAGO

Continued cold weather and severe storms throughout Illinois and Indiana result in a considerable improvement. The possibility of a mine suspension also helped support the market, dealers taking advantage of present conditions to stock up.

A large factor in the market was the disposal of demurrage coal, but this centered principally around low priced fuels. While obtaining closer to circular prices than for the last two months, producers see no prospect of any increase in the circular. As the result of a limited supply of fine coal, screenings are approaching the mine-run price, there having been an increase of from 5c. to 15c. a ton and the upward trend still evident.

Storage piles of retailers are rapidly being depleted and there is need for additional coal to carry them through March, but they desire to start April with a new stock. This condi-

tion of affairs means that dealers are willing to take 30- or 35-ton cars, but not more unless the April discount be attached to at least a part.

Improvement is seen in the Hocking situation with the demand accelerated by the cold weather. Prices are steady at $1.50 a ton. Some anxiety had been felt regarding the splint situation owing to the fact that Eastern operators persist in sending stock in large open cars whereas the demand is for small cars. With a cleaning up of accumulations, however, conditions have become better with prices at from $1.25@1.40 a ton. Conditions are somewhat better in the Franklin County field and the Carterville market with the recent low prices withdrawn. An improved demand for domestic coke resulted in a stronger market.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07@2.17	$2.55@2.65	$2.12@2.27	
Steam lump	1.97		1.97	
Egg		2.55@2.65		$4.30
Mine-run	1.87	2.20@2.25	1.87	3.45
Screenings	1.67	1.90	1.62	

Coke—Connellsville, $5.25@5.50; Wise County, $5@5.25; by-product, egg and stove, $4.90; byproduct, nut, $4.75; gas house, $4.50.

ST. LOUIS

Improved tone in the local market. Large operators attempting to keep the mines working. Considerable buying in anticipation of a suspension.

The local market is in an optimistic mood at this time and has been since the conference adjourned at Philadelphia. The big operators of St. Louis do not want a strike or suspension as they hope to force the little operator out of the coal game. This seems to be the general opinion. The little operator, however, is playing his hand well and will force a suspension if such a thing is possible.

During the past week between four and seven hundred cars of railroad coal was purchased over and above regular requirements. A few steam plants have put in from ten to forty cars for storage coal, but there was no general demand up to the early part of the present week for storage coal.

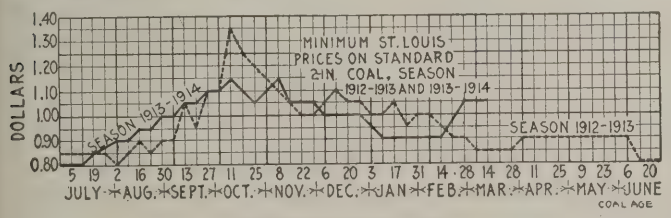
By Thursday or Friday it is likely that the market will rise considerably on account of the concentration of buying power. This is explained by the fact that big companies are buying in five- and ten-car lots in order to keep the market from getting away from them. So many companies practicing these tactics will have the same effect as if they went into the market and bought their entire requirements.

Screenings are still in good demand, Carterville at from 75c. to 80c. with chances of going to $1, and Standard at about 60c. to 70c. and lined up for an advance. The sized coals have not changed much since last week, but the market is liable to take an upward turn daily, and for that reason a conservative price list is maintained.

There is no demand for smokeless, coke or anthracite. The washed market is strong on Nos. 3, 4 and 5, with little demand for Nos. 1 and 2. There is a car shortage to some extent on the C. & E. I. and I. M., but nothing serious. Movement of coal is better and transportation facilities easier.

The market continues quotable as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	.....	$1.05 @ 1.10	$1.15
3-in. lump	.....	.....	$1.40	.....	.....
6-in. lump	$1.25 @ 1.50	.....	1.50	1.25 @ 1.35	1.25
Lump and egg	1.85 @ 2.15	2.15	.....	.....	1.15
No. 1 nut	1.20 @ 1.40	.....	.....	.....	.....
Screenings	0.80 @ 0.85	.....	.....	0.55 @ 0.60	0.60 @ 0.65
Mine-run	1.10 @ 1.20	.....	.....	.....	.....
No. 1 washed nut	1.50 @ 1.60	2.25	1.50	.....	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.75 @ 0.80	.....	.....	.....	.....



KANSAS CITY, MO.

Return of milder weather and mine operations have again slackened up. Market steady but at a relatively low level.

Mining operations in the Southwest have again slackened somewhat after a brisk month. The weather has taken a turn for the better, from the standpoint of the consumer, and coal is moving correspondingly slower. The end of February saw a shortage of cars, due partly to the heavier movement, but chiefly to a blizzard which swept through the Southwest, demoralizing transportation. The trouble was short-lived and caused only temporary inconvenience.

Mines are now producing about 75% capacity, and the market is steady at bed-rock prices.

PORTLAND, ORE.

Mild weather continues and demand for coal remains light. Hopes are entertained that railroads will grant reduction in rates to Portland.

This is about the mildest winter experienced in the Pacific Northwest for many years and consequently the demand for coal for domestic purposes has been and still continues light as compared with former winters. Only for a few hours has the thermometer dropped to the freezing point and there has been practically no snow. The dealers, however, say that while the consumption per capita has been light this winter, it is steadily increasing on the whole, and this in spite of the rapid introduction of fuel oil.

PRODUCTION AND TRANSPORTATION STATISTICS

Suspension Docket No. 331—Alexandria, Va., switching Charges.

Proposed increase in the switching charges on coal and coke by the Southern Railway Co. from the Potomac yard, near Alexandria, Va., to Alexandria proper, not justified, but a maximum charge of 20c. per net ton established for the future.

BALTIMORE & OHIO

The following is statement of coal and coke tonnage moved over this system and affiliated lines during the month of January, 1914, and for the corresponding month of the previous year:

	1914	1913
Coal	2,917,834	3,003,404
Coke	274,955	439,176
Total	3,192,789	3,442,580

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for January of this year and last year in short tons:

	January	
	1914	1913
Anthracite	915,027	1,014,259
Bituminous	4,117,514	4,210,196
Coke	853,412	1,288,514
Total	5,885,953	6,512,969

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during January, as compared with corresponding period of 1913 in short tons:

	January	
Coal	1913	1914
Tidewater, foreign	144,062	151,315
Tidewater, coastwise	308,918	337,654
Domestic	1,616,894	1,364,229
Coke		
Tidewater, foreign	143,196	114,776
Domestic	5,055	.....
Total	2,218,125	1,967,974

THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Feb. 14, as follows:

	Surplus	Shortage	Net*
New England Lines	2,313	0	**2,313**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	20,190	0	**20,190**
Ohio; Indiana; Michigan; Western Pennsylvania	39,580	0	**39,565**
West Virginia, Virginia, North & South Carolina	4,982	15	**4,982**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	4,641	0	**4,641**
Iowa, Illinois, Wis., Minn.; North & South Dakota	4,486	24	**4,462**
Montana, Wyoming, Nebraska	1,685	0	**1,685**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,869	0	**2,869**
Texas, Louisiana, New Mexico	347	0	**347**
Oregon, Idaho, California, Arizona	3,682	200	**3,482**
Canadian Lines	0	0	0
Total	84,775	239	**84,536**

	Oct. 15	Nov. 1	Nov. 15	Dec. 1	Dec. 15	Jan. 1	Jan. 15	Feb. 1
Surplus	6,014	6,720	10,520	17,621	36,435	72,535	87,149	85,489
Shortage	12,502	12,595	8,477	5,095	2,295	57	789	102
Net*	6,488	5,875	**2,043**	**12,526**	**34,140**	**72,478**	**86,360**	**85,387**

***Bold face** type indicates a surplus.

GREAT LAKES

The "Marine Review" reports the gross coal trade on the Great Lakes for the past three years as follows in short tons:

	1911	1912	1913
Anthracite	3,917,419	4,204,741	5,033,696
Bituminous:			
Pittsburgh, district	10,611,941	11,300,000	13,415,473
Ohio	4,019,544	4,676,000	6,176,624
West Virginia	7,151,200	7,360,000	8,736,586
Total bituminous	21,782,685	23,336,000	28,328,683

The total of all kinds in 1913 was 33,362,379 tons, which is the heaviest season business ever reported. The Pittsburgh district kept its position as the leader in supplying Lake coal.

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for December, 1912-13, and for the 12 months ending December, 1911-12-13, in long tons:

	12 Months			December	
Imports from:	1911	1912	1913	1912	1913
United Kingdom	9,278	8,697	6,141	2,403	812
Canada	980,174	1,404,139	1,096,924	109,723	116,944
Japan	16,031	30,621	117,483	4,958	18,046
Australia and Tasmania	232,969	162,671	188,613	10,743	27,859
Other countries	356	2,222	4,696	20	1,400
Total	1,238,808	1,608,350	1,413,857	127,847	165,061
Exports:					
Anthracite					
Canada	3,498,980	3,615,530	4,083,333	278,350	219,422
Hungary	.....	.....	84	.....	84
Other countries	55,019	73,259	70,969	5,481	6,885
Total	3,553,999	3,688,789	4,154,386	283,831	226,391
Bituminous,					
Canada	10,609,587	10,433,010	13,496,190	594,309	746,890
Panama	496,830	486,309	489,761	39,332	37,210
Mexico	470,674	302,487	477,046	33,480	37,619
Cuba	1,053,703	1,152,004	1,275,538	118,784	74,580
West Indies	565,822	651,268	608,762	48,211	60,308
Argentina	.....	.....	70,048	.....	.....
Brazil	.....	.....	279,933	.....	29,270
Uruguay	.....	.....	16,858	.....	11,695
Other countries	682,138	1,434,900	1,272,621	76,109	132,404
Total	13,878,754	14,459,978	17,986,757	910,225	1,129,976
Bunker coal	6,667,338	7,340,100	7,700,520	578,667	607,249

FOREIGN MARKETS

GREAT BRITAIN

Feb. 13—The market continues generally firm for prompt loading. For forward positions, buyers are holding off. Tonnage is being somewhat delayed by stormy weather, but at present this is not having any effect—most collieries having sufficient ready steamers to keep them fully employed. Quotations are approximately as follow:

Best Welsh steam	$4.50	Best Monmouthshires	$4.20
Best seconds	4.38	Seconds	4.05
Seconds	4.29	Best Cardiff smalls	2.73
Best dry coals	4.38	Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

British Exports—The following is a comparative statement of British exports for January of the last three years, in long tons:

	January		
	1912	1913	1914
Anthracite	241,924	298,308	269,871
Steam	3,945,278	4,417,993	4,231,381
Gas	827,198	901,364	885,713
Household	139,679	145,726	131,714
Other sorts	267,096	306,927	276,091
Total	5,421,175	6,070,318	5,794,770
Coke	113,871	107,095	124,256
Manufactured fuel	148,932	196,739	169,945
Grand total	5,683,978	6,374,152	6,088,971

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follows; complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

The chief owner and manager of a tramways company in a foreign country informs an American consulate that he desires to import American coal. He is chiefly interested in Pocahontas and Georges Creek coal. The inquirier uses about 1600 tons of coal annually and desires to establish coaling stations at several points. He is reported to be able to finance such undertakings, as he is the largest private employer of labor in the country in question. All communications should be addressed to the consul who forwarded the information. No. 12,513.

SOUTH WALES EXPORTS

In the South Wales ports about 35,000,000 tons of coal are loaded annually, of which more than two-thirds is handled at docks in the Cardiff customs district. The great rise and fall of tide compels all ships to enter locked-in docks; these being excavated in level plains compel the use of expensive and elaborate appliances for lifting the coal from the dock over the vessel's side to the hatchway. The haul from the mine rarely exceeds 20 miles, and the cars carry 10 to 12 tons, tare being 6 to 8. All loading appliances are fitted for these weights.—"Daily Consular and Trades Reports."

COAL SECURITIES

William J. Hoey reports the market on various coal securities for the week ending Feb. 28, as follows:

Stock	Bid	Asked	Stock	Bid	Asked
American Coal	80	95	Jef. & Cle'fd. C. & I. Pfd.	75	85
American Coal Products	83	84	Kentucky Block Cannel	40	60
Amer. Coal Prod. Pfd.	104	106	Lehigh Valley Coal Sales	185	195
Big Muddy Coal & Iron	75	100	Leh. & Wilkes-Bar. C. Co.	300	350
Burns Bros.	50	53	Mahoning Coal R. R.	700	750
Burns Bros. Pfd.	94	99	Mahoning Investment	73	78
By-Products Coke	112	116	Maryland Coal of Md.	3	6
Central Coal & Coke	80	86	Maryland Coal of W. Va.	7	9
Central Coal & Coke Pfd.	78	86	Maryland Coal of W. Va. (5% Bonds)	54	62
Chicago Lumber & Coal	50	56	Midland Coal	80	90
Chicago Wil. & Ver. Coal	25	32	N. Y. S. & W. C. Pfd.	15	30
Colo. Fuel & Iron Pfd.	140	160	Pocahontas Con. Collieries	92	101
Cumberland Corporation	10	14	Pocahontas Con. Coll. Pfd.	98	105
Cumberland Corp. Pfd.	40	43	Texas & Pacific Coal	97	101
Del. Lack. & West. Coal	260	270	Unite Coal of Pittsburgh	3	9
Elkhorn Fuel	4	10	Victoria Coal & Coke Pfd.	40	80
Elkhorn Fuel Pfd.	55	70			
Hocking Valley Products	1	4			

Bonds	Bid	Asked	Bonds	Bid	Asked
By-Prod. Coke, 6's, 1930	100	102	New Mex. Ry. & C'l 5's 1951	96	99
Carnegie Coal, 5's, 1917	98	101	New Riv. (Coal) 1st, 5's, 1934	75	83
Consol. Coal, Conv., 6's, 1923	100	102	Pleas. Val. C., 1st, 5's, 1928	88	92
Consol. Coal, Ref. 5's, 1950	88½	91	Pocah. Collieries, 5's, 1937	94	98
Cumberland Corp., 6's, 1915	97	99	Pocah. Con. Coll., 5's, 1957	85	87
Erie-Pa. C. Col. Trust, 4's, 1951	90	91½	Solvay Collieries, 5½'s, 1931	96	99
Fairmont Coal, 5's, 1931	93	96	Sunday Creek Co., 5's, 1944	58	64
Lack. Coal & Lum., 6's, 1961	57	59	Vic. Am. F. 1st, & Ref. S. F. 6's, 1940	90	100
Monongа. Riv. C., 5's, 1945	92	95	Vic. Fuel 1st S. F., 5's, 1953	75	90
N. Mex. Ry. & Coal, 5's, 1947	96	99	Webster C. & C. 1st, 5's, 1942	79	84

No Important Dividends were announced during the week.

Central Coal & Coke Co.

President Chas. S. Keith, in the annual report for the year ended Jan. 1, 1914, says in part as follows:

During the past year we have arranged for the funding of the bills payable of the Central Coal & Coke Co., and provided for the construction of a new sawmill in Texas, by organizing the Delta Land & Timber Co. for that purpose. The coal company owns the stock of the Delta Land & Timber Co., and the Delta Land & Timber Co. in turn owns all the timber and lumber properties of the Central Coal & Coke Co. This transfer was completed in January, and will be shown on our annual statement for the year 1914.

At the present time all but $430,000 of the bills payable of the Central Coal & Coke Co. have either been paid, or we have the funds in the bank to cover payments coming due during this month, and possibly by the middle of next month the coal company will have taken care of all its bills payable.

The new sawmill will probably be in operation by January 1 next, from which time the company should take from this property in the way of earnings and depreciation an average of $500,000 per annum, in addition to its present earnings and charges.

The net earnings for the year were $544,044, as compared with $631,508 in the previous year. The comparative statement of earnings follows:

	Credit		Debit		
	1914	1913		1914	1913
Wholesale coal dept.	$490,742	$448,801	Mining dept.	.....	$33,807
Retail coal dept.	28,124	52,654	Roy cred coal lds	$126,663	107,655
Washer	3,551	18,444	Roy cred timb lds	339,865	253,678
Mining store	139,871	132,903	General expense	88,818	81,492
Wholesale lum.	305,804	363,496	Int. on bonds	72,990	78,596
Carson mill	169,275	93,586	Dep. on wash prop.	4,008	4,008
Keith mill	96,503	113,582	Dep. on mil prop	33,986	36,239
Miscellaneous	22,554	41,811	Dep. motor trucks	4,544	.....
Rentals, coal department	31,493	.....	Int. on exchange	73,041	38,291
Total	$1,287,922	$1,265,279	Total debit	$743,918	$633,770
			Net earnings	544,004	631,508

Note—For the previous annual report of this company see Coal Age, Vol. 3, p. 628.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 11
Issued Every Saturday
Hill Publishing Company

NEW YORK, MARCH 14, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Mining Coal in Great Britain



Cadeby Colliery, Yorks, England.



Barsteel Heavy Haulage Locomotive

4 Features of Baldwin-Westinghouse Barsteel Electric Mine Locomotives That Assure Maximum Tonnage with Least Expense

The Cast Steel Bar Frame which gives great strength with least weight; permits easy access to, and excellent ventilation for the motors.

The Vauclain Removable Gib which greatly facilitates the removal of journal boxes and permits inspection or replacement of all wearing parts with a small cost of time and labor.

The Oil and Waste Lubricating System for the motors, with specially designed bearings for long life in service, which has been adopted as a standard after years of investigation.

The Commutating-Pole Motors which insure sparkless commutation at all loads. As a result, the commutator and brushes are long lived and require little attention, brush renewals are seldom required, and carbon and copper dust inside the motor is practically eliminated.

These features are but few of many which have been incorporated in Baldwin-Westinghouse **Barsteel** mine locomotives in order to give the user the greatest possible service. You can obtain them only when you specify Baldwin-Westinghouse.

Address either company for full information.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MARCH 14, 1914 NUMBER 11

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 433

The Motive. Poem by Berton Braley.

*AUTOMATIC ARRANGEMENT FOR RAISING END GATES ON MINE CARS: *Page* 434

*PLUMB-BOB HOLDER FOR TRANSIT LEG: *Page* 435

*A USEFUL HITCH: *Page* 435

*SCALE REMOVED BY GRAPHITE: *Page* 435

*SOME EFFICIENT COMPRESSED-AIR PLANTS IN COAL MINES: *Pages* 436-439

Four plants in the anthracite region of Pennsylvania are here described which, by comparison with many installations of a similar character and made for a like purpose, may be truly said to be efficient. S. W. Symons. COAL AGE, Vol. 5.

THE PITTSBURGH COAL BED: *Pages* 440-442

A description of the Pittsburgh coal seam in all the four states in which it makes its appearance. The author, in drawing his statements from various official sources, enables us to get a good idea of the seam as a whole. W. G. Burroughs. COAL AGE, Vol. 5.

REPORTING ON COAL PROPERTIES: *Pages* 442-444

A report should tell the person who is to receive it all that he needs to know, and no more. A busy man won't read a long disquisition even about his own property, and may be unwilling to hunt up all the abstruse terms the engineer may choose to use. Frank Haas. COAL AGE, Vol. 5.

PULVERIZED COAL: *Pages* 444-445

*SAFETY-FIRST SIGNS: *Page* 445

AN ANALYSIS OF THE COMMERCE LAW: *Pages* 446-448

There are probably few shippers who have little more than a mere superficial knowledge of the "Act to Regulate Commerce." In order to make the measure effective in all its ramifications it was necessary to embody many unusual provisions. Thus the railroads are not the only ones who may be culpable of infringement of the law, and the incautious shipper would do well to post himself on its intricacies. Sydney A. Hale. COAL AGE, Vol. 5.

BOOK REVIEWS: *Page* 463

COAL AND COKE NEWS: *Pages* 464-467

SNAPSHOTS IN COAL MINING: *Page* 449

Miscellaneous views of surface and underground equipment gathered from all parts of the world.

WAGE NEGOTIATIONS IN CENTRAL PENN.: *Pages* 450-451

Letters submitted to the miners' scale committee by the Bituminous Operators of Central Pennsylvania. They refuse to consider the check-off and request a reduction of 10 per cent. in wages. COAL AGE, Vol. 5.

THE SLACK-COAL PROBLEM IN COLORADO: *Pages* 450-451

REVERSING FANS AT COLLIERIES: *Page* 451

*CLEANING ANTHRACITE BY THE HUFF ELECTROSTATIC PROCESS: *Pages* 452-453

An adaption of ore-treating methods to the cleaning of anthracite coal. An experimental apparatus on a small scale, which has given satisfactory results. A high efficiency is obtained, while operating and maintenance costs are moderate. Future developments along this line will be watched with interest. H. P. Withington. COAL AGE, Vol. 5.

MINERS UPHOLD LINKER DOCKING LAW IN PENN.: *Page* 454

RECORD OUTPUT OF PENN. MINES: *Page* 454

EDITORIALS: *Pages* 455-456

Pertinent Supreme Court Decision—A Lean Winter for the Coal Companies—The British Fatality Rate—Arbeitswillige.

D. A. THOMAS BACK AGAIN: *Page* 457

DISCUSSION BY READERS: *Pages* 458-460

An Acknowledgment—*Longwall Mining Methods. Letter No. 7—A Plea for the Mine Foreman—Liquor and Safety in Mining—Mine Legislation, Ohio—Mine Legislation, Arkansas.

STUDY COURSE IN COAL MINING: *Page* 460

INQUIRIES OF GENERAL INTEREST: *Page* 461

*Mensuration, Sphere—Study Question, Ventilation.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 462

COAL TRADE REVIEWS: *Pages* 468-472

ADVERTISING INDEX: *Page* 24

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

A Modern Pair Of Twins

The Weekly Ad-Talk Page

"In one sense, advertising and salesmanship are twin sisters. I do not know the girls apart. The one that is nearest I love best"

So says Elbert Hubbard, the man who put East Aurora on the map.

But it is only within recent years that advertising and salesmanship have gone hand in hand. Many of you can look back to the days when it was considered unethical for a reputable house to advertise —when the quacks and charlatans had it practically all to themselves.

Quite a contrast is the situation today—"Let the buyer beware" brand of advertising replaced by good honest salesmanship-advertising, the kind which not only creates the desire but which instills confidence as well.

More goods, today, are sold than are bought.

Why? Because the buyer has more confidence in salesmanship—also because the manufacturer is putting more salesmanship in his advertising copy.

And that is exactly what is making your technical journal more valuable to you—the fact that there is real salesmanship copy in the selling section.

What a slow and uncertain process it would be for you to find the right equipment for every job if you could not depend upon the printed advertisement to help you get what you want.

But you can *depend* upon the advertisers in COAL AGE. They are reliable. They could not stay in the paper if they were not. Their messages are free from misstatements, boasts, exaggerations and knocking—all of them conforming themselves to the "Hill Advertising Code," peacefully and agreeably.

Let, then, this be your first meeting place with the manufacturer who is to furnish any part of your equipment, today or tomorrow.

Pin your faith to the advertiser who stays before you *constantly* in the Selling Section of COAL AGE because *"Only reliable goods can be continuously advertised."*

COAL AGE

Vol. 5 NEW YORK, MARCH 14, 1914 No. 11

The Motive

By Berton Braley

Written expressly for Coal Age

We go below in the shakin' cage
To drill an' cut the coal,
To shoot an' load for our daily wage
An' work like a bloomin' mole,
An' why do we take the chanct of damp,
An' the chanct that the roof will fall?
An' why do we tote a miner's lamp?
Fer the wife an' the kids—that's all?

The boss he plans an' the boss he frets
At tryin' to "make her pay,"
He thinks an' schemes for the wealth he gets
From the depths of the mine each day,
An' why does he drive us for all he's worth
An swear that our work is small,
An' why does he want to own the earth?
For his wife an' his kids—that's all!

The Irish fight with the Hun and Wop
And the English scraps the Russ,
An' the oaths an' grumbles never stop
When the Finn an' the Magyar fuss,
They quarrel an' fight till heads are broke
An' the cops get a hurry call,
But they all work on till the day they croak,
For the wife an' the kids—that's all!

Yes, that's one way we are all alike,
Whatever the work we do,
Tony and Oscar and Hans and Mike,
Master and Miner, too,
Our job may weary us, head to feet,
An' our pay seem pretty small,
But it's all worth while when at night we meet
The wife an' the kids—that's all!

Ideas and Suggestions

Automatic Arrangement for Raising End Gates on Mine Cars

By Elkins Read*

The automatic arrangement for raising the end gates of mine cars here described has proved economical in time and labor, aside from eliminating to a considerable extent accidents at the dump.

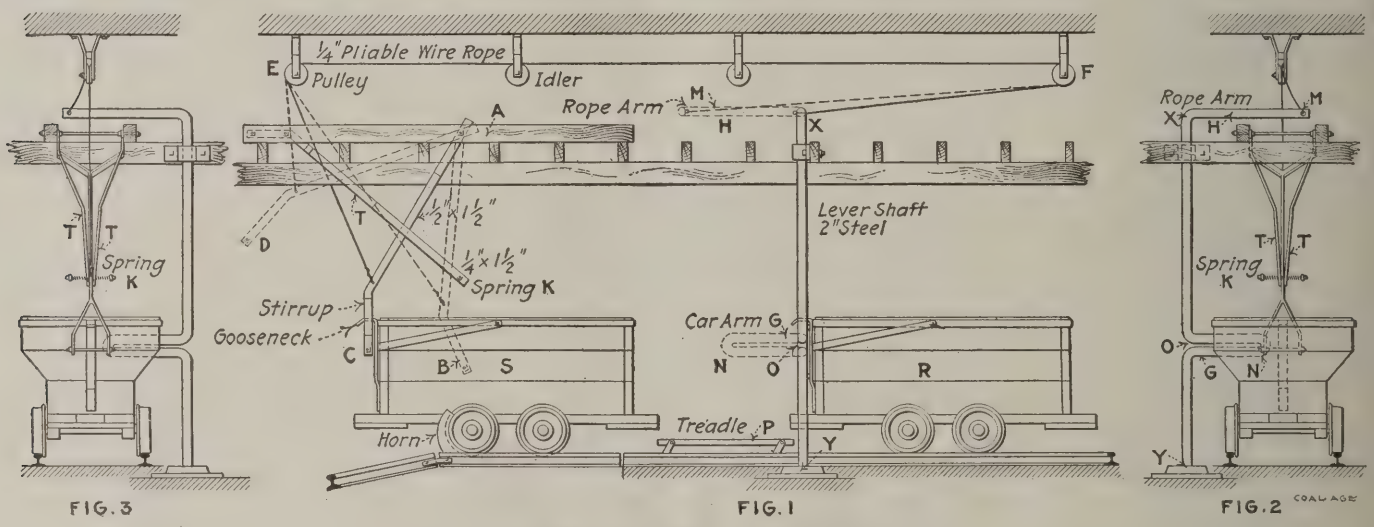
The incoming load R, Fig. 1, engages car arm G, which projects over the track. This revolves the vertical shaft XY and rope arm MX, causing the end of the arm M to move forward to the projected position. This movement carries the rope forward as shown, pulling the stirrup AC to the position AD. Load R advances and bumps the empty car S off the dump. The car arm G meanwhile rubs along the side of the car until it is released, thus keeping the stirrup up until the empty is out of the way.

After the load R has released the lever G, the stirrup falls to the position AB, pulling the lever shaft and arm back to their original positions. As the stirrup falls to the position AB, it wedges into the straps TT, which are in turn held by the spring K. It is essential that this stirrup be in approximately the position AB and at rest when the incoming load engages it, as under this condition no matter with what velocity the car approaches there will be no disastrous results, as the stirrup will be carried along with the car and be in perfect readiness to engage the gooseneck. This enables the dump man to throw his lever and let the dump tilt at the instant that the car strikes the horns.

The exact position and size of the several parts will necessarily depend upon local conditions, such as the size of the car, etc. However, there are a few points necessary to observe in order to obtain good results. The lever shaft XY should be placed back from the dump a sufficient distance so that the stirrup will be in the position AD before the incoming load bumps the standing empty. At the same time it should be certain that the stirrup will come to rest at AB before the load R engages it.

Some Details of Construction

The lever shaft should be set back about 2 ft. from the rail and the arm should be approximately 4 ft. long. The stirrup should be made about 6 ft. in length, fixing the point A about 2 ft. behind the end of the car bed and the point B, 8 or 10 in. below the gooseneck, thus allowing the dump to attain its initial momentum without undue hindrance. The rope should be of sufficient length, so that when the stirrup is in position AB and the arm MX is at right angles to the track it will be taut.



The Automatic End Gate Raiser

There should be a weak link somewhere in the rope, so that if the incoming load should strike the car arm while the dump is down, this link will straighten out and relieve undue strain, after which another one can be substituted. Placing idlers so as to carry the weight of the rope eliminates the necessity of attaching a counterweight to pull the lever arm back into position, since under this favorable condition the stirrup performs this function.

This device can be made at any mine blacksmith shop at a moderate cost. Time and money will, however, be saved by first making a rough model to be used for finding the exact length and position of the entire appliance.

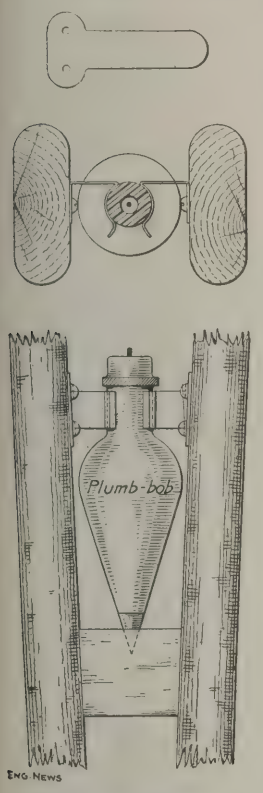
An arrangement of this kind, working in conjunction with a car haul and dumping into a reciprocating hopper feeder, allows coal to be dumped and screened at the rate of six 2-ton cars per minute over a Phillipp's crossover dump.

*Mining engineer, Maryland Coal Co. of West Virginia, Simpson, W. Va.

The common practice of running electric motors and electric currents through the return air courses of dusty mines is dangerous and should be strictly forbidden.

Plumb-Bob Holder for Transit Leg

The description of a device for holding a plumb-bob, in *Engineering News* of Nov. 20 (see COAL AGE, Vol. 4, p. 898), has called forth a description of another, which the inventor, C. M. Lawrence, County Surveyor of Hughes County, Oklahoma, believes much superior. His directions are as follows:



A BRASS SPRING PLUMB-BOB HOLDER FOR TRANSIT LEG

Cut two pieces of thin spring brass (mine are cut from the shell of a discarded alarm clock) as shown in the accompanying sketch. Bend as shown, and fasten in the split leg with 3/8-in. round-head brass screws. I also cut from the same material an oval plate, and tack it on the block below with brass brads before boring the $\frac{3}{16}$-in. hole for bob point. A very light grip will hold the bob, even up to a jolt which would put the instrument out of business. No parts project. And no "trigger work."

A Useful Hitch

R. C. Hardman, Colorado Springs, Colo., sends the following description of a rope hitch, which he believes has not been described previously in print:

In tying the knot a bight is taken wherever desired, as shown in Fig. 1. Then catching the the bight at the points *a* and *b*, the bight is turned over in a direction away from the tier, so that the knot assumes the shape shown in Fig. 2. Another turn is made in the same direction with Fig. 3 as the result. These two turns are made, in practice, in one operation, Fig. 3 being merely a 360-deg. turn of the bight in Fig. 1. The line *B* is then placed beside the line *A* and the loops *a* and *b* are brought together back of the lines *A* and *B*. A hook or other fastening may then be placed in the double loop so made and a strain taken on the line *A*. The finished knot is shown in Fig. 4. Care must be taken to have the line *B* beside the line *A* or the knot will not hold. When the strain is taken off and the hook removed the knot falls apart. Its principal use is on a fall line, or any line to which power is applied, in case a temporary pull is desired at any point other than that at which power is usually applied. It may be used also in various other cases which will be obvious after the knot is known.—*Engineering News.*

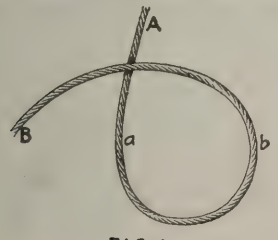


FIG. 1

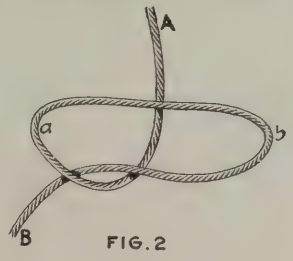


FIG. 2

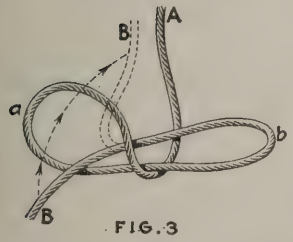


FIG. 3

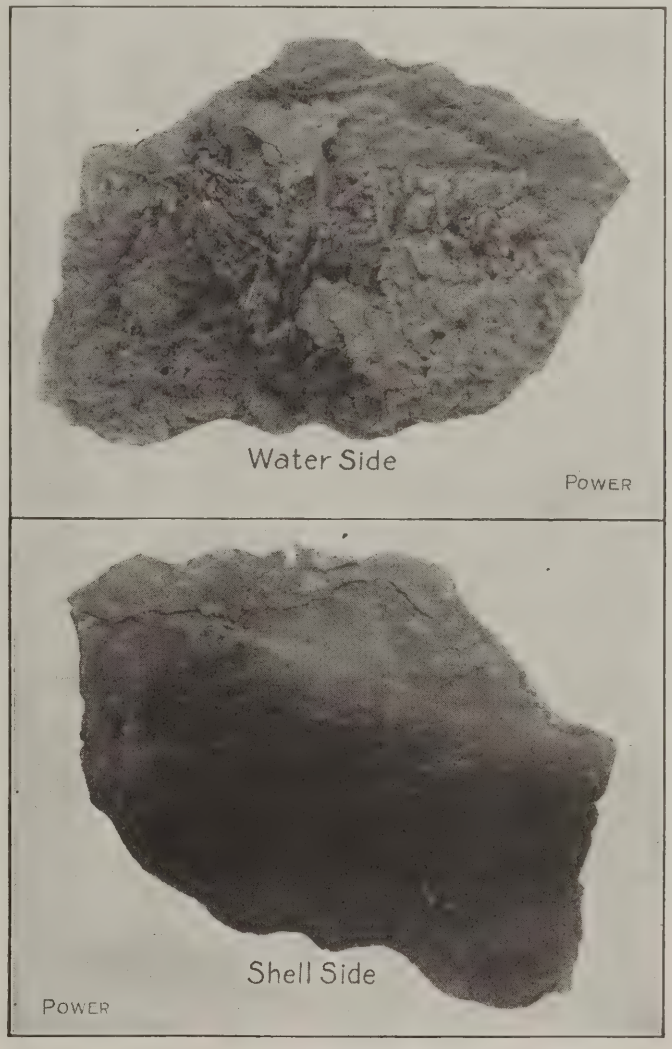


FIG. 4

ENG NEWS

Scale Removed by Graphite

The photographs show the front and back views of a piece of scale taken from the bottom front end of a 8-ft. x 30-ft. Lancashire boiler on which we have been using graphite for about three months, says E. Russell in *Power* of Mar. 3, 1914. This boiler is one of a battery of three, fed from a dirty river, the water from



A PIECE OF SCALE REMOVED BY GRAPHITE

which leaves moderately hard scale which formerly had to be chipped off, but since using graphite the boilers are as clean as it is practicable to get boilers. What little scale remains may be easily brushed or scraped off; it is not necessary to use a scaling hammer. On examining the front view it will be seen how effectively the scale has been driven off the shell plate and flues and collected in layers on the bottom of the boilers.

Some Efficient Compressed-Air Plants in Coal Mines

By S. W. Symons*

SYNOPSIS—Four plants in the anthracite region of Pennsylvania are here described which, by comparison with many installations of a similar character and made for a like purpose, may be truly said to be efficient.

Economy in the operation of machinery, like the cost of living, is rather more a question of ratios than one of absolute values. The cycle of operations in the compressed-air mining installation is so long and complex from the combustion of the fuel in the boiler furnace to the coal cutting or pumping at the working face, that from the thermodynamic standpoint no figures of high efficiency can possibly be secured.

In spite of the many losses which the ingenuity of man has never succeeded in stopping, there are numerous others which are capable of elimination either in total or in part. That installation, then, which cuts down these needless wastes to a minimum may, by comparison with other plants erected for the same purpose, be justly and rightly termed economical. It is the purpose of this article to describe four plants coming under this category which are in successful daily operation in the anthracite-coal region of Pennsylvania.

In compressed-air installations, the coal-mine operator may well profit by the experience of the iron and metal mines, where air-actuated rock-cutting machinery is a necessity and where, in most cases, economical Corliss engines or electric-motor-driven compressors are installed.

At the No. 5 colliery of the Lehigh & Wilkes-Barre Coal Co., at South Wilkes-Barre, Penn., air has been supplied for the last 8 years by an Ingersoll-Sergeant duplex compressor. This machine is provided with simple Meyer valve steam cylinders and two-stage air cylinders compressing to 100 lb. It has been kept running 24 hours a day since installation, and is now being rebuilt preparatory to being put again into regular service.

A new compressor, shown in Fig. 1, which was installed a year ago, was built by the Ingersoll-Rand Co. It is of the duplex type with Corliss steam cylinders 28 and 42 in. in diameter, hurricane air cylinders 37¼ and 22¼ in. in diameter, respectively, while the common stroke is 36 in. The capacity at 100 r.p.m. is 4206 cu.ft. of free air per minute compressed to 100 lb.

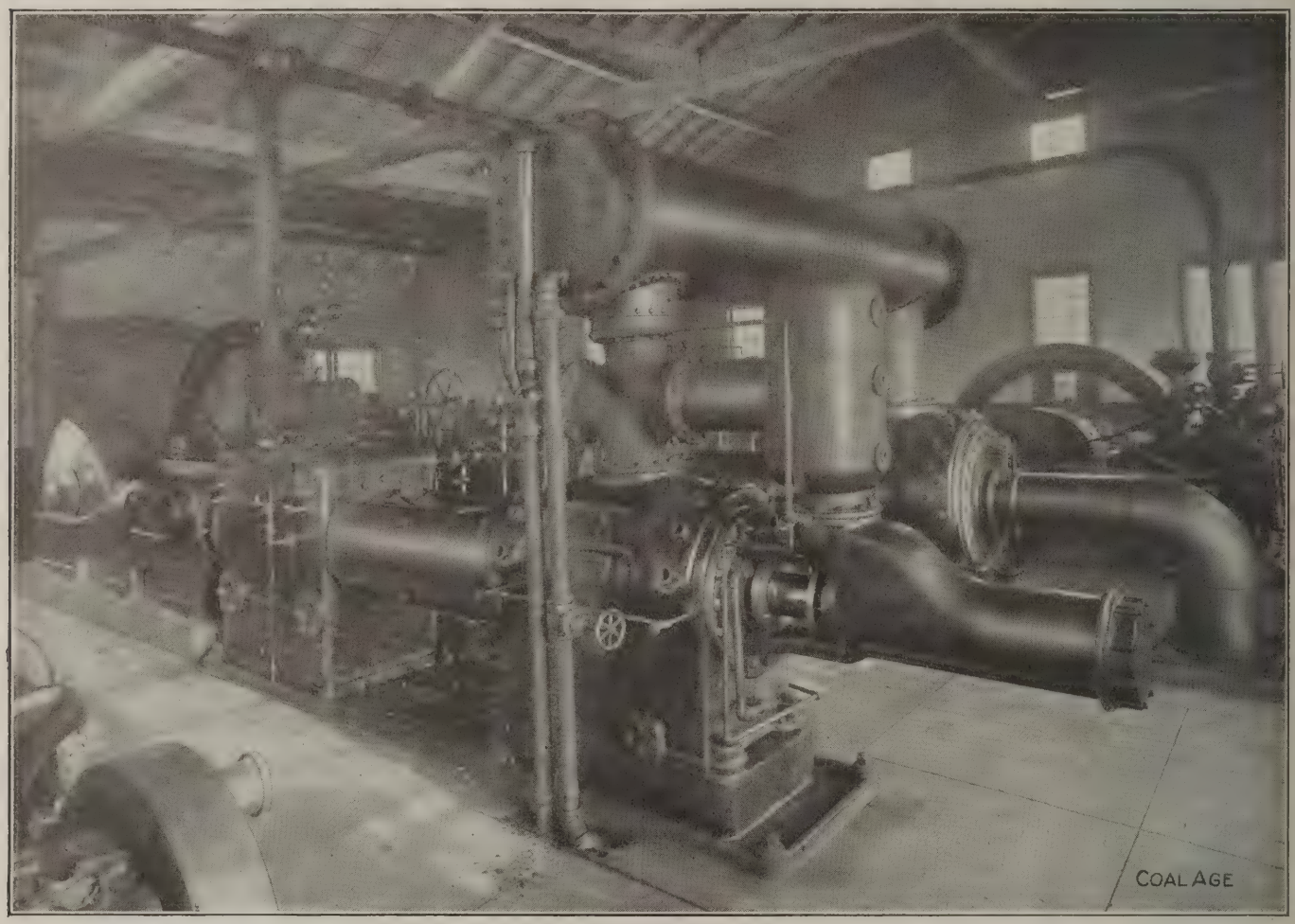


Fig. 1. Compressor Installed at the No. 5 Colliery of the Lehigh and Wilkes-Barre Coal Co.

*11 Broadway, New York.

The steam cylinders are fitted with a type of Corliss valve-gear, claimed by the makers to be highly efficient and nearly silent. This latter claim is well borne out by the smooth, quiet running of the machine, the only noticeable sound being the slight clicking of the relief gear and the sucking of the dash pot. The usual objectionable hammering of the drop rod hook on the dash-pot cover is entirely absent.

The Crank Case Forms the Oil Reservoir

The crank end of this machine, being wholly inclosed, provides a reservoir for a continuous oiling system for all the bearings except the valve-gear. This saves much time on the part of the attendant and is economical of oil, besides producing a cleanly machine with pleasing lines.

The air-valve gear is of a well known but unique type. The inlet air is drawn from a conduit beneath the engine-room floor through a hollow piston rod into a hollow piston, each face of which contains a valve of a continuous-ring form. These valves travel backward and forward with the piston and are opened and closed by their own inertia, consequently there is an entire absence of outside valve-gears, springs, etc., and no adjustments are required. The outlet valves are of the simple poppet type.

The air upon leaving the low-pressure cylinder passes through an inter-cooler of the usual surface condenser construction, from whence it passes through a trap in which the moisture which has condensed in the inter-cooler and hangs in the air in the form of a vapor, is caught on baffles and drained into a small tank placed on the foundation.

The amount of moisture drained from the air by this device will depend on the percentage of saturation of the air before entering the compressor and the temperature at which it leaves the inter-cooler.

It has been demonstrated that the capacity of air to absorb moisture increases directly with the volume, regardless of pressure, and that it practically doubles with every 250 deg. F. increase in temperature.

To take for illustration an actual case, in order to show the efficiency of the device, a two-stage compressor designed for 90-lb. terminal pressure at sea level will carry about 27 lb. gage, or nearly three atmospheres ab-

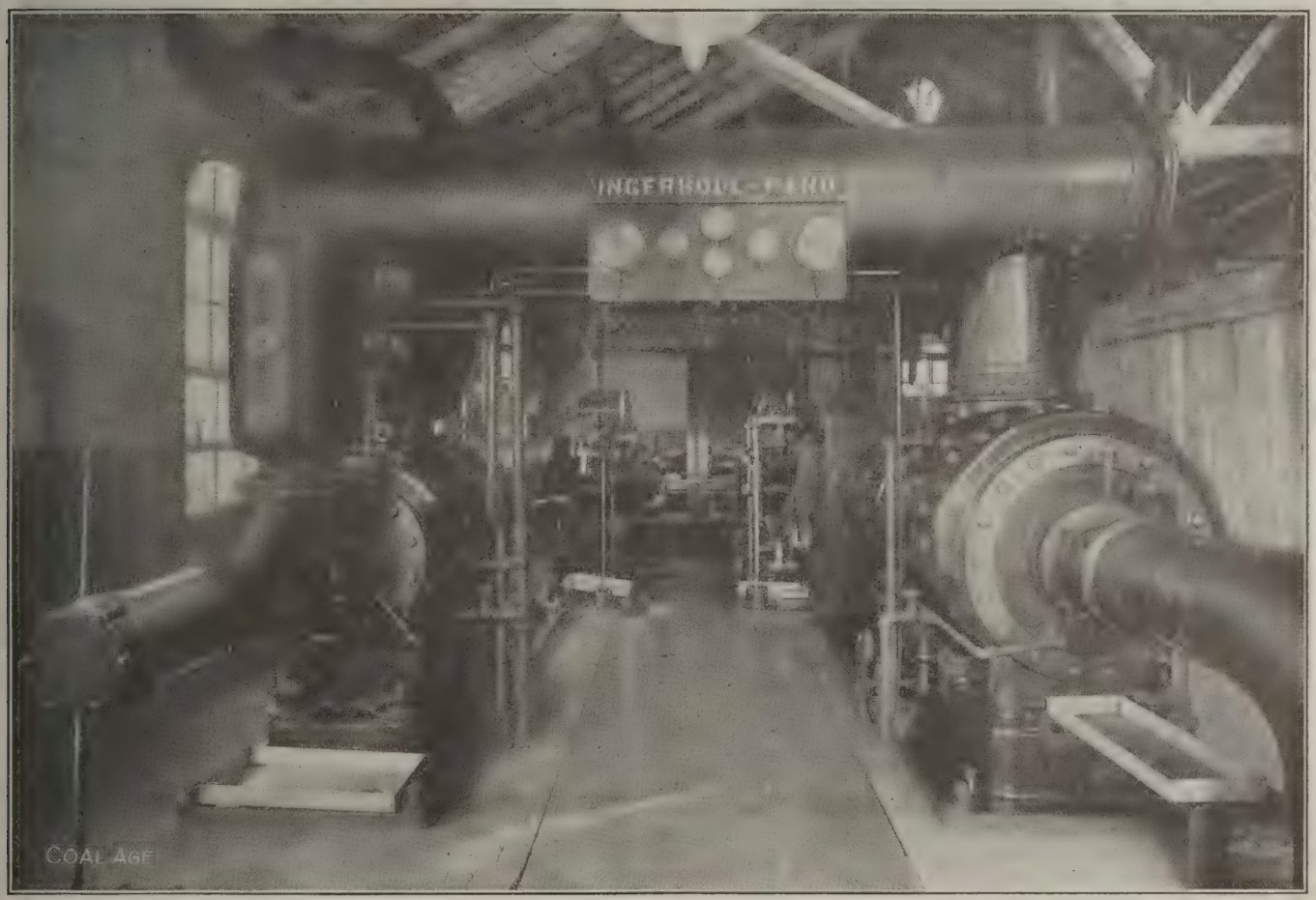


Fig. 2. A Compressor at the Plant of the Kingston Coal Co., at Kingston, Penn.

solute in the inter-cooler. This will give a temperature of about 240 deg. F. on leaving the low-pressure cylinder, if the intake temperature were 60 deg.

Assuming that the air on entering the compressor is in a saturated condition, the fact that its volume has been reduced by compression to nearly $\frac{1}{3}$ would mean that nearly $66\frac{2}{3}$ per cent. of this moisture would be precipitated, provided the temperature be reduced in the inter-cooler to 60 deg.

This is wherein lies the usefulness of the inter-cooler. But although this amount of moisture is given up by the air, it is not all precipitated, but the greater part hangs in the air in the form of a mist, and in the average installation is carried over into the high-pressure cylinder, where it is again taken up by the air, owing to the heat of compression, thus causing a loss of power, be-

sides trouble in the pipe line and at the points where the air is used. With the form of trap just described, nearly all of this moisture is caught and drained off.

Of course, the ideal conditions would be to extract all of this moisture before the air enters the compressor. This, however, would be impossible without a refrigerating plant. Much can be done, however, by taking the air from the coolest point possible, not from the inside of the engine room, or by installing some form of pre-cooler, which might be so designed as to clean the air as well as lower its temperature.

A Unique Air Cleaner Is Employed

A unique form of air cleaner is placed on the inlet to this machine. This is constructed of concrete and consists of a pit or box a little below the level of the engine room. A cover is placed over this box provided with openings so screened as to exclude large particles of foreign matter. The bottom of this chamber is filled with a heavy oil, just above the surface of which is placed a horizontal pipe provided with a long slot on the under side with one end closed and the other connected with the compressor intake conduit.

The air in passing to the compressor suction impinges more or less on the oil in the basin, leaving behind much dust and grit which would otherwise be carried over into the machine to the detriment of the valves and pistons. The oil can be easily removed and renewed as found necessary.

The use of this cleaner is of great benefit to the proper working of the compressor, and credit is due to the Lehigh & Wilkes-Barre Co. therefor, the device having been constructed by their engineers. It is, of course, impossible to put down in figures the saving realized by such an apparatus, its operation being in the nature of a preventative rather than a cure. Some such cleaning device should, however, form a part of every uptodate compressor installation.

The air from this machine is used to operate underground hoisting engines during the day, and at night a single pump for unwatering the mine, which takes the full capacity of the compressor, is operated. The main pipe line is, at present, 4 in. in diameter, but is to be increased to 6 in. in diameter to take care of the increased capacity afforded by the second machine.

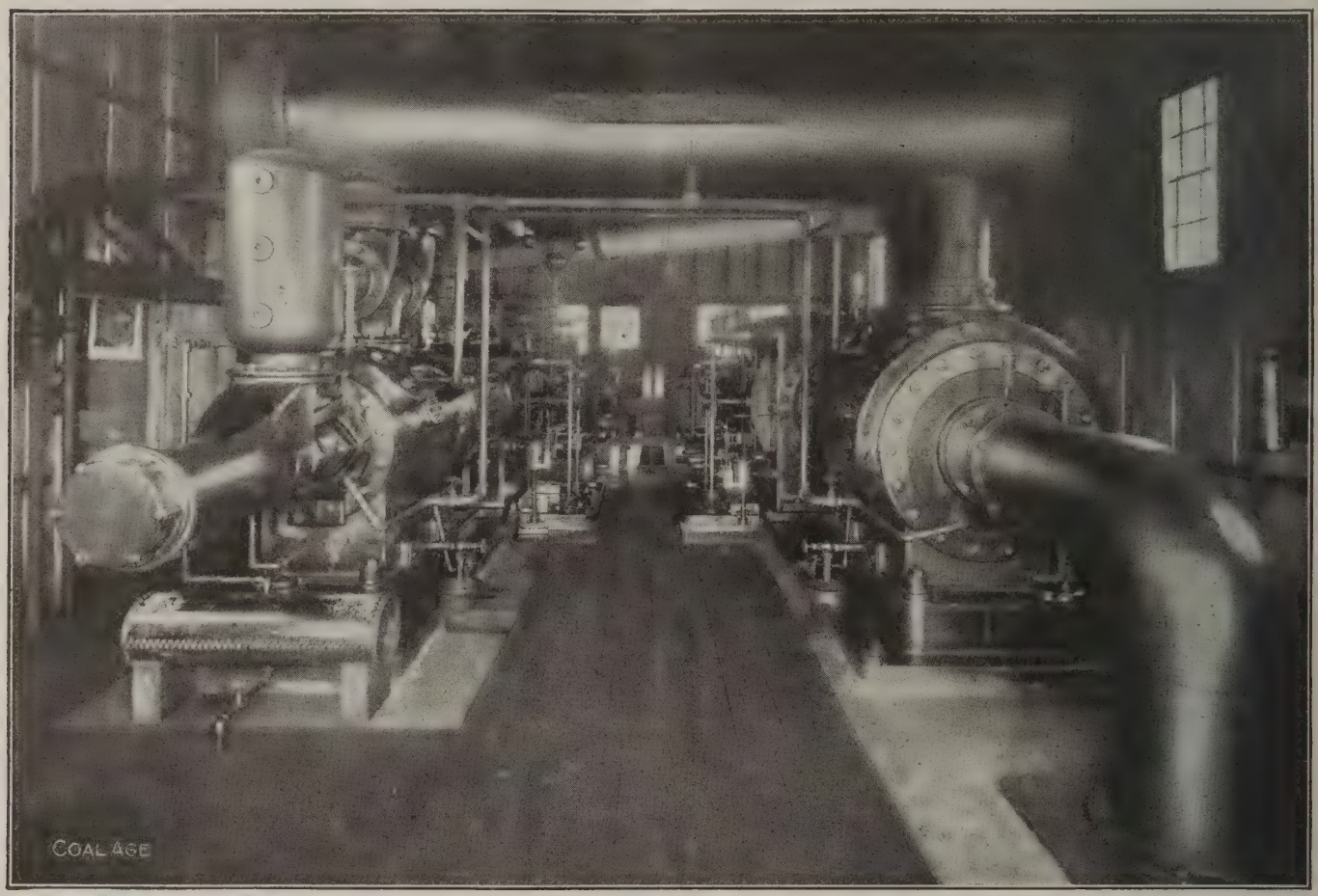


Fig. 3. Compressor Installed at the Dodson Mine of the Plymouth Coal Co., Plymouth, Penn.

But Little Steam Is Used

The engineer in charge made the assertion that his compressor used little if any more steam than the older machine of about one-half its capacity; and this in spite of the fact that the steam pressure fluctuates anywhere between 80 and 100 lb., so that the engine at times runs practically without cutoff.

A compressor of the same type but slightly smaller, was installed two years ago at the plant of the Kingston Coal Co., at Kingston, Penn., to take the place of two straight-line tandem-compound compressors with a combined capacity of 5000 cu.ft., which were installed some years before.

The new machine shown in Fig. 2 has a rated capacity of 3336 cu.ft. at 120 r.p.m., compressing to 100 lb. It easily takes care of this load, but owing to the increased

use of air in the mine, another compressor of the same type and design is to be installed.

A Battery of Receivers Is Employed

The air is piped to a battery of receivers, consisting of three 42-in. by 34-ft. cylindrical tanks coupled together. It is led in at the top to a pipe connection in the center of the battery. Provision is made for the new compressor when installed at the other end of the system.

This air-storage system was installed by the coal company to take care of the fluctuations of the load, and worked out well in practice. The air is used for pumps and hoisting engines underground.

This compressor is installed beneath a coal breaker, and consequently under unfavorable conditions, the intake being only protected by wire screens. In spite of this fact, however, it has not been necessary to renew any of

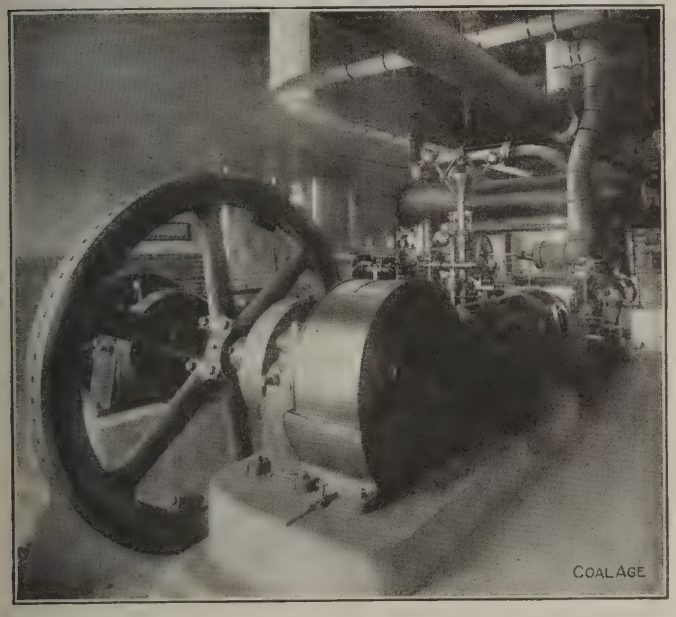


Fig. 4. Compressor at Gaylord Mine, Plymouth, Penn.

the air-inlet valves or valve springs since installation. The machine runs 24 hours per day, and has been speeded up to 125 r.p.m. for hours at a time.

At the Gaylord mine of the Kingston Coal Co., at Plymouth, Penn., another machine of the same type shown in Fig. 4 is installed for operating the mine hoist. This compressor has a capacity of 2000 cu.ft. at 134 r.p.m., and runs so smoothly that the writer was able to balance a nickel on edge on top of the main frame, while the machine was operating at 125 r.p.m. This compressor takes the place of an old Ingersoll-Seargent straight-line machine.

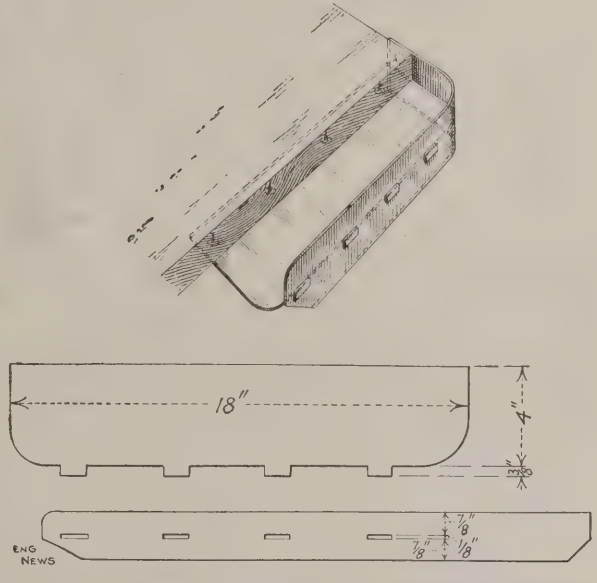
At the Plymouth Coal Co.'s Dodson mine, also in Plymouth, Penn., a compressor of the same size and type as that installed at the Kingston plant was put in to take the place of a 10-year-old duplex machine, a relic of former days. This compressor has run constantly for the last year and a half, generally being speeded up to about 125 r.p.m., at which speed it was possible for the writer to balance a nickel at the edge of the main frame, the same as was done at the Gaylord mine. This speaks much for the thorough manner in which the foundations were put in as well as the fine balancing of the machines themselves.

This compressor, about a year ago, was put to a rather unique use. Fire had broken out in the workings, and it was found to be impossible to get any fire-fighting apparatus within reach of the flames, owing to the noxious gases present. This difficulty was overcome by directing the full capacity of the compressing plant, which includes a small straight-line machine beside that above mentioned, into the workings and forcing the gases back until the fire-fighters were enabled to get near enough to extinguish the fire. This illustrates another use for compressed air in the coal mines, although it is one to which we hope it will be seldom necessary to resort.

In all of the above mentioned plants, the steam pressure fluctuates considerably. This does not, however, appear to interfere with the proper operation of the Corliss compressors, but makes it impossible to obtain any actual record of economy. The writer was unable, furthermore, on account of the briefness of his visit, to secure any data on the economical utilization of compressed air in the coal mines.

A Convenience for the Draftsman

Frank W. Miller, 422 Crane Ave., Detroit, Mich., has made a device illustrated herewith, which proves very useful to catch pencils, erasers, dividers, etc., which might otherwise be swept off the edge of the board and buried under the drawings below, in case the draftsman has



Cardboard Tray for Holding Drawing Utensils

much shifting of layouts and reference drawings from the top of his drawing board to his reference table at the side. The device consists of two pieces of heavy cardboard, cut as shown in the sketch. The tabs left on the piece forming the bottom fit into slots in the side piece, which is held quite firmly by mashing or spreading the projecting edges of the tabs. The bottom is tacked to the under side of the drawing board along the right-hand edge, while the side piece is bent around and fastened at the upper corner, as shown in the sketch. The whole thing is below the level of the board. During the last six months, Mr. Miller says, it has saved him many a search for buried instruments.—*Engineering News.*

The Pittsburgh Coal Bed

By W. G. Burroughs*

SYNOPSIS—A description of the Pittsburgh coal seam in all the four states in which it makes its appearance. The author, in drawing his statements from various official sources, enables us to get a good idea of the seam as a whole.

The Pittsburgh coal seam is the most valuable coal bed in North America. It was named by H. D. Rogers and his associates of the First Geological Survey, of Pennsylvania, in honor of the city of Pittsburgh, though it extends over parts of West Virginia, Ohio and Maryland, as well as Pennsylvania, in all of which states it is an important source of fuel. The workable coal area in the Pittsburgh seam is estimated by White at from 6000 to 7000 square miles. The bed has an average thickness of 7 ft. over an area of about 2100 square miles and it contains in all an estimated tonnage of 9,641,792,907 short tons.† It occurs at the base of the Monongahela formation of the Pennsylvania (Upper Carboniferous), series.

The Time Needed for Deposition of Coal Seam

The approximate length of time required for the accumulation of the vegetable matter from which the seam is composed, has been estimated by G. H. Ashley.‡ He states that 1 foot of peat can be laid down at the surface in 10 years. This will later shrink to 3 in., due to loss of moisture. It is estimated that it loses by partial decomposition about ¼ of the vegetable matter, but as its specific gravity increases to about twice what it was before compression, the original 3 in. will be compressed to about ½ of ¾ of 3 in., or 1⅛ in., and probably less in the deeper bogs. Thus, about one foot in a century is roughly the rate of accumulation of buried peat.

A cubic foot of peat from the lower part of the bed will weigh on an average about 50 lb. Due to loss of water this weight will be reduced ⅓, and the remainder will be decreased a further ⅓ by distillation, leaving, roughly, 25 lb. One cubic foot of coal from the Appalachian field will weigh on an average about 87½ lb. "Therefore, to make one foot of such coal will require 3½ ft. of well compressed peat.

Ashley writes that "the factor 3 has been selected as representing not the shrinkage of the whole bed, but the number of feet of well compacted, deeply buried old peat necessary to produce one foot of bituminous coal of the general character of the Pittsburgh coal of Pennsylvania. Applying this to our estimate that one foot of such peat requires a century for its deposition, 300 years is the time necessary to lay down one foot of bituminous coal. At this rate the Pittsburgh bed, where 7 ft. thick, required 2100 years for its accumulation, and 4000 years in its best development in the Georges Creek basin of Maryland."

Characteristics of Coal Bed

Over most of the large territory covered by the Pittsburgh bed, the coal has the following characteristic structure:* roof coal, over-clay or draw slate, breast coal, parting, bearing-in coal, parting, brick coal, parting, bottom coal.

"Roof Coal" and "Overclay"

The top bench of the seam is known as the "roof coal" and is made up of a number of thin layers, each 2 to 12 in. thick, separated from one another by shales, or clays, of varying thickness. Some of the layers of "roof coal" are clean, others contain much dirt and various other impurities.† In number, these thin coals range from one to eight, sometimes more, their total thickness seldom exceeding 3½ to 4 ft. The separating slates and clays sometimes are only half as thick as the coals, while in other places, they are often 2 or 3 times thicker than the coal.

The "overclay," or "drawslate," is an impure fireclay, varying in thickness and at times almost disappearing, and again in other regions, thickening up to 2 or even 5 ft. It is usually mottled and has many slickensides, rendering it dangerous, as large pieces of it will drop from the roof without warning. Therefore, it is generally taken down at once.

The "Breast Coal"

The "breast coal" is often, also, called the "main bench," and is usually the most important and valuable division of the whole Pittsburgh bed. In the Pittsburgh region, this section is generally about 3 ft. From this district it thickens gradually up the Monongahela, attaining a maximum of 6 ft. at Brownsville, while to the eastward in the Georges Creek and North Potomac basin, of Maryland and West Virginia, it increases in thickness still more, reaching 7½ and even 10 ft.

The top of the "breast coal" is nearly always of a boney nature for a thickness of 1 to 4 in. Frequently, this boney portion must be separated and rejected in mining; but even where this is not required, the top of the "breast coal" is distinctly harder than the rest, and inclined to show cannelly structure. As the Pittsburgh seam extends westward to the Ohio River, this "breast coal" member in certain districts thins to 2 ft. in thickness.

"Bearing-In Bench"

The "bearing-in coal" has been so named by the Monongahela River miner, because in mining operations, the undercutting of the "breast coal" is made in this layer, the latter being wedged or blown down, and the "brick" division subsequently taken up. The "bearing-in coal" is usually brilliant and pure. It varies in thickness from 3 to 6 in., and is inclosed by two thin parting slates, almost exactly alike in color and structure. In the region between Pittsburgh and Brownsville, these slates are ¼ to 1 in. thick, and of a dark mottled gray color.

In West Virginia, they are generally a dark bone, and will sometimes burn with the coal.‡ The persistency of

*129 North Professor St., Oberlin, Ohio.

†Ohio Geological Survey, Bulletin 9.

‡"The Maximum Rate of Deposition of Coal," "Economic Geology," Vol. II, Jan.-Feb., 1907.

*Ohio Geological Survey, Bulletin 9.

†West Virginia Geological Survey, Vol. II, Part 3, pp. 164-204.

‡West Virginia Geological Survey, Vol. II, Part 3, pp. 164-204.

these twin slates over all the regions drained by the Monongahela, east to the Georges Creek and North Potomac field, and west to Wheeling, Bellaire and the neighboring regions of Ohio, is one of the remarkable features of this coal bed. When, however, the areas of this coal south of the Little Kanawha River in West Virginia and west from the Muskingum in Ohio, are examined, these twin slates are not found, or if represented, are no longer recognizable as the Monongahela partings; but the "roof coal" and the "overclay" appear to be present."



MAP OF THE HORIZON OF THE PITTSBURGH COAL BED IN PENNSYLVANIA, WEST VIRGINIA AND OHIO

The Maryland deposit is excluded. It will be noted in the illustration that in West Virginia there is a line which shows where the Pittsburgh bed becomes thin and of little commercial value. While some of the deposits west of that line in Ohio are of considerable value, many are utterly valueless, and some are mere traces. In other places, the bed is missing and its horizon alone can be determined. As this is a map covering the horizon of the coal bed and not its actual presence, the profitable coal area, especially in Ohio and West Virginia, will be considerably smaller than that shown.

The "Brick Coal"

The "brick coal" comes next beneath the lower of the twin slates. It owes its name to the fact that it comes out in oblong rectangular blocks, like common bricks. It is generally about one foot thick. The parting which separates the "brick coal" from the "bottom coal" is always present along the Monongahela from Brownsville to Pittsburgh; and it is also represented in the Georges Creek and North Potomac field, but in the Fairmont region it is rarely present, the bed in that section generally being undivided below the "bearing-in coal."

The "bottom coal" is from 12 to 20 in. thick along the Monongahela in Pennsylvania. It contains many thin, slaty, sulphurous laminae.

I. C. White gives the following section, taken near Scott Haven, Penn., as typical of the Pittsburgh bed, as it occurs over large areas:

THE PITTSBURGH BED AT SCOTT HAVEN, PENN.

		In.	
"Roof"	Coal, several films of earth	3¼	46¼ in.
	Shale, black, earthy	2	
	Coal	2¾	
	Shale gray, streaks of coal near top	11	
	Bone, a hard, dull, impure, coaly layer	1	
	Coal	2½	
	Shale, black	0¼	
	Coal	1¾	
	Shale, black, coaly	1	
	Coal	3	
	Shale gray, with irregular coal streaks	4½	
	Coal, compact, free from "binders"	9¼	
	Slate, with coal streaks	1½	
	Coal	2½	
"Overclay," impure, fireclay, light gray above, getting browner and then a much darker gray with coal streaks of irregular shapes, especially toward the base			10½ in.
"Breast coal" (with 1½ in. of bone at top, and next 10 in. harder than the rest of the bench)		41½	7⅝2 in.
Shale, dark, grayish brown, mottled		0¼	
"Bearing-in coal," clear and brilliant		4	
Shale, dark, grayish brown, mottled		0½	
"Brick coal," clear and brilliant		11	
Shale parting		0⅛	
"Bottom coal"	Coal with few thin dirt layers	12½	
	Shale	0¼	
	Coal, bright and clean	2	
Total thickness of Pittsburgh bed			10 ft. 9⅜ in.

In Athens and Gallia Counties, Ohio, a marked change occurs in the Pittsburgh bed. The well known structure of the seam, described above, is wanting. In its stead, we find a threefold division. This consists of an "upper bench," and a "lower bench" of coal separated by a layer of clay or shale. Usually the "Lower bench" is the more important, and in places it is the only one mined; but it is not always the most important, as is shown in the following section.

PITTSBURGH COAL SECTION AT SHARPSBURG, ATHENS COUNTY, OHIO

		Ft.	In.
Shale, unmeasured			
Upper bench	Coal	4	0
	Bone coal	0	2
	Coal	0	4
Clay parting		1	0
Lower bench	Coal	2	10
	Pyrites parting	0	0½
	Coal	0	8

SECTION OF THE SAME SEAM AT BLADEN, GALLIA COUNTY, OHIO, ON THE BANK OF THE OHIO RIVER

	Ft.	In.
Shale	2	0
Upper bench coal	0	4½
Clay	1	0
Lower bench coal	2	9

Ohio Geological Survey Bulletin 9.

Usually, the structure is more complex than is shown in this section.

The structure of the Pittsburgh coal in Ohio presents two distinct phases, as follows: In the eastern counties it is usually normal and similar to that of the great fields east of the Ohio River; farther southwest in Ohio, as has been stated above, the structure is different, but it is persistent in that territory. Between these two modes of structure are intermediate, transitional forms, as the Ohio Geological Survey points out.

The Pittsburgh coal is also remarkable for the number and size of its "clay veins," which penetrate the bed in every region, whether along the Monongahela, or the Great Kanawha, 200 miles distant. In some districts, these "clay veins" are more frequent than in other regions, but they occur in all. I. C. White regards them in most cases as being due to earth movements which squeezed up the underclay into and often through the over-lying coal.

An analysis of the Pittsburgh coal from a mine in Belmont County, Ohio, which county has a larger quantity of that coal than any other county in that state, is here given, taken from the reports of the Ohio Geological Survey.

ANALYSIS OF PITTSBURGH COAL FROM BELMONT COUNTY, OHIO

Ultimate		Proximate	
Carbon	71.45	Moisture	3.39 (a)
Hydrogen	5.21	Volatile matter	36.84
Oxygen	11.27	Fixed carbon	51.91
Nitrogen	1.24	Ash	7.86
Sulphur	2.97		100.00
Ash	7.86	(a) = moisture in air-dried sample about 3%.	
	100.00		
Calorific value	7217 calories.		

Prof. N. W. Lord, of the U. S. Geological Survey, found the average calorific value of samples of Pittsburgh coal from Pennsylvania to be 13,557 B.t.u.

Pittsburgh coal is a leading fuel for the production of illuminating gas. For the manufacture of coke, Pittsburgh coal stands second to none. The average of a large number of analyses of Pittsburgh coal and coke of the Connellsville basin, is here given:

CONNELLSVILLE COAL AND COKE

	Coal	Coke
Moisture	.....	0.184
Volatile matter	31.04	0.552
Fixed carbon	61.97	88.726
Ash	5.77	9.993
Sulphur	1.22	0.533
Phosphorus	.....	0.010

22nd. Annual Rept., U. S. G. S., p. 176.

Reporting on Coal Properties

By Frank Haas*

SYNOPSIS—A report should tell the person who is to receive it all that he needs to know and no more. A busy man won't read a long disquisition even about his own property, and may be unwilling to hunt up all the abstruse terms the engineer may choose to use. Every report should be attractive and facts should be mainly conveyed by maps, diagrams and photographs rather than in the most graphic of language.

Probably every engineer at some time in his career will have to make a report on a coal property. The work well done will bring quicker and larger reward than any other, and every mining engineer should study this feature of his profession. Experience, it is true, is the best help to that kind of work, but there is a way of profiting by other people's efforts which will go a long way toward replacing such deficiency.

What the Report Is to Be Used For

The engineer should have a clear understanding of the object of the report so that he will not waste his time and the time of those who read it by introducing needless detail. It is necessary to know if the property in question is to be purchased or sold, whether it is to be exchanged for other lands, whether it is to be considered as an immediate operating property or whether it is to be taken by bankers as a basis for a bond issue.

*Consulting engineer, Consolidation Coal Co., Fairmont, W. Va.

Note—Article prepared to be read at the meeting of the West Virginia Coal Mining Institute, Charleston, W. Va., Dec. 8-10, 1913.

A Report to a Banker

A report made to a banker should be different from one made to a president or general manager, who perhaps may contemplate immediate operation. The bankers want to know whether the property will earn interest on the bonds which they are floating or which have already been issued and whether it will earn a sinking fund for retiring the bonds and a margin large enough to make investment amply safe.

If your information and judgment warrant it, the quickest and shortest way of convincing the banker will be most acceptable to him. Give the banker no details which he does not understand. Ordinarily, he knows nothing of anticlines and synclines or butts and faces, and so on. The chances are that if he does not understand, he will not admit it. Anything in a report which is not plain or is not understood is a weakness. It does not matter whether it is your fault or not, the damage is done and the world and modern business does not stop to rectify personal grievances. However, by all means do not underestimate the banker in his knowledge of the coal business or you will regret the day, for some time you will meet a wise one who will ask questions which are interesting and would be decidedly embarassing if you did not fortify yourself with a supplementary report of detail facts.

Reports to Managers

If, on the other hand, you make a report to your president or general manager, the proposition is one of an entirely different nature. Perhaps as you should have previously determined, you are only to accumulate the facts, and if so, devote yourself to this alone; your opinion will probably be asked for some time, so it isn't necessary to intrude it until the proper occasion. This kind of a report is the most difficult of all to make.

To place all the facts of a proposition in such a manner and so concisely and plainly to a second party that he can form a definite opinion without further question or investigation, is a success indeed. Probably you may have to know your man as well as your property and in such a case it is well to put yourself in the other man's place and see if you can, in a theoretical way, formulate an opinion from the facts in hand. If you are sincere and conscientious in the criticism of your own work, and find it satisfactory, the probabilities are that your effort is a success.

Care in Ascertaining Facts

A common error is lack of discrimination between facts and opinion. There is nothing that will so completely destroy an otherwise good report as an inadvertent statement which is offered as a fact that cannot be fully substantiated. I have seen reports in which there was apparently no thought or idea of discrimination. A report recently passed through my hands covering, in a general way, several hundred thousand acres in eastern Kentucky from information apparently gathered in two weeks' time.

In this report nine seams of coal were identified and the correlation carried without a hitch or a question for over one hundred miles. It was a decidedly remarkable achievement if it were true, yet the report gave no indication other than that its statements were proven facts. Yet the man, I feel sure, was sincere in his own mind, but did not realize the mischief he was making for others following in his path.

I have in mind now a property on which twelve separate reports have been made and the opinions formed after a careful study of them would vary widely; in fact, the property would hardly be recognized except for the geographical names. The character of coal was variously described in the several reports as if it varied from semi-anthracite to coking coal, all this occurring without any desire on anyone's part to willfully deceive, but from a lack of discrimination between fact and opinion, or gross ignorance, for the facts in this case were so very apparent and so readily available.

Considerable time and labor are consumed in weeding out such inaccuracies. A statement once made must be either substantiated or proven wrong and nothing must be left for interpretation, for this is the real object of the report. It is far easier to go into a virgin field and cover the proposition concisely and briefly than to make a report when the territory has previously been described in an inaccurate manner.

Prejudiced Opinion

Another very important matter to be considered is that of prejudice. The coal fields of the Appalachian system are fairly well known and those who have followed the profession are more or less familiar with the entire system and, by hearsay, publications or otherwise, have ideas in regard to the various fields and in some cases even positive opinions.

It is a difficult thing to pull away from such ideas or opinions and constant vigilance is needed to keep these preconceived ideas from entering into our estimates, but it is essential that they should be excluded. It would be a clever writer, indeed, who could incorporate a prejudice and not have it discovered. But this failing is common and most reports are contaminated in this way.

A prejudice may be in the right direction, but if it is discovered it will naturally throw the reader in an opposite direction and the injury will be threefold, first to the reader of the report, second to the property and finally to the writer himself. And it is usually a hopeless case, for once it is known that a person is prejudiced, argument is considered useless and generally not offered.

Of course, there are many reasons why these prejudices occur and many excuses for their existence. For instance, one may be called upon to report on a property belonging to one corporation and subsequently required to do the same on an adjoining property, which may belong to a competitive company, and it is almost against human nature to think that the statements of one's first report would not affect those of the second.

Find Out What Facts Are Needed

It has been said heretofore: "Know your man." This adage may be used here to express that we should understand just what he wants to know. He is paying his money for a record of facts and perhaps an opinion on a piece of property and it is your duty to furnish him with the information that he wants and in the way he wants it. It is sometimes surprising to hear some of the questions that are asked, simple but entirely to the point, which would not have occurred to the engineer had the suggestion not been put.

It becomes almost a habit among those in the same profession not to discuss or even mention things which are to such profession self-evident facts, but which may

be to others unheard of and unknown. It is only a short time ago that I had occasion to travel over a considerable territory with an owner of a large property. The man was serious and thoroughly interested—he had his money invested and wanted to know in a manner that he could understand just how much coal he had, what kind of coal it was and what kind of market the coal would suit and where that market was, and so on.

Those who have been through the mill can appreciate how tedious it becomes to answer the fire of questions that can be put in a week's trip. But after all, it might almost be said that he who answers or tries to answer those questions learns as much as the man who asks them, in that it gives ideas as to what people who are not acquainted with the coal business want to know and what facts should be covered in a report.

A Brief Report with Extensive Examination

I have in mind now another man for whom I have made numerous reports. At first these reports were patiently read through; after a while I found that the last page was read first and the fore part afterward, so adjusting the reports to the conditions, the last page was submitted first. This proving satisfactory for a time, I found that the rest of the report was only indifferently read and more probably not read at all; so finally, to perfect the matter still more, the rest of the report was omitted, which apparently was most satisfactory of all. It is a fact that the largest acreage, or deal, that went under my observation was based on a report that had less than two typewritten pages. But don't assume that the work wasn't done; the supplementary report, though not submitted, was quite complete and handy should a critical moment have arrived.

Maps Should Be Reduced to Manageable Size

Having pointed out that a report should be brief, concise and without prejudice, it might also be added that it should be attractive and pleasing in its arrangement. Anything that can be illustrated by a map or a diagram should be so presented, not only for brevity, but for quick understanding. A map is far more comprehensive than any description could be, diagrams of sections are more easily read and a few photographs of characteristic features add greatly to the value and attractiveness of a report.

For the purposes of a report, a map is merely an illustration, and such a scale should be selected that the entire proposition can be grouped at a glance; by all means avoid a map which requires a special table to display it; it should be rather one that a person can hold in two hands and comfortably see it all. Avoid unnecessary detail, but bring out the essential features prominently; should some detail require a larger scale, provide another map, which is a section of the whole, large enough to demonstrate it properly, but maintain a uniform size of map if possible. The facilities for enlarging or reducing maps are or should be available in any engineer's office, and there should be no excuse for maps not being reproduced in the most attractive and convenient form.

Whatever the illustrations you may see fit to offer, by all means, make them neat in appearance. Any man who makes any pretense of being an engineer must be a draftsman, and there is nothing that will provoke criticism so readily as a careless or untidy map.

However, whatever the subject, whatever the object, make your report in such a manner that you will have no excuses to make, and the presentation will meet all your own conscientious criticisms. Then the probabilities are that your effort will be a success.

Pulverized Coal

James Lord, president of the American Iron and Steel Mfg. Co., Lebanon, Penn., addressing the Engineers' Society of Western Pennsylvania, gave the following specifications for powdered coal for metallurgical uses: (1) The free and combined moisture must be expelled by artificial heat till their combined percentage falls to 0.5 per cent. (2) The coal must be pulverized so that 95 per cent. will pass through a sieve of 100 meshes to the square inch. Over 80 per cent. at the Lebanon works will go through a 200-mesh sieve. (3) The coal should have a high volatile content, not less than 30 per cent. (4) The sulphur should not exceed one per cent.

The cost of drying, pulverizing and transmitting the dust amounts to 50c. per ton of which the first two items cost a total of 40c. When pulverized coal in the furnaces is used, smoke is eliminated. Sometimes the coal catches fire in the storage bin, in which case the supply is stopped and the burning coal is fed to the furnace. There is no danger of an explosion under these conditions, in fact no explosions have been experienced at the Lebanon works.

William A. Evans, New England manager, Griscom-Russell Co., Boston, Mass., discussing the paper, stated that drying was not absolutely essential but effected a large economy. The dryer can only be eliminated where the pulverizers will permit moist coal to pass through them. If screens are used for the separation of the coal and fine material, they clog up immediately when fed with moist coal. Moreover, damp powder in the storage bin will coke almost solid and develop heat tending toward spontaneous combustion.

Pulverized Slack Costs as Much as Mine-Run Coal

Coal cannot be taken from the cars, and be pulverized and delivered to the furnace for much less than 50c., certainly not for 10 or 12c., as has been stated. The cost of slack pulverized is about the same as that of mine-run which would be used on grate fires. Low-grade coal is no better suited to this class of furnace than to ordinary purposes. Much slag is deposited in the furnace by such coal and the furnace front has to be repeatedly opened to permit removal of the slag; thus the furnace is cooled, heat is lost and castings are ruined.

The entire combustion space should be free from any metallic surface. The failure to take this precaution is probably the reason why success has not been obtained in burning pulverized coal under boilers. Coal dust cannot be burned in brick checker-work because of its slagging qualities. In this department, therefore, it cannot compete with producer gas but in its proper field, the use of pulverized coal is 25 per cent. cheaper than the indirect process of turning coal to gas and burning the gas in a furnace. Coal is also about 60 per cent. cheaper than oil for furnace use.

Note—Pulverized Coal in Metallurgical Furnaces, Vol. 29, p. 362, October, 1913.

Burning Impure Coal

H. R. Barnhurst, engineer of the Fuller Engineering Co., Allentown, Penn., stated that by the use of special furnaces pulverized anthracite containing 25 per cent. ash could be burned, also coke breeze with 15 per cent. ash and even washery waste with 52 per cent. ash. He also stated that 4 B.t.u. can be saved per degree of preheating per pound of fuel when 50 per cent. excess air is admitted. In his belief the pulverization should produce a dust of which not less than 85 per cent. should pass the 200-mesh screens and not less than 95 per cent. the 100-mesh.

One pound of coal will evaporate 6 lb. of moisture in the fuel. One man can deliver the coal to a drier of 6 or 8 tons hourly capacity. One man can operate mills capable of grinding the same amount of coal and delivering it finished in the bins. The repairs of dryer and mills will be less than 2c. per ton. The power including conveying and elevating will be about 17 hp. per ton of product per hour.

Large economies have been made over raw-coal firing and the use of coal in producers: In continuous furnaces for heating billets, 24 per cent; in openhearth producer-gas fired furnaces, 30 to 35 per cent; in puddling furnaces, 33 to 50 per cent.; in heating and busheling furnaces, 20 to 25 per cent.

I. W. Rawlins declared that coal with 2.05 per cent. sulphur had been used at Cananea and E. D. Barry instanced the use of West Virginia slack coal with 2.71 per cent. of sulphur, Pittsburgh coal with 1.28 per cent. and Illinois coal with 1.47 per cent.

Safety First Signs

A great many coal-mining companies are placing illuminated signs in their underground workings, with the idea of preventing accidents and thereby saving lives. As constructed today by the Electric Service Supplies Co., of Philadelphia, these signs are practically indestructible and necessitate but little cost for maintenance.

Mining companies can place such danger signs at any point where human life is in danger by exposed electric wires, switches, third rail, etc.



These Danger Signs Are Practically Indestructible



The Roller-Curtain Sign Shown on Left above Is a New and Novel Type. The Curtain Contains a Number of "Safety Precepts"

The very latest development in the construction of safety-first signs is the Keystone illuminated roller-curtain sign, shown in the accompanying illustration. This particular type is an educational feature with great possibilities. The curtain may contain any number of "safety precepts" covering an entire campaign, and conforms nicely in its adaptability to the modern safety idea.

In a suit in Alabama it was contended that a man working about an air pump was asphyxiated by the air discharged. It was said that an explosion of the lubricating oil in the compressed-air pipes and receiver filled the pump cylinders with noxious gases and caused the man's death.

An Analysis of the Commerce Law

By Sydney A. Hale*

SYNOPSIS—There are probably few shippers who have little more than a mere superficial knowledge of the "Act to Regulate Commerce." In order to make the measure effective in all its ramifications, it was necessary to embody many unusual provisions. Thus the railroads are not the only ones who may be culpable of infringement of the law and the incautious shipper would do well to post himself on its intricacies.

The prosperity of the United States, as of no other country, is dependent upon its transportation facilities. Business moves and has its being in this interlacement of steel, approximating a quarter of a million miles. Unless these avenues are kept open, community isolation and industrial disintegration would be inevitable—and swift.

With this power of financial life and death concentrated in the control of one agency, it was only natural that arrogance should creep in and the railways, for a time, forgot that, while in their strength they might crush, they would be buried eventually under the commercial havoc they wrought.

Individual states were the first to take up the issue with statutory curtailment of the railroads' license, but local regulation proved inadequate. The national government, acting under the powers of the commerce clause of the Constitution, then stepped in. With the Constitutional grant that Congress shall have power "to regulate commerce with foreign nations and among the several states" as their authority, senators and representatives proceeded to make transportation amenable to the public will. The Cullom Act of 1887 was the result. But this soon proved more admonitory than corrective. Amendments were grafted on it in 1889, 1891 and 1895. Still complaints grew apace. In 1906, the act was vitalized by the so called Hepburn amendments and regulation that regulated came into existence.

The Objects of the Act

Primarily, the act is an instrument to regulate the transportation agencies of the country, but, inasmuch as these agencies exist by the traffic the public tenders them, by implication in every instance, and by direct phraseology in several, the shipper is also subject to the provisions of the law. Thus, where the act strikes down an unjust discrimination of the carrier, preferential to some favored industry, it also strikes at the beneficiary of such discrimination. More than that, in the duties and burdens it places upon the shipper in his relations to the carriers and the public at large, equally, if not more so than in the demand it makes of the carriers, the vitalizing features of the act as it stands today find their fullest expression.

An intelligent understanding of the law must comprehend a full knowledge of its dual requirements. Preliminary to this must be cognizance of what the act controls. By specific description, the term "common carrier" is made to embrace not only the railroad proper, or the rail and water lines when land and water facilities are used under a common arrangement for continuous carriage, but pipe lines, express and sleeping-car companies.

Every commodity, excepting water and natural or artificial gas carried through pipe lines, comes under its restrictions. "Railroad" is made inclusive of all bridges and ferries used in connection with any railroad, all the road used by any corporation operating a railroad, all switches, spurs, tracks, terminal facilities, depots, yards and grounds used or necessary in the interstate transportation or delivery of persons or property. "Transportation" itself covers cars and other vehicles and all instrumentalities and facilities of shipment or carriage, irrespective of ownership, and all services in connection with the receipt, delivery, elevation and transfer in transit, ventilation, refrigeration, icing, storage and handling of property transported.

Discussion of the commerce act has been all so largely with respect to the duties it lays upon the carrier that a brief recital of what the shipper is entitled to under the law from these agencies of transportation is deemed sufficient here. In the first place, he is entitled to transportation upon reasonable request therefor. The carrier is also bound by law to give him through routes and joint rates applicable thereto. All charges must be just and reasonable.

The classifications of freight and the rules and regulations governing rates, classifications and tariffs, must be able to meet the same test. The shipper has a right to rates that are not only just and reasonable in and of themselves for the services rendered, but transportation charges that shall not discriminate against any particular traffic, persons or communities where the conditions and circumstances are substantially similar and the service is of a like and contemporaneous kind. The foregoing in itself is an inhibition against preferential rates to traffic, persons or localities, but the act also carries the specific prohibition against preferences in rates and practices.

All Rates Must Be Made Public

The Act to Regulate Commerce also makes it unlawful to charge more for a shorter than for a longer haul over the same line or route in the same direction. Where a railroad reduces rates to meet water competition, the elimination of that water competition will not be permitted to furnish justification for again raising the railroads' rates. These provisions were storm centers in the legislation of 1910. Upon application by the carriers, existing adjustments in violation of the long- and short-haul principle must be withheld until such time as the commission might pass upon the commercial justification of such departures.

One of the greatest aids to the shipper and most effective deterrents of discrimination is found in the provision of the law which requires carriers to post all changes in rates at the stations to and from which they apply not less than 30 days in advance of their effective dates. From these tariff charges no deviation is permitted, either directly, or by devices such as false billing, false classification or false weight.

Practices of such devices subject the carrier and its agents to a fine of not more than $5000, or two years'

*5455 University Ave, Chicago, Ill.

imprisonment, or both; the penalty for rate discrimination is a fine not exceeding $5000, or imprisonment not exceeding five years, or both. Carriers are forbidden to engage in traffic without tariff authority. The shipper may demand written rate quotations from the carrier and damages arising from a misquotation or failure to quote within a reasonable time carries a penalty of $250, accruable to the United States.

The shipper is entitled to through routes for his consignments. Where several routes are available under a joint tariff, he is also given the right to direct the routing of his goods, both intermediate and terminal, subject to such reasonable exceptions as the Interstate Commerce Commission may from time to time prescribe. The carrier must also provide reasonable facilities for operating through routes and prescribe reasonable rules and regulations governing the operation of said routes.

It must furnish switch connections with private sidetracks, where such connections are reasonably practicable, can be put in with safety and the volume of traffic warrants the construction and maintenance of such connection. Cars must be distributed among shippers to the best of the carrier's abilities and without discrimination. Provision must likewise be made for the interchange of traffic between carriers and discrimination between connections is forbidden, though one railroad is not compelled to give the use of its tracks and terminal facilities to a competing line. The railroads are not permitted to adopt devices to defeat the continuous carriage of through freight.

Action for Recovery

The act also provides that the shipper may look to the initial line for reimbursement for loss or damage to freight; this is the Carmack amendment. With the exception of timber and the manufactured products thereof, and supplies for the carrier's own use, no railroad may transport any commodity in which it has an interest, direct or indirect. Free transportation, as far as the shipper is concerned, is limited to the necessary caretakers of live stock, poultry, fruit and milk. The carrier may not disclose any knowledge of a shipper's business except to governmental authorities, connections or in the course of legal process. A shipper is entitled to reasonable compensation for services or instrumentalities furnished in connection with transportation.

If the carrier is derelict in any of the obligations laid upon it by the act, the law gives the shipper the right to make complaint to the Interstate Commerce Commission, in whom is vested plenary powers to hear such complaint, determine the merits thereof and make appropriate orders in connection therewith. That there should be no defeat of justice through narrow construction, the law confers this right of appeal to the commerce board on "any person, firm, corporation, company or association, or any mercantile, agricultural or manufacturing society, or other organization, or any body politic or municipal organization or any common carrier." The commission is also authorized to entertain complaints forwarded by state railroad commissions. "No complaint," reads the law, "shall at any time be dismissed because of the absence of direct damage to the complainant."

This right of complaint embraces not only rates and practices in effect at the time of filing of the petition, but also changes about to be put into effect. The commission can, if it deems the equities of the case warrant the action, suspend any proposed advance for a period not exceeding ten months. As to all charges advanced since Jan. 1, 1910, the burden of proof to defend such increase is upon the carrier.

If the violation of the act has resulted in damage to the complainant, the commission has discretionary powers to award the injured party reparation. In any award of reparation, it may be parenthetically remarked, the commission makes a practice of reaching the man who paid the freight. All complaints for the recovery of damages must be filed within two years from the time the cause of action accrues.

Precautions that Assure Effectiveness

Since the underlying purpose of the act is to secure equality of opportunity, it necessarily follows that all favoritism which operates to destroy that equality is unlawful; that it is as reprehensible for the shipper to be the recipient of unlawful gratuities as it is for the carrier to permit preferential adjustments to exist. To obtain the needed reciprocating action of the law, Congress hit upon publicity, coupled with corrective powers, as the instrument of accomplishment. It said: Require every rate, every practice of the common carrier to stand open before the whole world. Publicity of rates and regulations will expose the discriminations against which popular clamor has been directed; we clothe the Interstate Commerce Commission with full powers to take summary action in correcting the evils that show themselves.

But publicity without effective enforcement would only aggravate. To avoid this, the published rate was made supreme and on the shipper is laid the burden of knowing what this published rate is. He must know and he must pay this rate, no more, no less. This is the great responsibility the law puts upon the shipper, knowledge of the published rate and absolute adherence thereto. If a railroad misbills, that does not avoid the shipper's liability to pay the legal rate. Even the practice of offsetting overcharges with undercharges is frowned upon. Each shipment is considered a separate transaction and carriers are required to exhaust their legal remedies in collecting their full tariff rates. Unlimited extension of credit by carrier to shipper has, in at least one instance, been urged as a basis for indictment on the grounds of rebating.

Harsh as this principle may seem in theory, onerous as it sometimes proves in practice, it has been recognized generally as the only way in which the equality sought for in the law might be enforced. One deviation from the published rate would open the door to more. Misquotation of rates subjects the carrier to fines recoverable by the United States, but offers no redress to the injured shipper.

Some Unusual Features of the Act

This in no way contravenes the shipper's right to just, nondiscriminatory rates and charges, for every unreasonable rate or practice is declared unlawful. To properly understand the situation, one must know the distinction between "legal" and "lawful;" the publication of a rate in the manner prescribed by law, runs the substance of a principle announced by the Interstate Commerce Commission in the case of the Arkansas Fuel Co. vs. Chicago, Milwaukee & St. Paul Railway Co., 16 I. C. C. Rep., 95,

makes the rate a legal rate, but the mere publication cannot make a rate lawful that is unreasonable and excessive; no rate can be lawful in the sense of being immune from attack, either with respect to past or future shipments, if it be excessive and unreasonable in amount.

So, if the legal rate be unlawful, the only course open for the shipper is to pay it and then seek relief from the commission. Granted that the rate is unlawful, the commission will then fix a just rate which shall be open to every shipper alike and order reparation—if the claim is well founded therefor—to the injured shipper. And that full justice may be preserved, the principle of reparation will apply to all who have shipped under the rates condemned, when such shipments are not barred by the statute of limitations and when they come within the provisions laid down by the commission in its original rate and reparation decision.

Congress was not content to rest with the general declaration that all rates, charges, practices and regulations should be just, reasonable, nondiscriminatory and nonpreferential, but augmented the general prohibition against charges opposed to these principles by singling out special vices for condemnation in the case of the shippers; it has also not stopped with the pronouncement that they must pay the published rate without deviation, but has stamped illegal certain devices that had been used to defeat the spirit of the law. Connivance or collusion of the carrier or its agents offers no mitigation. The attempt to defeat the rates is made equally criminal with the actual accomplishment of the unlawful project; both are declared frauds and misdemeanors and made punishable by a fine not exceeding $5000 or, in the case of real persons, imprisonment for a term not exceeding two years, or both.

Liability of the Shippers

But the law goes still further in its check on the unscrupulous. It makes the unfounded claim also a fraud and a misdemeanor, punishable by the same penalties and extending in the same way to shippers and their agents found mulcting the common carrier by this same device. That evasion of the intent of this section of the act may not be easy, the prohibition runs against those who, "by false statement or representation as to cost, value, nature, or extent of injury, or by the use of any false bill, bill of lading, etc., knowing the same to be fictitious or fraudulent, attempt to obtain any allowance for damage in connection with the transportation of property, whether with the connivance of the carrier, whereby the compensation of such carrier is made less than the regular rates.

When a preferential adjustment is made, railroad officials not infrequently set up the defense that the rate or practice complained of was not the voluntary act of the carrier, but was forced upon it by the pressure of large shipping interests controlling tonnage of such volume that the transportation company was loathe to see it go to other lines. In its attempts to safeguard equality of opportunity, Congress has taken cognizance of this condition; it has declared that any shipper or his agent who, "by payment of money, attempts to induce any common carrier or its officers or agents, to discriminate unjustly in his favor, as against any other consignor or consignee," shall be guilty of a misdemeanor and liable to a fine of $5000, or two years' imprisonment, or both, for each offense. In addition, such shipper or its agents, shall, together with the common carrier, be liable jointly or severally for all damages arising from such discrimination.

As the carrier is estopped from disclosing information relative to a shipper's business to his competitor, so, too, the shipper soliciting such information as may be detrimental or prejudicial to his rival subjects himself to a fine of $1000.

Conclusion

The effectiveness of any law is wholly dependent upon the public support that lies back of it. The Act to Regulate Commerce as it now stands is one of the most concrete expressions of the broader social sense of justice that has grown up in this country within the last few years. It is an index to an awakened business conscience, a reaffirmation of the age-old principle that you cannot build lasting success on the advantages you may unjustly take of your neighbor. Many of the practices now condemned in this statute were frankly recognized a decade ago as shrewd business and proof of commercial acumen. It is more than possible, in the light of past experiences, that certain of the practices that today bear the stamp of legitimacy, tomorrow may be crossed with the bar sinister. But, whatever the changing ideas of business morals may bring as to specific performances, it is inconceivable that there should be any departure from the fundamental purposes of equality of opportunity as expressed in this act. The instruments of guarantee for this equality, full publicity and strict adherence to the published rates, have proven adequate to the needs of the times. The soulless corporation is still run by living men who will still err as in Pope's day, who still will look at things from different angles; the mistakes of the past have not all been wiped out; the sins of the railroads and industrial fathers not all canceled by their children and new wrongs are bound to intrude from time to time in the relations between the transportation industry and commerce at large. But the machinery of redress is there.

To the shipper who knows his rights, such wrongs can only be temporary and prompt action will save him from permanent financial scars. His right to redress and relief, however, is still predicated upon that doctrine of universal application, that he must come into court with clean hands. Translated into direct terms of transportation this means that he must know his rates; he must pay them; he must adopt no device, however legal it may be, that will defeat the published rate; that will enable him to obtain his services at less than this rate. Having thus established his title to justice, he can stand at the bar and demand it.

Coal Rates to Chicago

The Peabody Coal. Co.'s monthly, "Coal Trade Sparks," describes Indiana and Illinois freight rates to Chicago as follows:

	Number of Billing Points	Freight Rate per Ton
Indiana		
Clinton and Brazil	29	$0.77
Linton	75	0.87
Princeton	15	0.94
Booneville	11	0.97
Evansville	1	1.27
Illinois		
Montgomery County	6	0.82
Central Ill. (Springfield)	63	0.82
Du Quoin	11	0.97
Belleville	72	0.97
Southern Ill.	48	1.05

Snap Shots In Coal Mining



The Penwell Coal Company's Tipple and Surface Plant at Pana, Ill.



Tipple and Boiler House at Government Mine of Carthage Fuel Co., Carthage, N. M.



Tipple, Power House and Store of H. C. Frick Coke Co., at Gates, Penn.



Washer at Virginia Mine of Consolidated Connellsville Coke Co., Gray's Landing, Penn.



Old-Fashioned Wooden Tipple of Nebo Consolidated Coal & Coke Co., Circle City, Ky.



One of the Modern Plants of the Christopher Coal Mining Co., in Southern Illinois

Coal Age Offers a Prize of $3 Each Week for the Best Photograph Sent to Us by Any Subscriber. Prints Submitted Must Be for the Exclusive Use of Coal Age. All Photographs Not Awarded the First Prize, but Accepted for Publication, Will Be Paid For at a Liberal Rate, Never Less Than $1 per Photo.

Wage Negotiations in Central Penn.

The following letters were submitted to the miners' scale committee by the Bituminous Operators of Central Pennsylvania. They refuse to consider the check-off, and request a reduction of 10 per cent. in wages.

LETTER No. 1

Du Bois, Penn., Mar. 3, 1914.

TO THE SCALE COMMITTEE OF THE UNITED MINE WORKERS OF AMERICA OF DISTRICT NUMBER TWO:

WHEREAS, under the terms and conditions of the various scale agreements entered into for many years between the Operators and United Mine Workers of America, the operators have been compelled to collect from their organization employees, in one form or another, the dues and assessments levied by the United Mine Workers of America, which system of collection is commonly called the "Check-off"; and

WHEREAS, During the past few years at various intervals extra assessments were laid or levied by the United Mine Workers of America on its members for the purpose of maintaining strikes at other points or in other states, with the demand on the operator to collect the same, which caused more or less dissension and controversy, strikes and suspensions in our own region; and

WHEREAS, legal action has been taken in some of the states against the United Mine Workers of America for such action, alleging a conspiracy between operators dealing with organized labor and the United Mine Workers of America; and further actions have also been threatened as disclosed by newspaper reports; and

WHEREAS, the check-off system has become so serious, unreasonable and un-American from the abuse or misuse on part of the United Mine Workers of America as to make its abolition necessary.

THEREFORE, BE IT RESOLVED, That the Association of Bituminous Coal Operators of Central Pennsylvania, through its Scale Committee this day assembled, do hereby demand from the United Mine Workers of America of District Number Two, an elimination of all such check-off provisions or clauses from all future scale agreements, and that hereafter the operators shall not be required in any manner to collect in any form from its organized employees any dues or assessments that may be levied or laid on said employees by the United Mine Workers of America.

LETTER No. 2

Du Bois, Penn., Mar. 3, 1914.

TO THE SCALE COMMITTEE OF THE UNITED MINE WORKERS OF AMERICA OF DISTRICT NUMBER TWO:

WHEREAS, the coal operators of central Pennsylvania, doing business within your district and with organized labor, have granted the miners of said district, from time to time during the past fifteen years, increases in wage rates amounting to 50%, which has resulted in the highest wage that has ever been paid to the miners in the history of this district; and

WHEREAS, during said period of fifteen years, the cost of producing coal, outside of the question of wages, has more or less likewise increased, produced by increased cost of material and new mining and other laws, both state and national; and

WHEREAS, the competition from the nonunion or unorganized coal fields, which work on a lower wage basis, is just as keen and severe as it ever was with the operators of the Central District of Pennsylvania; and

WHEREAS, during said period of fifteen years, the average selling price of bituminous coal in the markets, eliminating one or two temporary flurries, has rather decreased than increased, and the operators are further prohibited by the Sherman law from forming any combination to regulate the selling price of coal; and

WHEREAS, a contract was made and entered into on Apr. 20, 1912, between said operators and miners whereby a 5% increase in wages was granted to the miners who therein guaranteed that the operators should have the right to work their mines on the open-shop basis, and, notwithstanding such contract, the miners at numerous mines throughout the district refused to work with nonunion men, demanded an absolutely closed shop which resulted in a large number of strikes likewise in violation of said contract and thereby materially interfered with the business of said operators in not only a loss of trade, but also in the increase of expenses; and

WHEREAS, since about Oct. 1, 1913, a decided slump has taken place in the general business of the country and especially in the coal business to such an extent as to enable the large consumers who make their annual contracts for a coal supply based on normal business to accumulate large surpluses or stock piles of coal, thereby resulting in a general stagnation of the coal business to such an extent as to make coal a drug on the market, large accumulations of unsold coal at the mines and only about half time for the miners; and further that the coal business is showing a steady decline, and that the large amounts of surplus coal in the hands of the consumer do not argue for an upward turn in the near future; and

WHEREAS, the burden of depression of business conditions must be recognized and born mutually by the miners and operators of this district.

THEREFORE, BE IT RESOLVED, That the Association of Bituminous Coal Operators of Central Pennsylvania, through its Scale Committee this day assembled, do hereby demand from the United Mine Workers of America of District Number Two, a general deduction of 10 per cent. from the wages paid under the scale agreement of Apr. 20, 1912.

The Slack-Coal Problem in Colorado

BY CARSON W. SMITH*

There is beginning to be a slack problem in the northern Colorado lignite field, which is becoming more serious each season. The market for this grade of coal is becoming steadily more restricted and actual losses are sustained in handling it during at least one or two months of the year. From an economic standpoint, it is essential that the slack be sold at such a figure that it will carry its proper proportion of the operating costs.

The standard grade of slack in this district is that passing through a 2½-in. screen, the portion passing over the screen being sold as lump coal. While this slack makes an excellent steam fuel, the demand from this source has been steadily decreasing for some time. This is probably due principally to the incursion of electric power into its market, some of the mines themselves having adopted this. In fact, the principal demand for slack coal now comes from sources where the requirements extend over a portion of the year only, such as the beet-sugar factories, heating plants in the cities, canning factories, etc.; the fluctuating character of this business naturally results in unstable market conditions. Thus a market in which substantial premiums prevail may be abruptly changed, due to a sudden heavy demand for lump coal, which naturally results in an excessive production of screenings, with the result that the situation is rapidly reversed.

Normally, the margin of profit on this grade is small, while car shortage, inadequate methods of storage and deterioration are all factors tending to complicate the problem. Occasionally, the slack is dumped on the ground alongside the track at costs, including shrinkage, waste, etc., ranging from 25 to 50c. per ton, although this might be accomplished at a cost of about 10c. per ton. While a more comprehensive plan for doing this on a large scale would do much to establish a more equitable market, this would involve some uncertainty, as, for instance, the danger from spontaneous combustion (lignite coal firing easily), while elaborate and extensive equipment would be required. There is also the ever-present tendency to take a gambler's chance on the possibility of real-

*Consolidated Coal & Coke Co., Dacona, Colo.

izing a higher figure for the slack coal each succeeding season.

More Careful Sizing

It has also been suggested that a broader market for the slack coal might be obtained by a more careful sizing, say, for instance, rescreening into nut and pea coal. This has never been done heretofore, and, in fact, there are grave physical reasons for doubting the practicability of such a scheme; for instance, it is doubtful whether the breakage and disintegration incidental to loading, shipping and delivering would not cause this lignite coal to deteriorate until it was practically worthless.

This would certainly be the case if the coal is handled over the ordinary shaking screen and loaded in open railroad cars; but if it were put through suitable revolving screens and carefully deposited in the cars by means of loading booms and, say with the nut coal in closed cars, it is probable that a satisfactory product could be shipped in cold weather in any event. It is quite possible that some such plan will be tried in the near future, in which event the nut coal will be sold as a domestic grade and the pea coal as a superior steam fuel, the remainder of the screenings being thrown away. This seems to be a logical solution for the problem, providing a satisfactory market can be developed for the nut and pea coal, and it should result in a reasonable profit

There is also the possibility of briquetting the slack coal, and it is not improbable that this may develop into an important industry in the near future. This would, of course, result in the slack coal being utilized in the domestic trade, for which purpose it is now entirely unsatisfactory. One of the most important advantages of such a condition would be that the necessity for having a market for steam coal would be eliminated, and the electric power would have this latter field to itself. Such a readjustment in fundamental conditions as this would, of course, involve enormous expenditures for additional equipment, and it is unlikely that such will be attempted for the time being.

Underground Storage

The third solution of the difficulty is the storage of the slack coal underground. It is claimed that this is entirely practicable, and that large tonnages could be conveniently accumulated in many of the lignite mines and at little cost. It will not deteriorate so rapidly when stored underground, nor will the waste or shrinkage be so great, but there will be the danger of spontaneous combustion.

This plan provides for loading the coal at the working face with "harps" or screening forks, throwing the finer sizes back against the rib. Of course, a readjustment in the basis of payment would have to be made in order to reimburse the miner for shooting the unloaded portion, and the cost of reloading this when required would also have to be reckoned in. Suitable rooms in the mine would have to be selected, preferably new ones, having relatively little refuse and gobbed so that the slack could be thrown back and left for several months, if necessary. The number of places to be worked thus could be gaged according to the demand for slack coal at the time; and it would seem that there is no theoretical reason why such a method should not operate successfully.

It is naturally to be expected that an innovation of this character will develop problems in working out the details in practice, but it is difficult to foresee any of a serious character; and it is quite probable that if many of the operators would investigate the marketing of their slack coal, they would find an explanation for their reduced profits.

BY THE WAY

The shortest answer is to do it.

It is often better to bend than to break.

Don't think a royal crown will cure a headache.

Water down in the well does not quench thirst.

The water runs smooth where the river is deep.

Little troubles speak loudest; great cares are dumb.

It's not so hard to catch the mouse that has but one hole.

We can't gather roses without being pricked by the thorns.

Many men go wool-gathering and come home shorn themselves.

The fellow who wears the shoe knows best where it pinches.

Cleaning Anthracite by the Huff Electrostatic Process

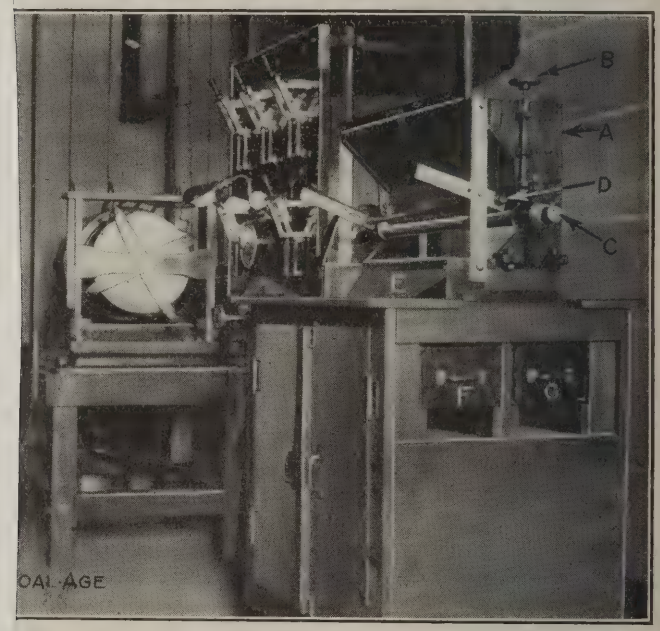
HINGTON*

s necessary as the particles get in the way of one another nd it is impossible to make a complete separation on ne electrode. For most coals it should not take more han four electrodes, as shown, to make the two final roducts—clean coal and tailings.

It is possible to treat the very fine sizes such as "slush," silt" and "dirt" (local names for culm) on a machine omposed of slides or chutes, but with this apparatus, the nly moving part would be the feed roll.

Description of the Apparatus

A machine having the revolving electrodes 30 ft. long nd built double (3 ft. 6 in. wide), as shown in Fig. 1,



IG. 2. Experimental Apparatus Now Installed

The process in its application to coals consists in effecting separations of such impurities as slate, bone, sulphur, iron phosphorus, etc., by utilizing the difference in electrical conductivity of these ingredients; it is accomplished without water and regardless of specific gravity or magnetic quality. Fig. 1 illustrates the principle of the process as applied in a field machine. The coal is fed to a hopper with an adjustable gate, which allows an even feed of a stream one or two particles deep to the first roll or "electrode" directly below.

The revolving electrode consists of ordinary steel shafting, 1½ in. in diameter, opposing which is a non-rotating electrode; means are provided for regulating the distance between these electrodes. As the mass of coal, slate, bone, etc., passes through the electrical field between the electrodes, the conductive particles are repelled or thrown out over an adjustable divider while the nonconductive remain inert and drop down to another electrode, where they are subjected to similar treatment. This repetition does not require more than two horsepower, electrically and mechanically, to operate. The capacity of the machines varies, for the same reason as does that of any jig or other concentrating apparatus, with the size of material treated. In cleaning No. 3 buckwheat, one machine should handle 150 tons in twenty-four hours.

The electrical set, for producing the electrostatic fields, consists of special generators and transformers, but of standard construction and capable of steady commercial use. In separating ore they are in use twenty-four hours per day and seven days a week. A three-horsepower motor drives the set. Fig. 2 shows the switchboard, and to the left a generating set capable of supplying a plant of 500 tons capacity. This outfit, which takes up little space, is capable of generating 35,000 volts, but at low amperage, thus eliminating danger in the operations. To the right of the switchboard is shown a one-electrode coal-testing machine, driven by a one-quarter horsepower motor (inclosed). *A* is a feed hopper of 50 to 75 lb. capacity. *B* is an adjustable feed gate which can be raised or lowered according to the size of material and the

*Harris Laboratory, 86 Fulton St., New York.

thickness of feed desired. *C* is the revolving electrode of the same diameter as used in a field machine. *D* is the opposing adjustable electrode, also of the same diameter as used in a field machine. The distance between the electrodes is varied according to the size of the material being separated.

For separating coarse particles the electrical field should be strong in order to repel and attract the conductive material over the divider *E*, to accomplish which, the opposing electrode is brought in close proximity to the revolving one. *F* is a drawer containing the conductive clean coal product which has been repelled over the divider *E*, while *G* is a similar drawer containing the nonconductive elements, slate with more or less bone. Divider *E*, being adjustable, may be set to obtain any grade of product desired, or, in other words, a high or low recovery. A low recovery of very clean material may be had, or a much higher recovery with corresponding decrease in grade may be obtained by the adjustment of this divider.

Method of Operating

With this electrical apparatus, which is the counter part of that in use in a number of large plants, and conditions the same as in the operation of a 500-ton commercial plant, the feed and electrodes of the same diameter as those in the field machines, accurate tests can be made on a small sample of 150 lb., the results of which can be relied upon to be duplicated in field or commercial work.

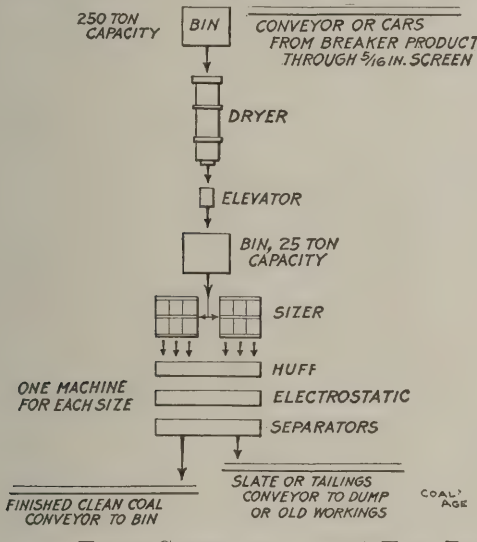


Fig. 3. Flow Sheet for a 500-Ton Plant

The one-electrode testing machine makes it possible to sample the products each time they are treated or separated, and also if found necessary, to have an analysis made before rerunning the clean coal product. By adjusting the chutes in a field machine almost any grade of coal can be treated, as the process is simple and flexible, and requires no special attention.

Due to its compactness, an electrostatic plant can be built adjacent to a breaker and by means of a conveyor belt or cars all the product mined and passing through a $\frac{3}{8}$-in. or $\frac{5}{16}$-in. screen can be treated. Fig. 3 shows a flow sheet of a proposed 500-ton plant. Coal comes from the breaker after passing through a $\frac{3}{8}$-in. or $\frac{5}{16}$-in. screen, is dried, and separated in the electrostatic machine. Practically all the moisture must be eliminated, as water is a good conductor of electricity, and makes the slate and other impurities conductors. This leaves a dry material of maximum heat units.

Anthracite coal running from 15 to 25 per cent. ash (slate) can be successfully cleaned electrostatically, as this slate has much less electrical conductivity than the coal (carbon) which latter has excellent conductive properties. The coal can be dried on this scale for less than $1\frac{3}{4}$c. per ton, an insignificant amount in comparison to the enhanced value of the dry finished product. This cost of drying includes labor, power, fuel and depreciation.

From the rotary dryer, the coal passes to a sizer from which three or four sizes can be obtained from the same machine, or more if necessary. The greater the number of sizes made, the corresponding lessening of the capacity. As the sizers can be placed on the top floor of the plant, the products are piped to the electrostatic machines on the floor below. The same is true of the electrostatic process as of any other concentration or separating process; i.e., the closer the sizing, the better the separation. After passing through the machines and the two final products are made—finished coal and refuse—conveyors take the cleaned coal product to storage bins while the slate can be flushed back into the old workings.

Some Advantages of the Electrostatic Process

By the electrostatic process not only can practically all the coal be saved, including that which passes through a $\frac{3}{32}$-in. screen, but the ash content is so reduced that the product can be sold on an absolutely guaranteed ash-and-moisture basis, the ideal method of purchasing. This kind of coal naturally commands a higher price since it is a much superior product. The ash-disposal charge is greatly diminished, the freight lessened, and the B.t.u. value per ton increased sufficient to effect a reduction of from 10 to 20 per cent. in the coal consumption.

The large consumers in New York City using Nos. 2 and 3 buckwheat, rice and barley, buy from 7 to 10 per cent. moisture and from 15 to 20 per cent. ash in their coal. Electrostatic separation should deliver this material with the moisture content practically eliminated, and the ash reduced to 10 per cent. or less.

No doubt a method will eventually be devised to burn direct (instead of briquetting) the clean coal from culm, which in general amounts to about one-half of the total product passing through a $\frac{3}{32}$-in. screen and, after electrostatic separation, runs less than 11 per cent. ash. A reason anthracite briquettes have not found a ready market is that they contain from 18 to 25 per cent. ash, which as the briquettes disintegrates chokes the fire much more than when burning stove or chestnut size. With the ash content reduced from 25 or 30 per cent. to 10 or 12 per cent., not only a better grade briquette can be produced but one having a much higher heat value will be obtained.

Thus this electrostatic method, which is just beginning to attract attention in the coal world, should prove of great value to those having to deal with the finer sizes of anthracite. Its application to the bituminous fields will be described later.

To anyone interested in seeing the apparatus shown in Fig. 2 in operation, invitation is extended to call at the Huff Electrostatic Separator Co.'s office and laboratory, 60 India St., Boston, Mass. The same method in a large-scale use may be seen in the metalliferous mining regions.

Miners Uphold Linker Docking Law in Pennsylvania

A legal battle to determine the status of the Linker Docking law was started by the United Mine Workers when the organization caused the arrest of Superintendent Walter Fahringer of the South Side Division of the Lehigh & Wilkes-Barre Coal Co., charged with its violation. Superintendent Fahringer waived a hearing before Squire McShea, at McAdoo, Penn., and entered bail for his appearance at court.

For many years the coal companies have docked for dirt and rock when the cars reached the breaker. The Linker act, which is said to be generally ignored in the anthracite field, provides that the miner must be paid for his coal when it is mined at the face. If docking is to be done, there is where the charge must be made.

The State Senate amended the act so that it was not to operate in violation of any existing wage agreements between miners and operators. The latter have claimed that it does this, and hence they have not followed it.

Miners cite the charge that the Lehigh Valley Coal Co. docked its Yorktown miners at the Yorktown breaker until the structure was abandoned. Now the dockage is done at Jeanesville, which prepares the Yorktown coal. The men argue that if the company can change the place of payment to the miners, then the state legislature has the same power.

The Linker bill opens other avenues of dispute over dockage. If a miner is digging out coal, he is to be paid by the car. The United Mine Workers argue that if he strikes slate or rock and must cut it out he is compensated by the yardage on another agreement. Since this is the case, the miner is entitled to either pay for cutting rock or pay for mining coal.

The Linker act is designed to prevent thefts of cars of coal. One man of the Lehigh & Wilkes-Barre Coal Co. mines has shown the United Mine Workers' officials that he has lost eight cars at $2.22 each in two weeks. The contention of the organization that when a miner fills his car and the drivers, servants of the company, take it, it constitutes an acceptance of the car, has never been sustained. But the United Mine Workers assert that under the Linker Docking law, the car is receipted for as it arrives at the face of the breast, and theft of coal cars will be impossible.

A Record Output at a Pennsylvania Mine

Eighteen 100,000-lb. capacity steel railroad cars loaded in a single day, is the record output recently made by one motorman at Mine No. 1, of the Scalp Level Coal Mining Co., whose offices are at Windber, Penn.

On this particular day they worked exactly nine hours and 45 min. The only haulage equipment used was an 8-ton Baldwin-Westinghouse bar-steel electric mine locomotive, equipped with commutating-pole motors. This locomotive, except for a few mine cars hauled from a dip heading by a mule, did all the work, gathering the coal cars and hauling them to the tipple. When they stopped work in the evening the locomotive was inspected and found to be in first-class condition in spite of the heavy work it performed. The motors were nearly as cool as when they started in the morning.

Twelve mine cars, each loaded with two tons of coal, were hauled on each trip. The longest haul was about 2500 ft., from the face of the first-left entry to the tipple, and about the same distance from face of main heading to tipple. The grades in this mine at two points for a distance of 400 ft. are 1½ per cent. against the loads.

Thirty-six trips were hauled, and it is estimated that at least two minutes were lost on each trip on account of the motorman waiting for empty cars outside. Notwithstanding this loss of time the operators feel certain this was the highest run of coal ever made in western Pennsylvania in one day by one motorman.

The men at this mine claim that there was no extra effort made this day to make a record. It was only an ordinary day's work, and they believe that if they would make an extra effort, with every man on the jump, for any one day, this Baldwin-Westinghouse mine locomotive could gather and haul sufficient coal to at least load 24 steel cars.

Coming Society Meetings

American Mining Congress

A special meeting of the American Mining Congress, in accordance with a resolution adopted at the 16th annual session of the American Mining Congress, is called, to be held at 8 p.m., Mar. 26, Majestic Building, Denver, Colo. The purpose of the meeting is to adopt or reject an amendment to the by-laws, which proposed change, prepared by H. M. Chance, Eli T. Conner and J. Blair Kennerly, is designed to meet the recommendation of the Ways and Means Committee that some way be provided to furnish a larger fund, so that the work of the congress can be more properly carried on. The proposed amendment will accomplish this end through securing the support financially of the larger mining corporations by making such corporations "subscribing members" of the congress. These "subscribing memberships," however, will not be entitled to vote.

American Peat Society

The American Peat Society will hold its eighth annual meeting at Duluth, Minn., Aug. 20, 21 and 22. Papers will be read and discussed on all uses of peat, agricultural, fuel, industrial, etc. Julius Bordoilo, Sec.-Treas., 17 Battery Place, New York, N. Y.

Canadian Mining Institute

A meeting of the Rocky Mountain Branch of the Canadian Mining Institute is to be held at Fernie, Crowsnest Pass, British Columbia, Mar. 18 and 19. W. R. Wilson, general manager for the Crow's Nest Pass Coal Co., Ltd., is chairman, and John L. Stirling, provincial inspector of mines for Alberta, secretary.

The meeting will be opened on Wednesday, Mar. 18, when the chairman will deliver an address, following which several papers will be read and discussed, as follows: "Mine-Rescue Apparatus," by Charles Graham superintendent for the Corbin Coal & Coke Co., Corbin, B. C.; "Mechanical Equipment of Collieries," by N. C. Pitcher, Lethbridge, Alta.; "Certain Classes of Faults Encountered in the Crowsnest Pass District, with their Correlative Effects on Economic Mining," by W. R. Wilson; "Shaft Sinking in Edmonton Coal Field," by E. I. Roberts, Evansburgh, Alta.

Papers read at earlier meetings of the branch, namely those of J. Somerville Quigley, manager for the Hillcrest Coal & Coke Co., Hillcrest, Alta., on "Methods of Driving Pillars in Pitching Seams"; C. C. Richards, of Edmonton, Alta., on "Field Notes for an Underground Survey"; M. L. Hyde on "Important Details in Connection with Construction of Colliery Plants"; N. C. Pitcher, on "Preliminary Costs of Machinery for Colliery Work"; and of Francis Aspinwall, district inspector of mines, Lethbridge, Alta., and Andrew A. Millar, manager for the Pacific Pass Coal Fields, Ltd., Fergie, Alta., on "Mine-Rescue Apparatus and the Value of Mine-Rescue Work," will also be open for discussion.

Editorials

Pertinent Supreme Court Decision

The Supreme Court of the United States has recently handed down a verdict affirming the judgment of the lower court rendered by the late Judge Ferris, in what has become known as the Barrier-Pillar Case.

The anthracite-mining law, Art. 3, Sec. 10, requires the leaving of a sufficient barrier pillar between adjoining coal properties, sufficient to provide for the safety of the employees in those mines. It is stated that the mine inspector of the district, David T. Davis, Aug. 3, 1909, notified the Plymouth Coal Co. and the Lehigh & Wilkes-Barre Coal Co., operating adjoining mines in Plymouth, that the barrier pillar required by law must be left in their respective adjoining workings. By law, Mr. Davis, together with the engineers of the two companies, constituted the board to determine the size of pillar that should be left to comply with the statute. They failed to arrive at any agreement; and, as a result, Mr. Davis, in the following October, filed a bill in equity, in the court of Luzerne County.

This case, which, at the present time, has an important bearing on other mining decisions, was heard by Judge George S. Ferris, now deceased. On the claim of Mine Inspector Davis that a 70-ft. barrier pillar should be left between the workings of these companies, Judge Ferris so ordered. An appeal from this decision was taken by the Plymouth Coal Co., and the case went to the Supreme Court of Pennsylvania.

It was claimed by appellant that the requirement of the anthracite law in question was not in harmony with but contrary to the provisions of the fourteenth amendment to the Constitution of the United States and Art. 1, Sec. 10, of the Constitution of Pennsylvania. These laws are as follows:

Anthracite mining law, approved by Governor Robert E. Pattison, June 2, 1891, Art. 3, Sec. 10:

It shall be obligatory on the owners of adjoining coal properties to leave, or cause to be left, a pillar of coal in each seam or vein of coal worked by them, along the line of adjoining property, of such width, that taken in connection with the pillar to be left by the adjoining property owner, will be a sufficient barrier for the safety of the employees of either mine in case the other should be abandoned and allowed to fill with water; such width of pillar to be determined by the engineers of the adjoining property owners, together with the inspector of the district in which the mine is situated, and the surveys of the face of the workings along such pillar shall be made in duplicate and must practically agree. A copy of such duplicate surveys, certified to, must be filed with the owners of the adjoining properties and with the inspector of the district in which the mine or property is situated.

Fourteenth amendment, Federal Constitution:

No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of life, liberty or property without due process of law.

Constitution of Pennsylvania, Art. 1, Sec. 10:

No person shall, for the same offense, be twice put in jeopardy of life or limb; nor shall private property be taken or applied to public use without authority of law and without just compensation being first made or secured.

The pertinent bearing, in this case, on present-day mining operations in the anthracite field, relates to the contention of the company that under the provision of the Anthracite law the private property of the coal company was appropriated to public use, namely, the protection of the lives and properties of the community and no compensation was provided for the owner of the coal left for this purpose. It was claimed that this was an illegal exercise of the police powers of the state.

Judge Ferris, in rendering his decision, from which the appeal was taken, discussed broadly this contention of the appellant company, stating in words that are memorable:

The principle is equally vital, because it is essential to the peace and safety of society that all property in this country is held under the implied obligation that the owner's use of it shall not be injurious to the community; therefore, the act of 1891, under which this case was brought, was a valid exercise of the police powers of the state.

Without going further into the details and merits of the barrier pillar case, we would draw attention to the application of the principle involved in that case, as recently made by City Solicitor David J. Davis, who is resisting, at present, the appeal taken by officials of two of the largest coal companies in the anthracite region. The city solicitor claims with much justice, we believe, that the principle of equity laid down by Judge Ferris, in the former case, applies with equal force to the protection of the lives and properties of communities residing on the surface overlying coal seams from which the mineral is being extracted.

It is a large question and one to which COAL AGE has referred previously as involving "a clash of equities." The law defining the equal rights of surface holders and the possessors of underlying mineral claims has yet to be clearly defined. It cannot be decided briefly or offhand, but must be worked out with due regard to justice and the equal rights of the parties concerned.

The principle, however, of the *paramount importance and value of human life and health, in its relation to individual or corporate rights,* is unquestionable. Any law that ignores this principle is unstable and must eventually be annulled.

A Lean Winter for the Coal Companies

Following a summer period of almost unprecedented activity, the coal trade has experienced a winter season of equal depression. The trouble seems to have been due to a combination of adverse conditions, such as the general wave of retrenchment in all lines of industrial activity, and to the peculiarly mild temperature prevailing throughout the country during most of the season. Under the compelling influence of these determining factors, the coal trade has rounded out the year in a most disappointing form.

It is likely that even the most consistent pessimists have failed to realize the full proportion of the curtail-

ment, upon which a study of the performance of some of the leading coal roads offers some interesting thoughts. The Pennsylvania Railroad, the largest bituminous-coal road in the country, showed a substantial increase in fuel shipments all through the year 1913 until the break occurred in December. Until that time the total shipments over this road for 1913 amounted to nearly 70 million tons, as compared with 63½ million in 1912. But December shipments for 1913 were 300,000 tons less than in 1912, while in January the movement for the current year was 600,000 tons less than the same month last year. A sudden decline in the shipments is noticeable, beginning with October; in that month 7 million tons were handled, 6½ million in November, 6¼ million in December, and less than 6 million in January. The other bituminous coal roads reflect substantially the same conditions.

Because of the shortage of some six million tons as a result of the six weeks' suspension in mining in the early part of 1912, a comparison of the monthly shipments of anthracite cannot be made fairly with the movement in 1913. However, it is a significant fact that the total shipments for the year 1913 fell short of those for the last previous normal year, 1911, by nearly a million tons. The meager shipments of 4½ million tons in January of this year, the lowest made during any normal month since September, 1909, speak eloquently of the adverse conditions in hard coal. Turning to the earnings of the Reading company, we find still additional light on this subject. January receipts for the current year were $2,836,047, as compared with $3,680,572 for January last year, while profits for the same periods were $95,359, and $560,356, respectively.

A glance over the coal-car supply statistics substantiates still further these conclusions. When the peak of the load was reached in mid-October, a net shortage developed which continued until Nov. 1. But during the closing two months of the year, the surplus of coal equipment was more than doubled each two weeks, finally reaching over 86 thousand on Jan. 15—a figure scarcely exceeded during the suspension in both the anthracite and bituminous fields in April, 1912.

But even in the face of these adverse conditions, there are hopeful possibilities in the future. It is noted, for instance, that free tonnages of demurrage coal are not being indiscriminately dumped into a market totally devoid of any absorbing power, in the manner characteristic of previous dull seasons. There are also many who rightly argue that the possibility of a suspension in the bituminous field Apr. 1, will have an important psychological effect upon the trade. Whether this materializes is dependent entirely upon the pending negotiations.

Opinions as to the outlook in this regard are about as inconsistent as in former years. The possibility of a suspension of more or less long duration seems to be about equally balanced, although the opinion of those best informed on the subject seems to be that a shut-down of at least short duration is inevitable.

The British Fatality Rate

The British fatality returns are always based on two different methods of computation. One is concerned with separate fatal accidents and the other with the number of lives destroyed by such untoward occurrences. While tables like the latter may be unduly swelled by one or two severe explosions, hoisting accidents, inundations, airblasts or mine caves; the former must always remain in some ways a fairer index of mining conditions.

As an example of the dependence of the total fatality rate on the casting of a die, the Bicknell explosion in the state of Indiana at the close of last year is a case in point. It evidenced that the mine was in a dangerous condition just as clearly as if it had killed almost a full shift of men. If the mine had been working with the full quota, few would doubtless have been saved. Only chance prevented it from making a much larger addition to the death rate of last year.

The number of separate fatal accidents in Great Britain was greater by 59 in 1913 than in 1912, an increase of 5.13 per cent. This was probably due to the greater number of days the mines were operated. In fact, the fatal accident rate per month really improved even if we assume that the British strike in 1912 only lasted a month. It actually exceeded that period about a week everywhere and in some places a longer time. A 4 per cent. improvement per month would be shown if the figures were based on a month's suspension.

But the increase in fatalities enumerating not separate accidents but individuals killed cannot be thus reasoned away, for explosions of coal dust or firedamp while numbering only 12 caused 461 men to lose their lives. Thus the loss of life mounted from 1276 in 1912 to 1742 in 1913, a gain of 466.

The Senghenydd explosion was, of course, largely the cause of this increased death rate, for in it 434 men lost their lives. It was the sole catastrophe of magnitude in Great Britain in the year except a much smaller accident at the Rufford shaft. Unfortunately we, in the United States, cannot point to as good a record in 1913. Our death list seems to point rather to decreased safety and only what we know about the efforts being made everywhere to make mining safe, gives us certain assurance that there is more cause for perseverance than there is for alarm.

Arbeitswillige

A labor agitator in Germany must not use any such opprobrious title as "strike-breaker." He must term such a man an *"arbeitswillige,"* a man who is willing to work. The Teutons are as sensitive to mere language as we are. How we also shrink from that word, "scab," which expresses a man who is willing to work when and where his mates are unwilling?

Much usage in unpleasant association will make *arbeitswillige* as offensive as strike-breaker, but this mil substitute of the Germans must be used with due discretion to persons only who are offenders against the moral sense of the public, or it will have as little meaning as "mugwump," which was a word to conjure with in the eighties and nineties and now is like "abracadabra," a relic of a past superstition.

If *arbeitswillige* is used to express disdain, the last estate of society will be worse than the first, for a willingness to work under all conditions will be regarded as evil. Are not *arbeitswilligen* altogether too rare in all countries, especially among the well-to-do?

D. A. Thomas Back Again

The New York *Evening Journal* publishes the following interview with the English coal man:

D. A. Thomas, the Welsh coal magnate, who made two visits to America last year to look into the coal resources of West Virginia, with a view to acquiring coal properties here, arrived from England Mar. 6. Mr. Thomas stated that his visit is not for the immediate acquirement of more coal properties in West Virginia, but to complete arrangements for the building of a 1500-mile railroad in northwest Canada.

Accompanying Mr. Thomas on the Lusitania, were several Canadians, with interests in the Northwest, and he is to be joined in New York by other capitalists interested in the building of this road, which will open up a vast territory. The line will be known as the Pacific, Peace River & Athabasca R.R. Mr. Thomas became interested in this proposition when he made a visit to the Northwest last year. The road will pass through a large coal area, not at present developed, known as the Ground Hog* coal fields, and as these lands lie near the Pacific, Mr. Thomas sees possibilities of placing the coal in the Pacific markets and said further:

"My interest in producing coal in Wales, is secondary to my interest in coaling depots all over the world. I recognize that if I am to keep them going successfully, I have to look ahead for supplies. The unsettled labor conditions in the Old World make it all the more imperative that I look to America for coal for the future. The labor situation in England is very much unsettled, and I would not be surprised if we have serious trouble with the miners in 1915."

Asked about the action of certain Congressmen from coal-producing states in urging the United States to enact legislation prohibiting the sale of any but American coal on the Panama Canal, Mr. Thomas said: "Such legislation is entirely unnecessary. Panama is the natural outlet for American coal, and American producers will unquestionably reap the benefits that will accrue through the operation of the new waterway. When one considers that in the past ten years, American coals have supplanted Welsh coals in the West Indies, one does not need to give serious consideration to the fear of competition at Panama from Welsh or German coals.

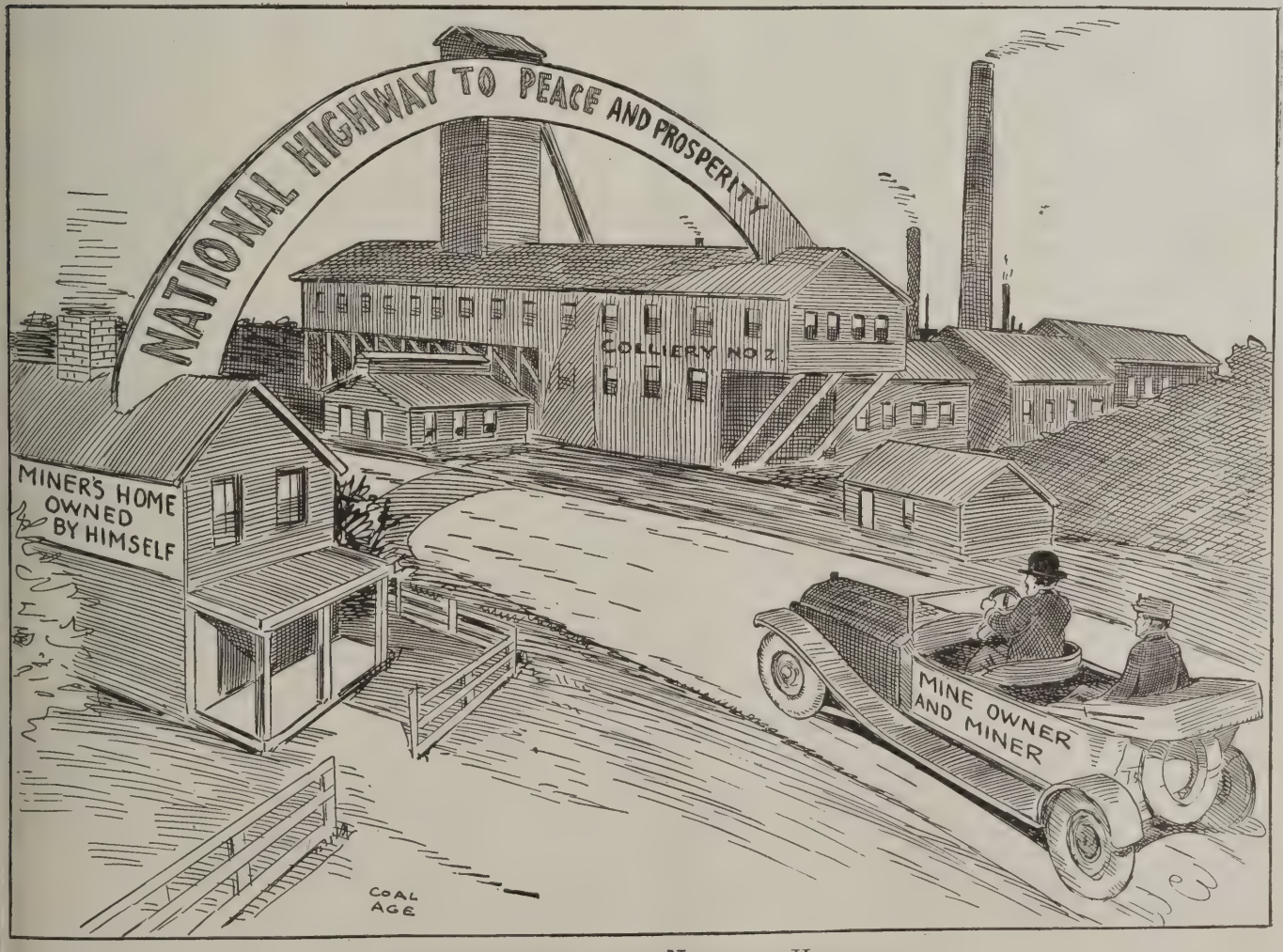
AMERICAN COAL AND THE PANAMA CANAL

"The canal will play an important part in commerce, and I am therefore giving it a great deal of study. To have my coal interests international appeals very strongly to me, and I am hoping to extend my operations from time to time, so that my producing interests will be situated so advantageously from a geographical standpoint that my coaling depots will be assured of a constant supply of coal and at competitive prices, no matter where they may be located.

"I see a great future for your better grades of American coals from the operation of the Panama Canal. Your coals are at present impregnable so far as the West Indies are concerned. The west coast of South America will take a great deal of tonnage from American shippers when the canal is opened up, while at the present moment Americans are increasing their shipments to the east coast of South America and to the Mediterranean."

*For a brief description of this district see "Coal Age," Vol. 3, p. 993.—Editor.

Duty to Warn Miner Against Danger—In a suit for injury to a miner, received in a mine explosion, caused by the lamp on his cap coming in contact with a charge of dynamite which his foreman had inserted in a hole in an overhead timber preparatory to blowing the timber out, the jury were warranted in finding that there was negligence in failing to warn the man against the danger, although he knew that the hole had been drilled in the timber for the charge; he having no knowledge that the explosive had been inserted. The foreman shouted a warning just too late to avoid the accident. (United States Circuit Court of Appeals, Second Circuit; Pennsylvania & Reading Coal & Iron Co. vs. Keslusky, 209 Federal Reporter, 197.)



THE ENTRANCE TO THE NATIONAL HIGHWAY

Discussion By Readers

An Acknowledgment

I wish to take this opportunity to thank you for publishing my inquiry in your issue, Jan. 5, p. 30, relative to water-bearing strata over a coal bed. The discussion by your readers was very helpful. After we have developed our mine I shall be glad to correspond with anyone who desires the benefit of our experience.

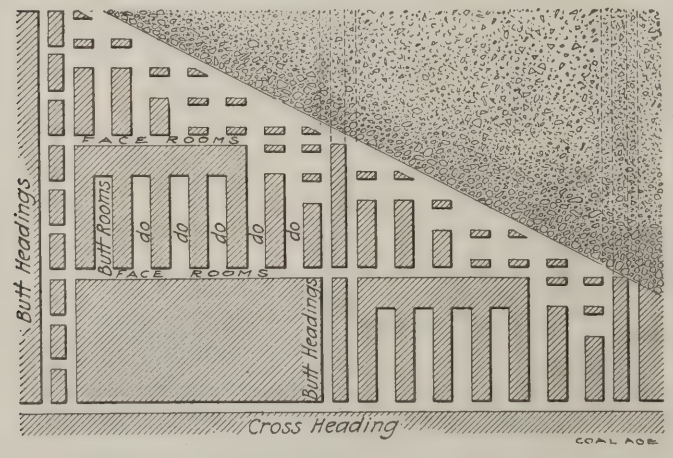
GEORGE MACPHAIL, Engr.,
What Cheer Coal Mining Co.

Bay City, Mich.

Longwall Mining Methods

Letter No. 7—Referring to the inquiry of "Bituminous," in regard to methods of longwall mining, in my opinion, the kind of longwall best suited to the conditions described would be a modified room-and-pillar system that may be described as follows:

The work is begun by developing a full section of eight pair of butt entries, or headings, driven on 300-ft. centers and forming a longwall face of, practically, 1400 ft. in length, a portion of which, only, is shown in the accompanying figure. Starting at the inby corner, or at the



A LONGWALL FACE, RETREATING SYSTEM

head of No. 1 or No. 8 butt entry, as the case may be, and retreating, face rooms are turned off the even butts only. These face rooms are turned on 120-, 140- or 160-ft. centers, depending on conditions. In the present case, I would drive the face rooms on 140-ft. centers.

Now, starting at the inby corner of the face rooms, butt rooms are driven on 42-ft. centers. These rooms are driven 21 ft. wide and 21-ft. pillars. In the retreating plan, the face rooms may be driven double, but care should be taken to drive the breakthroughs between them on the same centers, 42 ft. The butt rooms and breakthroughs may be driven while developing the face rooms, thereby increasing the production of coal, for the same cost of operation, and decreasing the cost per ton over what can be attained in the regular longwall-retreating system.

When Nos. 1 and 2 or Nos. 7 and 8 butts have been driven to the line or barrier, work is started on the retreating plan, by driving the butt rooms off the face rooms, on the upper side only, as described. The butt rooms are driven through the ribs, and three cuts are then made in the 21-ft. ribs separating them, these cuts being 18 to 20 ft. wide and leaving stumps of 7 or 8 ft., which are taken out at once with picks. The break line or line of fracture, is kept on an angle of about 60 deg. off the butts or 30 deg. off the face rooms.

This is an excellent system, in respect to economical haulage and ventilation. The air current can always be made to sweep the gobs, after passing the working face. The system has been tried and proved very successful, both on the semi-retreating and the full-retreating plan; but the latter, in my opinion, is the more satisfactory system to adopt, if given proper attention.

A similar system but worked with smaller entries and perhaps narrower rooms, can be found on the upper end of the Monongahela River, near Brownsville, Penn. The Bridgeport and other mines, in that vicinity, have tried a similar system that would have been more successful had they used longer rooms and greater entry centers. The system I have described gives an actual longwall-retreating face, with room-and-pillar development.

MINE FOREMAN.

Coal Center, Penn.

A Plea for the Mine Foreman

I noticed in your timely editorial, Mining Education, COAL AGE, Jan. 10, p. 96, a reference to the efforts often made by large coal-mining companies, to secure a large available list of candidates for the positions of mine foreman and fireboss, while there are but comparatively few of these positions to be filled. And when these qualified men ultimately secure the position they seek, it is to work for a salary that is generally less than the pay received by a hard-working miner.

During the course of several years in coal mining it has frequently occurred to the writer that one of the fundamental weaknesses of the usual scheme of organization at coal plants consisted in the lack of proper incentive to the right type of men to become mine foremen.

I consider the mine foreman to be the keystone of the whole mining system. He is, in point of law and in fact, in exclusive control of the mine. True, he is guided and directed by his superiors to a large extent; but I believe that most practical mining men will concede that the mine foreman has more direct control over the cost, tonnage, safety precautions, etc., than any other individual in charge. But the point to which I wish to draw attention is that the financial and social inducements that are offered to the man aspiring to become a mine foreman are, to say the least, not flattering.

In the mines with which I have been acquainted, there were men who made more money than their foreman, and

who were without responsibility other than their own safety, and whose social position in the community was as high as that of their foreman. It is not necessary to go into details of the worries, difficulties, trials and tribulations of the mine foreman. Mining men all know what he is up against. I think, too, that if one stops to consider he can but realize there is little inducement for a man to prepare himself for such a position. Mine foremen, as a class, do not make as much money as railroad trainmen. They must live as close to the pit mouth as possible, and often work seven days a week and 12 or 14 hours a day. The mine foreman is regarded by his men as directly responsible for most of their troubles, and is too often so regarded by his superiors.

When one stops to consider that it is financially more profitable to run a cutting machine, work six or seven hours a day and come out of the mine with no responsibilities to worry over until the whistle blows the next morning, he is forced to conclude that either there should be a division of the responsibilities that now rest so heavily on the mine foreman, or his pay should be more commensurate with the salaries of other mine officials and the prices paid for other labor around the mine.

Any foreman can save or lose twice the amount of his salary each month in material and coal lost or recovered; and the same is true of a number of items, the loss of which would not be discovered by his employers.

I believe that the position of mine foreman as at present understood, requires ability of a high order. It may be said to the credit of our faithful mine foremen that they have no labor affiliations to stand out for their assumed rights and privileges, but depend on their own merit and ability as true workmen.

W. G. Srodes.

Moundsville, W. Va.

Liquor and Safety in Mining

I have noted with strong approval some of the recent editorials and articles in Coal Age, relating to the evil effects of alcoholic liquors on mine workers. Being the owner of a small anthracite-mining operation, I have had some opportunity of noting these effects, which, I believe, if fully known to owners and managers of mining properties, would cause them to stand aghast.

For some time, I have been considering the advisability of writing a letter to mine owners in this district or even the entire hard-coal field, suggesting the calling of a meeting to discuss the liquor question in its relation to the safe operation of coal mines. It has even occurred to me that it might be advisable to select one or more engineers of experience in coal mining, for the purpose of making a careful investigation and inquiry into existing conditions in this regard and making a report that would show the exact relation of the liquor habit to safety in mining; and to make suggestions as to how the evil can be best overcome. I have hesitated to do this, because of the comparatively small interest I represent in the coal-mining industry. However, I write this letter in the hope that a way may be suggested by which the attention of those in control of the anthracite industry will be drawn to the matter and some action taken.

E. S. Stackhouse.

Shickshinny, Penn.

Mine Legislation, Ohio

Referring to the recent interesting compilation of statistics in reference to the production of coal for 1913, Coal Age, Jan. 10, I notice that, in several of the larger coal-producing states, the death and accident rates have materially increased. In our own state, Ohio, the increase in the death rate has been 25 per cent., notwithstanding the "safety first" campaign that has been waged so successfully throughout the state. One is led to wonder what might have been the result if these endeavors in the interest of safety in mines had not been undertaken.

The Ohio Legislature, now in session, have considered a number of measures having for their aim and purpose the safety of mining operations and the conservation of the coal. Among these measures may be mentioned the appointment of safety mine foremen; the regulation of solid shooting; and the provision of suitable emergency supplies in mines. The general tone of the legislation thus far passed by the assembly, under the leadership of Governor Cox, has given general satisfaction and leads both miners and operators to hope for the passage of further sane and uptodate measures relating to safety in the mines. This is more earnestly hoped and expected, since the law-making body turned its attention toward the coal business.

Operators should not object to the passage of laws looking to the safety of life or the conservation of natural resources because additional expense would be incurred by the passage of such laws requiring improvements in the equipment of the mine and methods of operating. Any increase in the cost of operation must necessarily fall on the consuming public. The anthracite tax in Pennsylvania will naturally be added to the price of anthracite. Any wage increase always means an increase in the price of coal to the consumer.

If the public demands these measures for safety, the public must be willing to stand the expense, and I believe that whatever additional expense is required to reduce the death rate among miners, or the conservation of the coal supply will be gladly met where it rightly falls. It must be conceded that the coal business must pay a living wage to the miner and a proper return to the operator.

George N. Lantz.

New Straitsville, Ohio.

Mine Legislation, Arkansas

It was with great interest that I read the article in Coal Age, Feb. 21, p. 314, entitled Safety in West Virginia. Although one or two of the rules given would not, perhaps, be applicable to coal mining in this state, I have seldom read a more complete set of instructions than what is there stated as "furnished to every mine foreman and assistant mine foreman." I am sorry to say that we have no such excellent rules and regulations in Arkansas.

Not to censure anyone in particular but with the hope of gaining better mining laws in this state, I submit a few facts that illustrate some of the conditions existing in all mines. The fact that these conditions exist is sufficient evidence that the state mining law is poor.

As has been mentioned in regard to other states, here also, too much is expected of the mine foreman. His

territory is too large to permit a daily visit to every working place in the mine. In many instances, the mine foreman's time is taken up with matters that should be looked after by someone else. He is obliged to devote much time each day to start an old pump working that is fit only for the scrap pile, instead of inspecting the working places and looking after the safety of the men in his charge. There are, I am sorry to say, some mine foremen who seldom go into the mine except on measuring days.

The fireboss, also, is required to cover too much territory. In many instances, he must examine in 2 hr. so many places that, if the examination were properly made, the work would require 4 hr. to complete. The fireboss often removes gas from the face of a room by brushing it out with a piece of canvas, regardless of the presence of any open lights. Everyone knows that such a practice is dangerous and that the gas should be removed by the air current only.

Speaking of brattices and stoppings, it cannot be said that we have any such things in these mines. There are what are called dirt stoppings," over which one can see into the next entry. Other stoppings are constructed of powder kegs, soft shale rock, sulphur balls, etc. These are the kind built on the main entries; in the rooms, there are no stoppings of any kind.

The rooms are driven up from 100 to 300 ft., and, in the latter case, there is sometimes a curtain hung on the entry to throw some of the air into the rooms; but this air is generally lost in the first crosscut 30 or 40 ft. from the entry, and never reaches the face. Where cross-entries are turned off the main entry, instead of a good door being hung on the entry, a curtain of 12-oz. ducking is used, which only throws a small scale of air into the cross-entries; the most of the air current goes over or under the curtain or passes it on either side.

The old workings are never examined, not even once a week. I have known cases where mines have not been examined after an idle day, and the men are allowed to go in and work as usual. On many haulage roads, water is allowed to flow down the middle of the track and where mules are used to haul the coal a miner, making a misstep, will go up to his knees in mud.

In conclusion, I wonder that any mine foreman or assistant foreman would neglect to perform his duty, under the good rules that are laid down for their benefit in West Virginia, regardless of the offer of a premium for so doing. While a word of encouragement goes far toward securing the faithful performance of duty, any neglect of duty should meet with a sufficient reprimand.

A. R. HAMFLETT.

Huntington, Ark.

Study Course in Coal Mining

By J. T. Beard

The Coal Age Pocket Book

Caution—In the calculation of all problems in mine ventilation, regard must be had to th[illegible]s with respect to the power and the pressure [illegible] resulting from the circulatio[illegible] of the air in t[illegible]

Both the power and the pressure are commonly said to produce the circulation; but, as a matter of fact, it is the power that produces the circulation, while the pressure is the result and measured by the resistance of the mine or airway.

Unfortunately, these factors do not vary alike, but the cube root of the power varies as the square root of the pressure; or, more simply, the cube root of the power ratio, in any mine or airway, is equal to the square root of the pressure ratio.

$$\sqrt[3]{\frac{u_1}{u_2}} = \sqrt{\frac{p_1}{p_2}}$$

For example, in order to double the pressure ($p_2/p_1 = 2$)

$$\sqrt[3]{\text{power ratio}} = \sqrt{2} = 1.414$$

$$\text{power ratio} = 1.414^3 = 2.828$$

In other words, if 10 hp. on the air produces a given pressure or water gage in a certain mine or airway, it will require $2.828 \times 10 = 28.28$ hp. to double that pressure or gage.

Use of Potential Factors—Attention has been drawn to the potentiality of an airway or mine, in respect to the resistance it can offer to the passage of air, by virtue of its rubbing surface (s) and its sectional area (a). The potential of an airway or mine is the factor that determines the quantity of air such airway or mine will pass, for any given power or pressure. It is important, in the use of the potential, therefore, to consider whether the pressure or power is in question.

For every airway or mine, therefore, there is a power potential (X_u) and a pressure potential (X_p). The cube of the power potential is equal to the square of the pressure potential, for the same mine or airway, giving the equal values.

$$X_u^3 = X_p^2 = \frac{q^3}{u} = \frac{q^2}{p} = \frac{a^3}{k\,l\,o}$$

An inspection of these equal values shows that:

1. The quantity of air a given power will circulate varies as the power potential of the airway or mine.

2. The quantity of air a given pressure will circulate varies as the pressure potential of the airway or mine.

Hence, in comparing the circulations in different airways or mines, a constant power requires the use of the power potential, and a constant pressure, the pressure potential.

Other Potential Formulas—Transposing the values given above makes it possible to calculate the power or pressure required to circulate a given quantity of air in a certain airway or mine directly from its potential factor.

$$u = \left(\frac{q}{X_u}\right)^3 = \frac{q^3}{X_p^2}$$

$$p = \left(\frac{q}{X_p}\right)^2 = \frac{q^2}{X_u^3}$$

The Coal Age Pocket Book

It is, likewise, possible to calculate the quantity of air a given power or pressure will circulate against any given potential factor representing a certain airway or mine, by simply multiplying the cube root of the power or the square root of the pressure by the proper potential of the airway or mine as expressed by the following formulas:

$$q = X_u \sqrt[3]{u}$$

$$q = X_p \sqrt{p}$$

A few examples will serve to make the use of these formulas clear and to show their practical application, in the rapid estimation of what is required in the proposed development of mines, in order to make suitable provision for their proper ventilation.

EXAMPLES FOR PRACTICE

1. If 25 hp. produces a water gage of 1.5 in., in a certain mine, what water gage will 40 hp. produce in the same mine?

Solution—Since the square root of the pressure or water-gage ratio is equal to the cube root of the power ratio, calling the required water gage x,

$$\sqrt{\frac{x}{1.5}} = \sqrt[3]{\frac{40}{25}} = \sqrt[3]{\frac{8}{5}} = \sqrt[3]{1.6} = 1.17$$

$$\frac{x}{1.5} = 1.17^2 = 1.37, \textit{ nearly}$$

$$x = 1.5 \times 1.37 = 2.05 \textit{ in.}$$

2. It is proposed to provide for the circulation of 75,000 cu.ft. of air, in two generally equal splits, the airways including the return in each split being 6x10 ft. in section and about 8000 ft. long. (a) Find the power potential for the entire mine; and (b) calculate from that both the power and the water gage of the circulation.

Solution—(a) The sectional area of the airways, in this case, is $a = 6 \times 10 = 60$ sq.ft.; the total rubbing surface in the mine, $s = 2 \times 2\ (6 + 10)\ 8000 = 512{,}000$ sq.ft. Substituting these values and that for the coefficient of resistance $k = 0.00000002$ in the formula for power potential of mine,

$$X_u = \frac{2\,a}{\sqrt[3]{k\,s}} = \frac{2 \times 60}{\sqrt[3]{0.00000002 \times 512{,}000}} = 552.6$$

The power on the air required to circulate 75,000 cu.ft. of air against this potential is, then,

$$u = \left(\frac{q}{X_u}\right)^3 = \left(\frac{75{,}000}{552.6}\right)^3 = 2{,}500{,}000 \textit{ ft.-lb. per min.}$$

The water gage, as calculated directly from the power potential, $X_u = 552.6$, is

$$w.g. = \frac{q^2}{5.2\,X_u^3} = \frac{75{,}000^2}{5.2 \times 552.6^3} = 6.41 \textit{ in.}$$

Or, the water gage may be found thus

$$w.g. = 2{,}500{,}000 \div (5.2 \times 75{,}000) = 6.41 \textit{ in.}$$

Book Reviews

THIRTY-FOURTH ANNUAL REPORT OF THE DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY to the Secretary of the Interior for the Fiscal Year Ended June 30, 1913. 172 pp. + index. 5¾x9⅛ in. 2 pl. 0 illus. Paper cover.

This report gives an outline of the work of the Geological Survey during the past year, a work which was somewhat hampered by a decrease in appropriation. However, as usual, a most creditable amount of work was effected. Already 38.9 per cent. of the whole area of the United States has been surveyed by this department of the Federal Government with the aid of state appropriations.

The allotment for coöperative work made by the State of Pennsylvania was only $5528.19, whereas West Virginia contributed $12,000, Ohio $25,000, and Washington $13,750. In fact, 11 states were more liberal contributors than Pennsylvania despite the importance of her mineral production.

The land classification board makes an extensive report leaving out, however, that particular table to which we made exception. Interesting tables are added, however, one showing a summary of coal-land classifications and valuations in force June 30, 1912 and 1913. The highest average price of coal lands is in Colorado, where the figure is $59, the lowest in South Dakota, where it is $11. These figures are interesting, but we must always remember that much coal land is listed at $10 and $20 which Mr. Ashley says is not worth that much, and some of which we may be sure is not worth a song. This decreases the average price by its inclusion as coal land.

SALES OF COAL LAND JUNE 30, 1912, TO JUNE 30, 1913

Per Acre Price	Acres	Per Acre Price	Acres	Per Acre Price	Acres
$10	5,328.80	$60	160.00	$120	81.68
19	22.80	65	40.00	130	163.19
20	2,897.86	70	40.00	135	56.96
25	120.00	80	40.00	150	22.33
30	40.00	85	40.00	155	80.08
35	40.00	100	194.81	175	16.21
40	40.00	110	198.73	200	77.06
45	80.00	115	63.19		
				Total	10,338.70

These figures were obtained by a comparison of the totals in the two most recent bulletins.

We trust, however, that the present intention of the administration will continue and we shall replace purchase by lease. If these lease rates are small they will not largely exceed the costs of supervision and the question of what to do with the income will not arise. The surveys which coal valuation have made necessary have been of immense value and extremely creditable to the Geological Survey. We hope they will be pushed just as vigorously when valuation ceases. In fact, the work will be even better when less hurried.

TESTS OF PERMISSIBLE EXPLOSIVES BULLETIN 66, BUREAU OF MINES. By Clarence Hall and Spencer P. Howell. 313 pp. 5⅞x9⅛ in. 1 pl. 6 illus. Paper cover.

The bulletin gives details of the results of the tests made on all explosives declared permissible between May 15, 1909 and Mar. 1, 1913; bulletin 15 giving an account of those explosives which were approved before the former date.

It is interesting to note how rapidly the consumption of short-flame explosives is increasing. In 1902, only 11,300 lb. were sold; in 1907 the sales had already risen to 2,095,244 lb. The formation of the Technologic Branch of the Geological Survey and the creation of the Bureau of Mines caused a rapid development in the use of these explosives, so that the sales in 1912 were 18,149,977 lb.

We have calculated the increase by percentages year by year since 1903, the increase of one year over the previous being set against the later year of the two: 1903, 2454.5 per cent.; 1904, 110.7 per cent.; 1905, 69.5 per cent.; 1906, 48.7 per cent.; 1907, 36.6 per cent.; 1908, 0.6 per cent.; 1909, 324.1 per cent.; 1910, 32.2 per cent.; 1911, 13.6 per cent.; 1912, 35.1 per cent.

This list does not give a clear conception perhaps of what the Bureau of Mines and its predecessor accomplished because the early increase represented only a small increment in output. A few mines served to make the difference recorded. But the really noteworthy part of the list is that for 1908 and 1909. In 1908 the Technologic Branch of the Geological Survey had been started but had done no really effectual work. Many still believed that coal dust could not be exploded by black blasting powder shots without the presence of gas. The sale of short-flame explosives was at a standstill and some were being discredited. Then suddenly the increase rose under the fostering care of the Technologic Branch of the Geological Survey from 0.6 per cent. to 324.1 per cent. and the increase in sales has been high ever since and we have now more reliable permissible explosives than perhaps any other nation.

The amount of permissible powder should in the opinion of the authors be multiplied by 2, if we would obtain the equivalent quantity of powder of equal economic effect. The monograph claims that the use of permissible powder does less harm to the roof and permits the placing of timber closer to the face. The impulse being more rapid the effect is localized on the coal.

New methods have been adopted in testing. Two tests have been dropped, it having been found that explosives passing the other tests never failed in these two and that therefore they were not necessary. But in order to test the cartridges more truly under working conditions, they are fired in their commercial wrappers and not in tin foil. The paper contains no oxygen and the whole charge is increased in carbon by its addition. As a result less complete combustion results, more carbon monoxide is formed and the heat of combustion and the consequent pressure is reduced. As the presence of coal around the shot and the dust in the hole increases the carbon, decreases the carbon dioxide and decreases temperature and the pressure, it is a pity that a way has not been found to test the pressure developed under working conditions, but we suppose that is asking too much. The suggestion is worth considering, however.

Further variation is found, due to the formation of hydrogen in the blasting holes in mines, as much as 6.8 per cent. being found. As this is probably formed by dissociation of water, it must have an immense cooling effect on the flame and would offset "any increase in the duration of the flame caused by the coal entering into the explosive reaction."

There is so[illegible] is of interest in this book that it is somewhat [illegible] review. We advise the reader to read it with care as [illegible] much credit to the authors and contains much that is new and valuable. Of course the bulk of the book is intended for reference and comparison only.

COMPRESSED-AIR PRACTICE—By Frank Richards. IX + 326 pp. 6x9 in. 96 illus. McGraw-Hill Book Co., Inc., 239 West 39th St., New York City. Cloth boards. Price, $3.

No one who reads "Compressed-Air Practice" will declare Mr. Richards commercial. In his conversational style he ends his preface with the remark "Catalog 'literature' and auctioneer talk have their place but not here" and the promise thus made is kept throughout the book, not we think entirely to the writer's interest. The book tells us nothing about the design of compressors. It is impossible to do this without illustrating some types on the market and Mr. Richards has therefore eschewed them all.

So after giving consideration to the thermo-dynamics of compression, theoretical and practical, he gives only the barest generalizations on the details of construction. Then he describes the turbo-compressor, the Taylor hydraulic compressor and the Humphrey pump. Two chapters follow on the power cost of compressed air and on power from that source; the air receiver and pipe friction are then treated and also the economy of reheating the air.

Compressor and receiver fires are discussed and side lines for the compressor are then treated at some length. Apparently the author is anxious to introduce compressed-gas distribution into our large cities instead of the present low pressure. Electric air drills, the air lift, the use of air in hammers, such as have hitherto utilized steam, diving bells and caissons, the air jet, sand blast and the cement gun all receive consideration and the book ends with an account of methods of liquefying air.

The inefficiency of the air receiver as a cooling and drying device is discussed and the author's argument is well sustained. The small area exposed to the cooling influences, the short time the air is in the receiver, the absence of impinging surfaces on which water can be deposited, all serve to make the receiver of little value for cooling or drying the air. For this reason compressed-air pipe lines are always fitted with large water traps.

Coal and Coke News

Washington, D. C.

Under the influence of the Wilson administration bills to regulate the development of government owned lands in Alaska have been prepared by the Chairman of the Public Lands Committees in both Houses of Congress in consultation with Secretary Lane of the Department of the Interior and will be pressed forward as rapidly as possible as companion pieces to the Alaska railroad legislation. They are designed to make available for immediate development treasures in coal, oil, phosphate and potash deposits.

Drafted along the lines recommended in Mr. Lane's annual report, the bills provide for the leasing of public lands under rigid restrictions to guard against monopoly and to insure full development.

The law to govern oil land leasing would provide that the Federal Government issue a permit for 2560 acres, which would give the possessor the exclusive right to explore for oil in this territory for a period of two years, during which time exploration work aggregating 2000 feet in depth must be done. If oil is discovered, the permittee would be entitled one-fourth of the land in fee, the remainder of the land to remain with the Government and be subject to lease in small tracts upon a royalty basis.

Under the proposed leases or patents granted no drilling of wells could take place within 200 feet of the outer boundaries of the lands leased or patented, and provision is made for general regulations requiring precautions to prevent waste of oil or the entrance of waters into the oil sands or oil-bearing strata. Forfeiture of the lease would be the penalty for violating these conditions and forfeiture could be effected through court procedure.

It is proposed that the coal lands of the country, which are all in great part classified, be sold at present, in small blocks, but provision would be made in the bills for leasing them, any holding not to exceed 2560 acres. It also would provide that for strictly local and domestic needs limited permits may be granted for tracts not to exceed ten acres for a period of ten years.

To insure against speculative holding, a small annual rental per acre will be charged. Similar provisions adapted to the different conditions are proposed as to the production of phosphate and potash.

* * *

After an unexpectedly long delay the Senate Committee which was charged with the duty of investigating conditions in the West Virginia coal strike region has filed a report without, however, making any definite recommendations. The recommendations are withheld because of the fact that, as stated, conditions are now quiet in the disturbed region while Congress in the original resolution of inquiry did not call for any specific suggestions. The report does not take as drastic a position as had been expected but among the "contributing causes" which led to trouble it mentions the following:

"The failure of the operators in the Paint Creek district to renew their expiring contract with the United Mine Workers; the determination of the coal operators under no circumstances to recognize the miners as an organization or union, and the equal determination of the miners to organize and form a union, a right as they claim guaranteed to them without discrimination by the laws of West Virginia; the employment by the operators of mine guards, many of whom were aggressive and arbitrary; mine guards in the employment of the operators acting as deputy sheriffs and clothed with the authority of the law; the failure of the civil authorities to attempt even to preserve peace and order at the beginning of violence and permitting things to drift from bad to worse without vigorous interference and assertion of authority; discontent among the miners occasioned by no opportunity to purchase homes, no cemeteries except upon the company's grounds; post offices located in the company's stores; private roads only to the schools and stores; the disposition of the coal operators to keep strict espionage of all strangers who entered the district and to exercise their right of private ownership of this large district and to exclude from it all persons objectionable to them. These may be stated as some of the immediate contributing causes."

Harrisburg, Penn.

The operating cost in taking a ton of anthracite coal from the Schuylkill district to Philadelphia is 44.698 cents per gross ton on the Philadelphia and Reading R.R., while transporting a ton on the Pennsylvania from the Schuylkill, Lehigh and Wyoming Regions costs from 49.816 to 77.42 cents.

These figures are found in the report of Price, Waterhouse & Co., expert accountants who have been investigating the transportation charges on coal shipments from the anthracite region to Philadelphia for the Public Service Commission. The report was made public on March 6, by the commission, which has fixed March 30 as the day when argument will be heard on the rate inquiry at Philadelphia.

Incidentally, it is interesting to note in connection with the report that the freight rates of the various railroad companies per ton of coal from the anthracite region to tidewater at Philadelphia are as follows:

"From the entire Schuylkill region over the Reading or Pennsylvania lines to Philadelphia $1.70 per gross ton.

"From the Lehigh region in connection with the Reading or Central R.R. of New Jersey, via Allentown, $1.86 to Philadelphia; over the Lehigh Valley R.R. via East Penn Junction, $1.86; to Germantown, either route, $1.96; to Chestnut Hill, either route $2.06.

"From the Lehigh region, over the Lehigh Valley or Central R.R., via Pennsylvania R.R. connecting at East Philadelphia Junction $1.80.

"From the Wyoming region, Central R.R. or Lehigh Valley, over the Reading $2.10; over the Pennsylvania, via East Phillipsburg Junction $1.80."

To establish an adequate basis for the determination of the cost of transportation the accounts for the twelve months ending May 31, 1913, were examined, and the estimate of cost includes expenditures for (1) operating expenses, (2) taxes, (3) hire of equipment and (4) miscellaneous. The inquiry of the accountants, however, has been restricted to the question of operating costs and taxes, and they have not dwelt in any way with the question of investment and return thereon, a highly important factor.

In case of the Philadelphia and Reading, the records of revenues by divisions are not maintained, but in the case of the Pennsylvania it appears in the aggregate the revenue of the divisions involved in the anthracite coal traffic amounted for the year under consideration, to $73,917,654, and the operating expenses amounted to 71.25 per cent. of the revenues, leaving 28.75 per cent. to provide for return on investment and for any reserves for extraordinary purposes. While there are no figures as to the value of the investment now available, it seems probable that such a percentage would not be greatly in excess of a fair return.

"In the case of the two railroads in question (Philadelphia & Reading and the Pennsylvania), a considerable proportion of the subdivision of the expenses between passenger service and freight service was readily obtainable from the books in proper form. In some particulars, however, we have had to take exception to the methods of subdivision, and, in the case of the Philadelphia & Reading R.R., the subdivision is not fully carried out by the company and had to be completed by ourselves. The subdivision of the cost of freight service among merchandise, anthracite, bituminous coal and coke was for both companies carried out in the main by ourselves on the basis of data secured from the records. So far as we have been able to ascertain, neither company determines the cost of the anthracite traffic separately from the freight traffic, but each secures concurrently a considerable amount of pertinent information."

The report says that the terminal cost of anthracite traffic is relatively low, by reason of its being handled in bulk and usually with mechanical aid. On the other hand the value of the property employed in its terminal handling is an important item and calls for due consideration in the determination of the fair return that the traffic may be expected to yield.

The report states that the whole problem of determination of costs for rate purposes is still in an early stage of development.

PENNSYLVANIA

Anthracite

Scranton—A demurrer to the action in equity brought by the People's Coal Co., of this city, to test the constitutionality of the anthracite coal tax act of 1913, was filed by the Attorney General's Department on March 9, in behalf of Auditor General Powell and State Treasurer Young, the accounting officers of the Commonwealth. No steps for the collection of the tax have been taken by the State since the suit was brought, although all the reports are stated to be in hand and the bill can be sent out. The demurrer declares that the Dauphin County court, wherein the suit was brought is without jurisdiction to entertain the bill of complaint; that the bill does not state any facts, entitling it to belief; that the bill contains "many wholly irrelevant, immaterial, scandalous and impertinent matters and does not show on its face that the plaintiff is entitled to any relief which it seeks" that nothing is shown entitling the plaintiff to a permanent injunction; that the bill does not show the act to be unconstitutional in any respect. Date for argument will be fixed later on.

Hazleton—In the last year four companies in the 11th anthracite district did not have any fatal accidents at their collieries. They were Coxe Bros. & Co., Inc., Pardee Bros. & Co., the Harwood Coal Co., and the Upper Lehigh Coal Co.

According to the annual report of David J. Roderick, the mine inspector, there was one death for every 293,788 tons of coal mined, against one for every 275,000 tons the previous year. The inspector is gratified over the reduction in fatalities, and points to this record as one of the signs that more preventive measures are being taken.

Bituminous

Shenandoah—The Buck Mountain vein of 15 ft. of fine coal was struck on Mar. 5, by Dolan Bros., tunnel contractors for the Locust Mountain Coal Co. The company will begin shipments as soon as the new breaker, in course of construction is completed. The unexpected strike completes the tunnel and saves thousands of dollars for the company.

Harrisburg—The Public Service Commission has recommended that an evening service between Pine Grove and Outwood be installed for the accommodation of the miners residing along the S. & S. branch of the Reading R.R. The schedule calls for a train that will reach Outwood not later than 6 o'clock p.m. This service will take the miners home directly from the mines and they will no longer be compelled to walk several miles. The Commission found that it would not be reasonable to order a morning service from Outwood, because it would involve a net loss of $25 daily to the Reading Co.

West Pittston—Members of the Continental local of the United Mine Workers have made an investigation of conditions in the territory covered by its activities, and have discovered much acute poverty among the people. This report was made at a meeting of the local, and it was decided to empty the treasury of the local to alleviate the distress. There is about $4000 in the treasury and this money will be expended in keeping the families of the men who are in need, as well as in taking care of those who are outside the organization. The members of the Continental local have not been employed for some time. The mine has been shut down for repairs, the closing down following the announced presentation of some grievances on the part of the workers.

KENTUCKY

Frankfort—The Kentucky Railroad Commission has entered an order in the case of the Paducah Light & Power Co. against the Illinois Central Railroad Co. reducing rates of coal from the western Kentucky field to Paducah from 80 to 60c., and requiring restitution of $1,729.98 for overcharges made on coal from that section by the railroad.

Owensboro—It is understood that the Fern Hill mine, near this city, has been sold to the Deep Water Coal & Coke Co., of Evansville, Ind., which has been acquiring various coal properties in this section during the past two months, for $87,000.

Louisville—The scale committee of the United Mine Workers of America, District No. 23, was in session here all this week, formulating the wage scale which will be presented to the operators in the union (western Kentucky) section of the Kentucky field shortly as a basis for negotiations. The committee's deliberations were attended by about sixty delegates from the field. L. B. Walker, of Central City, Ky., presided. The wages scale to be adjusted will cover the next two years.

TENNESSEE

Jacksboro—After a year of prospecting the Lindsay Coal Co., of which H. B. Lindsay is president, operating near Caryville, Tenn., struck a fine vein of coal 4 ft. thick. The vein was struck after penetrating the mountain 1600 ft. with a 12-ft. entry. The company will at once enlarge its equipment and operate the vein on a large scale.

Knoxville—The executive committee of the Southern Appalachian Coal Operators' Association met at its rooms last week, reëlecting J. E. McCoy as Secretary, and discussing a number of matters of importance, including the rate adjustment covering the section, which is now pending before the Interstate Commerce Commission. The committee was composed of President E. C. Mahan, James R. Wooldridge, T. I. Stephenson, Alexander Bonneyman, N. B. Kenney, H. L. Cory, L. I. Coleman, L. I. Coleman, W. C. Tucker, H. S. Pless and A. H. Wood.

ILLINOIS

Marion—The new washer of the Peabody Coal Co. at mine No. 3 is now in operation and is the latest and most uptodate washing plant in the state, and at the same time is considered the most economical. It makes only three sizes of washed coal, No. 1 and No. 2 nut, and washed screenings.

Perry County—This county is at present the scene of a good deal of activity on the part of St. Louis capitalists, who already have secured options on 5000 acres of virgin coal lands in that section, and are seeking leases on 15,000 more. Joseph Crawford, President of the Murphy-Wall Bank & Trust Co., of Pinckneyville, Ill., represented the St. Louis men in the deal. Prospecting for coal will begin as soon as the options on 20,000 acres have been secured. Prospectors also have optioned a tract of coal land north of Pinckneyville. All of the area referred to is in proximity to the proposed electric road between Springfield and Duquoin, which will provide an outlet for mine products.

Belleville—R. W. Ropiequet, who was primarily the organizer of the 5th and 9th District Operators' Association, and who has been prominent in the affairs of the operators in the 5th and 9th districts for the past four years, has resigned and in the future will have nothing more to do with that organization. Mr. Ropiequet has done more for his organization than has been accomplished for a similar body anywhere in the United States by any one individual. He compelled the Illinois Central Railroad to build several thousand coal cars for the mines in his district on that road, and, in losing him, the coal trade will miss one of its most valued and competent men.

INDIANA

Evansville—Manager Henry F. Allen, of the Deep Water Coal & Coke Co., which recently took over a number of mines in the Western Kentucky district, announced recently that the company's policy would be to operate its mines with union labor exclusively. This announcement has been received with much enthusiasm by labor leaders, who are attempting to strengthen their organization in Western Kentucky.

KANSAS

Topeka—The Kansas Public Utilities Commission will hold another meeting in March for the purpose of hearing additional evidence in the mine-run case which has been pending for the past few months. The hearing will be held about Mar. 14, and is expected to result in some decision in the case.

Leavenworth—Fire originating in the tipple of the Home mine of the Home Riverside Coal Mining Co., destroyed the buildings with a loss of $25,000. Men working in the mine escaped through the Riverside shaft, two miles away. Three hundred and fifty miners were employed and will be out of work pending the rebuilding of the tipple and other structures included in the loss. About two-thirds of the loss was covered by insurance. The burning timbers dropping into the mine did not set fire to the buntings and the mine itself was uninjured. Twenty mules were driven underground two miles to the Riverside shaft and saved. A pump was installed and a temporary hoist operated, in order to keep the shaft clear of water. The Home is the oldest mine now operated at Leavenworth.

MISSOURI

Webb City—Missouri State Mine Inspector, George Hill, recently instructed deputies in the Southern district to enforce rigid observance of the eight-hour law. Communications to this effect from Mr. Hill were read at the meeting of district inspectors.

MISSOURI

Kansas City—Four coal company members of the Southwestern Interstate Coal Operators' Association have filed suit against President Chas. F. Keith of the Association, for alleged unwarranted payments amounting to not less than $40,000. Referring to certain funds of the Association the complaint states: "That the Association received no consideration therefor nor benefit therefrom; that they were foreign to the Association purposes and wholly unauthorized by it." The four companies involved in the procedure comprise the Bache-Denman interests and are the Prairie Creek Coal Mining Co., the Mammoth Vein Coal Co., the Coronado Coal Co., and the Kali-Inla Coal Co. Mr. Keith is president of the Central Coal & Coke Co.

Kansas City—The joint meeting of a committee of operators and miners held at the quarters of the Southwestern Interstate Coal Operators' Association in the Keith and Perry building on March 4 and 5, failed to result in an agreement on disputed points of the Kansas workmen's compensation law, passed in 1913. A resolution was adopted, recommending the appointment of an arbitration committee, to act as provided in Section 24 of the compensation law. This committee, should it at any time be unable to agree on the interpretation of any clause in the law, shall have the power to appoint one man as referee, and his decision shall be final. The arbitration committee is to be composed of an equal number of miners and operators. State Labor Commissioner, William L. O'Brien, of Kansas, attended the hearings in Kansas City, as did representatives of the operators and of employees. It was finally decided, after the meeting had gone two days, that the committee would ask the operators to reach some definite interpretation of the law and present it to the committee. Another meeting of operators and miners will be held in Kansas City later in the month. The mooted points were chiefly, when shall payment in case of injury to a miner begin; shall compensation be based on the gross or net earnings of the miner, and what does "concurrent employment" mean?

COLORADO

Denver—The Federal Strike Investigating Committee have secured a sworn statement from Arthur Langowski, 21 years old, to the effect that he receives $3 a day from the coal operators while exploding dynamite for the United Mine Workers of America. When questioned by the committee, he denied being a spy in the ranks of the union, although he admitted that he was "watching both sides" and received pay from both.

A compulsory arbitration law for the settlement of disputes between coal operators and their employees, is one of the recommendations of the committee. This proposal is fathered by Representative Howard Sutherland, of West Virginia, who takes the position that coal is a public necessity. It is possible that the enactment may lead to a Federal statute similar to the Canadian "Dispute Act," which includes coal-mining industries in which controversies between labor and capital must be submitted to boards of mediation.

WASHINGTON

Olympia—A statistical report of coal operations in the state of Washington during the past year has been compiled by James Bagley, state inspector of coal mines. The report shows that 3,823,837 short tons were produced, as compared with 3,346,946 during the year 1912, an increase of 476,901 short tons. An increase of 26,843 tons of coke was also indicated, 75,732 tons being produced as against 48,889 in 1912. The report shows also that the total number of men employed in the mines during 1913 was 6065, as compared with 5673 employed during 1912, an increase of 392 men.

CANADA

Montreal—According to the preliminary report on the mineral production of Canada during 1913, prepared by John McLeish, chief of the Division of Mineral Resources and Statistics, of the Department of Mines, and presented at the 16th annual convention of the Canadian Mining Institute, recently in session at Montreal, the total value of the output was $144,031,047, as compared with $135,048,296 in 1912. The production of coal was 15,115,089 tons, as against 14,512,829 tons in 1912; the year being marked by an increased production in Nova Scotia, New Brunswick and Alberta, and a diminution in the output of Saskatchewan and British Columbia. The decrease in the latter province amounted to almost one-half million tons and was due largely to the continuance of the strike in the Vancouver Island mines.

The total output of oven coke in 1913 was 1,517,133 tons, made from 2,147,913 tons of coal, of which 1,598,912 tons were mined in Canada; 549,001 tons imported.

PERSONALS

V. S. Veazey has recently been appointed Chief Engineer of the McVell Coal & Coke Co., of Glen Jean, W. Va.

George P. Wilson, of Philadelphia has been appointed chief of the bureau of tariffs by the Public Service Commission, the appointment to date from March 16.

George A. Gallinger, of Pittsburgh, has been placed in charge of the Pneumatic Tool Department of the Ingersoll-Rand Co., with the title of Manager of Pneumatic Tool Sales. His headquarters will be at 11 Broadway, New York City.

Joseph Huddleston, a coal operator of Excelsior, W. Va., and Mrs. Georgia C. Bayman, of Huntington, W. Va., were married last week in Jeffersonville, Ind. Mr. Huddleston is a prominent figure in the field where his mines are located.

Irving R. Gard, late mining engineer for the Canadian Collieries (Dunsmuir), Ltd., of Victoria, B. C., Canada, has been placed in charge of the properties of the Mecca Colliery Co., with headquarters at Eagle, W. Va. Mr. Gard assumed his duties Feb. 15.

K. U. Meguire, of Louisville, Ky., President of the Harlan Coal Mining Co. and of the Snead & Meguire Coal Co., left recently for a vacation trip to Florida, where he will recuperate from his labors on the workmen's compensation bill, which is before the legislature.

Sheffield Ingalls, Lieutenant-Governor of Kansas, allowed his option on a mine near Atchison, Kan., to expire on Feb. 15, and the plant probably will be purchased by a power company. W. B. Collett is representing the latter in new negotiations. Gov. Ingalls was unable to interest capital in the mine.

F. M. Sackett, of the North Jellico Coal Co., an operating concern, and of the Byrne & Speed Coal Co., of Louisville, is the chairman of a committee which is working to secure the donation for the erection of a public auditorium with the refunds of excess rates being made by a local telephone company to its subscribers, and is meeting with considerable success in the campaign.

OBITUARY

A. H. Reeder, president of the Stonega Coal & Coke Co., of Stonega, Va., died in Philadelphia a few days ago following an operation for blood-poisoning, which was due to frost-bite suffered while hunting. Mr. Reeder was well known in the coal fields of Western Virginia and Eastern Kentucky

Edward Wells, aged 82, president of the Hollenback Coal Co., died on Mar. 8, at his residence in Wilkes-Barre, Penn. He was a director in a number of Eastern banks, and a trustee of the Wyoming Historical and Geological Society. Mr. Wells is survived by his wife, one son, and his brother, John Wells Hollenback, a prominent coal-land owner.

John Yoeman Boyd, one of the most prominent coal men of the State of Pennsylvania and a member of the first Railroad Commission of Pennsylvania, died of heart trouble, on March 9, at his city residence, in Harrisburg, Penn. He was in his 52nd year. Surviving Mr. Boyd are his wife and four children.

Mr. Boyd was born in Danville, Penn., Aug. 9, 1862. He was prepared for college at the Harrisburg Academy and then entered Princeton. Since graduation he had been identified with the large Boyd coal interests and was heavily interested in Southern states. Mr. Boyd having succeeded his father who was a member of the noted Conyngham, Stickney & Boyd coal firm, of Philadelphia.

When the Railroad Commission of Pennsylvania was created, Edwin S. Stuart, then Governor, selected Mr. Boyd as a personal appointment, desiring one who was accustomed to large business matters. He was reappointed, but resigned because of the press of personal affairs, the management of his father's estate having fallen largely upon him. His resignation was the occasion of a tribute by Governor Stuart to his service in behalf of the State and of formal action by the other commissioners.

CONSTRUCTION NEWS

Kansas City, Mo.—The Central Coke & Coal Co., of this city, will install in its colliery at Rock Springs, Wyo., one 50-hp. and two 150-hp. motors and control equipments which have been ordered from the General Electric Co.

Lorain, Ohio—The announcement is made that the work of erecting the new unloading machine at the B. & O. docks, Lorain, will not be started until fall. When completed the machine will be one of the fastest on the Great Lakes.

Scranton, Penn.—The Hudson Coal Co., of this place, will install in its power station a 435 kv-a. motor-generator set and switchboard, and will place in operation in the mines three 7-ton, 30-in. gauge electric mining locomotives, which equipment has been purchased from the General Electric Co.

McAlester, Okla.—About $1,000,000 is to be spent here in the immediate future by the Rock Island R.R., according to a recent announcement. Much of this will go toward improving the mines now operated by the company, while two new operations are to be sunk on recently acquired coal lands. The number of miners to be employed will be increased largely.

Hazard, Ky.—The Kentucky-Jewel Coal Co. here have completed a first-class coal-mining plant three miles below here on the Lexington & Eastern R.R. and are now shipping 40 cars per day. The company announces a number of increases by Apr. 1. One hundred and fifty miners' houses are nearing completion. The coal field around Hazard is attracting much attention.

Wellsburg, W. Va.—Work has been started on the construction of ten new double blocks of houses at the La Belle Mine of the West Virginia Pittsburgh Coal Co. The United Mine Workers called a strike at this mine in November, and the influx of non-union miners since that date has been so great that the company was compelled to build new houses to accommodate them.

Pittsburgh, Penn.—The Pennsylvania Coal Co. of this city, will place in operation in substations considerable new electrical apparatus comprising one 500-kw., one 300-kw. and two 200-kw. two-unit three-bearing motor-generator sets; three 50-kv-a. and nine 100-kv-a. transformers; one 150-hp. and three 300-hp. motors; three control equipments, switchboards and accessories. The contract for all the apparatus has been placed with the General Electric Co.

McAlester, Okla. — Improvements contemplated by the Rock Island R.R. in this field in the near future include two new shafts and two additional slopes. One of the new shafts will be between Hartshorne and Gowen, 650 feet deep. The other will pierce to a depth of 800 feet, being at Alderson. Both slopes will be near Hartshorne. Mine No. 8 at Hartshorne probably will be abandoned. It has been sealed up for the past month, because of a recent fire. About 1500 new miners will be employed because of the additional capacity. This is expected to be in the neighborhood of 6000 tons daily. All of the new shafts will be equipped with steel tipples, late screening devices and other approved equipment. It is said that the Rock Island will utilize all of the facilities required by law, and will adopt the "safety first" idea extensively. Many of the old mines have been only partly equipped with modern casualty-prevention machinery, because of the difficulty of the task. The mines just being sunk, however, will embody all approved plans for "safety first."

INDUSTRIAL NEWS

St. Clairsville, Ohio—The Hutchinson Coal Co. has filed a mortgage of $1,000,000 with the Security Trust company, of Wheeling, W. Va., to secure a loan on coal properties in Belmont County, Ohio and Mason and Harrison Counties, W. Va.

Scranton—The Continental Miners Local of the U. M. W. of A., has voted $4000 from its treasury to aid members of the local who have lost their mine tools in the settling at that colliery. The men are unable to obtain work elsewhere because of their lack of tools.

Easton, Penn.—One of the largest mortgages filed at Easton for some years was that of the Lehigh Coal & Navigation Co., for $40,000,000. It is a consolidated sinking-fund mortgage, the principal of which is due on Jan. 1, 1954. The Pennsylvania Co. for Insurance on Lives and the Granting of Annuities is trustee for the bondholders.

Columbus, Ohio—At the annual meeting of the stockholders of the Ralston Steel Car Co., of Columbus, J. E. Tesseyman resigned as vice-president and general manager, being succeeded by Anton Becker. Other officers were reëlected. The company manufacturers steel cars for coal carrying and has had a very prosperous year.

Williamstown, Penn.—Property on which the Summit Branch Coal Mining Co., Lykens Valley Coal Mining Co., Northern Central Railways Co., and Isaac D. West were tenants, was sold on March 5 by the sheriff of Dauphin County to the Susquehanna Coal Co., for $2600. There were mortgages amounting to $220,364.25 against the property.

Wilburton, Okla.—The Great Western Coal Co of this place has been placed in the hands of a receiver. James Elliott, president of the Hailry Ola Mining Co., was made receiver. The company, capitalized at $200,000, is said to be in fairly good shape, despite the receivership, and is expected to resume operations in the near future. About 200 men are employed.

Sharon, Penn.—The Carnegie Steel Co. reports successful results of the experiments they have been conducting with pulverized coal in an openhearth furnace. With this new fuel, the quality of the metal was not only higher, but more heat was secured in much less time than required by the old method. At present, the Carnegie Co. have only one such furnace in operation, but they have signified their intention of erecting others immediately.

Spadra, Ark.—The Clark-McWilliams Coal Co., of this place, has purchased all of the holdings of the Southwestern Anthracite Mining Co., of Scranton, Penn., at Hartman, Ark. Included in the deal is 386 acres of coal lands, in John County, estimated to hold 2,000,000 tons of coal. The purchase price was not announced. The Clark-McWilliams Coal Co. will erect a $50,000 plant, with a 500-ton daily capacity, in the immediate future. The deal is the largest consummated in Arkansas during the past few years.

Zanesville, Ohio—Because of lack of orders and uncertainties of the new mine-run law a number of mines in the Zanesville and Cambridge districts of Ohio have closed down permanently. The granger mine of the Pan-American coal company located at Buckeye, south of Zanesville, was closed down and the new mine to be opened by the company on Turkey Run will be abandoned for the time being. The Peabody mine at Shawnee; the Jones Mine at Corning and Mine No. 24 at Jacksonville were also closed down. The closing of these mines threw out of work about 2500 miners.

NEW INCORPORATIONS

Melbourne, Ill.—The Melbourne Coal Mining Co. has been incorporated here, capital $3000, by B. S. Moulton, A. L. Chambers and Louis M. Davis.

Pittsburg, Kan.—The Interstate Operators' Coal Co. has filed articles of incorporation here. The capitalization is placed at $10,000. The company proposes to enter the coal mining field.

Fayette, Mo.—The Howard County Coal Co., capital $4000, has been incorporated here, with C. W. Watts, President, and Frank Grimes, Secretary. They have purchased and will develop the Russell property.

Brilliant, Ohio—The Blyth Coal Co. has been incorporated with a capital of $25,000 to mine and deal in coal. The incorporators are F. H. Bruening, F. T. Fitzharris, A. E. Vance, W. McD. Miller and J. S. O'Neil.

Lexington, Ky.—The McCormick Lumber Co., with a capital stock of $75,000, has filed articles of incorporation, under which it is authorized to develop coal, coke and timber lands in Kentucky. The company owns several valuable tracts of coal lands in Powell county, which are traversed by the Louisville & Nashville's L. & E. branch. It proposes to cut the timber on these tracts, and then develo the coal.

Coal Trade Reviews

General Review

Trade rounds out the season in better form than anticipated. Colder weather and delays in transportation create some activity. Little preparation being made for a suspension.

With the spring discount on anthracite now only two weeks off the trade is relapsing into the customary lethargy at this period. But as a result of the persistently cold weather over the past few weeks the market is rounding out the winter season in better form than was anticipated, and considerably better than in average years. Stocks in the hands of the dealers are being so rapidly exhausted that many of them are being forced into the market for small tonnages to tide them over. But all such orders are restricted to the lowest possible minimum, and new business is scarce. A gradual slowing down, with individual prices touching the April circular, will probably be the record over the balance of the month. Judging from the business now being negotiated there will be considerable activity at the opening prices, Apr. 1.

The continued low temperatures have had a mildly stimulating effect upon bituminous trade, but the business is still characterized by an almost total lack of interest on the part of buyers. The market has failed utterly to respond to the possibility of a protracted suspension in the mining regions. Concessions are readily obtainable on spot business, although many contracts are being closed at last year's prices. The situation in the Pittsburgh district is decidedly stronger, but not so much as would be expected, as a result of the recent severe weather and the proximity of what may be a protracted suspension. It is generally hoped there will be a suspension of sufficient duration to clean up the surpluses in the market, and inject some snap into the trade.

Stocks in Ohio have been well cleaned up by the colder weather, and the trade is much improved under the influence of better orders for both domestic and steam grades. The market is in a waiting attitude, because of the uncertainty in the labor situation, and a turn for the worst in this direction will undoubtedly cause a sharp rush for coal. There is said to be less coal on hand now than at any time during the winter. Spot demand at Hampden Roads has shown some slight improvement, especially as regards inland business, but dumping over the piers continues light; considerable accumulations in the local yards are also reported, but much of this tonnage is being assembled to take care of a number of Government collieries.

The Middle Western trade is showing a stronger inclination to prepare for trouble after Apr. 1. While many of the larger consumers are still skeptical about any serious shortage, because of previous experiences, as a rule they are accumulating extra supplies. As a result of this, and the continued lower temperatures, a great many mines are working up to the full limit of the car supply, and it is clear that the Middle Western trade will round out the season in much better shape than had been anticipated.

EASTERN MARKET

BOSTON

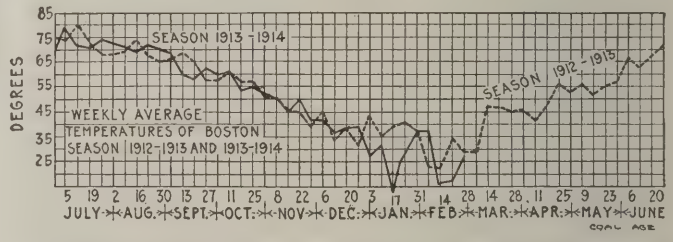
Practically no change in Pocahontas and New River. Agencies very watchful of one another. Little interest in Pennsylvania grades, contracts being gradually closed along usual lines. Georges Creek shows usual steadiness. Anthracite dull for March loading, but with active business in prospect.

Bituminous—The contract situation on Pocahontas and New River mulls along with no pronounced features. The various agencies are watching one another closely and while some low prices are known to have been made they are so well covered up by water freight arrangements that it would be difficult to check them back.

Spot coal is practically unchanged. Concessions continue to be made and contractors are generally dilatory in arranging for March quotas. Stocks are seasonably large and practically none of the sizable consumers will show any interest in the market at anything like the $2.85 basis. The heavy curtailment is still on, but most of the shippers are not slacking up any in their efforts to place current output.

Little interest is apparent in the Pennsylvania coals just now. The threatened suspension in mining is arousing only the mildest kind of attention. Some of the operators have now come out with flat prices and contracts are being closed much along the usual lines, each aiming to hold the tonnage acquired last year. Some light will be thrown on the general status when the Boston Elevated Ry. makes known its decision on its supply for the next season. This is one of the large orders in this territory and the award is usually significant. Practically every coal house of any size has submitted figures and there is much speculation over the result.

It is understood that the Georges Creek factors have closed about their usual tonnage on the basis of $2.85 f.o.b. Baltimore. For two years at least this grade has shown great steadiness, due both to its popularity among certain trade and to a rather limited output.



Anthracite—The recent spring-like weather has caused the retail demand to sag off. Stocks are light, however, in anticipation of lower-priced shipments early in April and there is likely to be some anxiety among retail dealers until they receive their first round of deliveries; many of them have been sailing too close to the wind. The storm early last week in New York and Pennsylvania was practically without result in New England. The prospect is excellent for a heavy demand for April, May and June. The disposition here is to take anthracite in as large a volume as storage will permit.

There has been a rumor about a possible advance of 25c. in the price of stove in the effort to shift some of the demand to other less popular sizes.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.90	2.92@3.02	
New York*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.75@2.85
Boston†				3.78@3.83
Providence†				3.73@3.78

*F.o.b. †On cars.

NEW YORK

Operations much curtailed by heavy storms of last week. Bituminous trade fails to respond to the strike talk. Loading in the harbor much delayed by frozen coal.

Bituminous—A persistent period of moderately low temperatures has served to clean up much of the surplus coal in the local market. Consumption has been increased, and as a result there has been a large hole made in the stocks on hand. On the other hand, the large shipments, delayed by the heavy storm of last week, are now coming in and tending to flood the market.

Transportation conditions are, however, not as free as might be expected. The Pennsylvania R.R. was the first to start coal moving again, and the situation on its lines is now relatively good. On the B. & O., the Reading, and others there is still considerable congestion. Early this week another storm in Pennsylvania again tied up the roads temporarily, distribution on the railroad being reported at only 80%. The general embargo at South Amboy has been removed, but boats are scarce and the loading continues slow, due to the frozen coal.

The local market is failing utterly to respond in any way to the possibility of a suspension in the mining regions. Some contracting is reported at prices said to be on the same basis as last year or better. The spot market is not quotably changed, and we continue it as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.75@2.80; best Miller Pennsylvania, $3.10@3.15; George's Creek, $3.15@3.25.

Anthracite—With the April discount now only two weeks off, dealers are cutting orders to the lowest possible minimum, in order to carry over as small stocks as possible. The persistent cold weather, however, has stimulated quite a little buying and will serve to wind up the season's business in hard coal in much better form than was anticipated.

Operations in the mining districts have been automatically restricted by the heavy storm, so that last week practically nothing was done until Thursday, while few mines succeeded in getting tuned up to full capacity before Saturday. Full capacity operations was the rule this week.

The demand continues to center around the steam grades. Most of the domestic sizes are still rather heavy. With boats scarce and difficult to load because of the coal being frozen, substantial premiums for loaded cargoes of the steam grades, including pea, were offered early in the week, as much as 30 to 40c. above the circular being readily obtained. Egg is the strongest of the prepared grades, with nut in fair demand, and stove heavy, selling off to the full April circular; April prices will probably prevail on all the prepared grades by Mar. 20, due partially to the fact that the line business is falling off heavily and excess tonnages are being dumped into the tidewater market.

We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00		$5.05	
Egg	5.25	$4.95@5.35	5.30	$4.90@5.30
Stove	5.25	5.15@5.35	5.30	5.10@5.30
Chestnut	5.50	5.55	5.55	5.35@5.55
Pea	3.50	3.55@3.80	3.50	3.50@3.75
Buckwheat	2.75	2.75@2.90	2.70@3.45	2.45@2.90
Rice	2.25	2.25@2.40	1.95@2.20	1.95@2.30
Barley	1.75	1.75@1.85	1.70	1.60@1.80

PHILADELPHIA

Anthracite trade rather quiet in anticipation of opening prices. Prospects favorable for good spring business. Bituminous in better demand, but prices unchanged.

Anthracite—From now on until the first of April, the anthracite busines is not likely to be very heavy. It is true that quite a number of householders, whose bins were depleted by the recent cold weather, have found it necessary to purchase additional supplies, but as a rule, buying at this time means only piecing out for the remainder of the season. All the dealers are holding up their orders and conserving what coal they have, until the first of April when the opening prices become effective. It is understood that the new circular prices will be no different from last year, with the exception that the contract sizes will in all cases carry the Pennsylvania State tax.

As indicated by the business that is now being placed for delivery as soon as the opening prices are announced, there is likely to be a shortage in stove coal almost as soon as the market opens for the year's business. As a matter of fact, it is believed that most of the companies have stocks of most every size but stove, which has moved off uniformly throughout the year. There is likely to be little or none of this size carried over, but the dealers claim to be well supplied with egg and chestnut, and it is not a question of waiting until Apr. 1 for additional supplies, as concessions down to the April circular can already be secured from individual operators on these two sizes. Stove coal is likely to be the stumbling block for prompt shipments, and orders for this size are being accepted only on condition that a certain proportion of egg and chestnut accompany them. Broken coal is about the only size that is short in the market at present, and this is only a continuance of a condition that has prevailed throughout the past season. Tidewater business has fallen off entirely. Any orders now being placed as a rule call for sizes that are not likely to be effected by the usual spring discount.

Bituminous—There seems to be a slightly better tone to the market on bituminous coal. This is more particularly due to a better demand, rather than to advancing prices. The call seems to be more active, and may be due in part to the heavy weather of the last three weeks, not only retarding production, but interfering with railroad movement. As a matter of fact, operators are assuming a more optimistic attitude, and are looking forward to a better spring and summer business.

BALTIMORE

Shipments interrupted, communication cut off by wire, and other delays due to heavy storms. Upward price tendency was confined to individual cases of necessity. Anthracite men busy.

Heavy snowfall and blizzard weather conditions of last week generally played havoc with regularity of tonnage movement. For several days the mines were shut off from supplies of empties even after the railroads had reëstablished operations and were moving out loaded cars. The roads kept promising as rapid dispatch as possible, but the movement of empties toward mine centers was slow.

The result of interruptions to shipments on contract forced some consumers into the open market who are seldom seen there. For the most part mine connections here were able to supply coal to customers from other sources, but some had to dig outside. There was no excessive charging even on the emergency business, however, as there was plenty of fuel close at hand to meet to all needs. The upward tendency of prices was confined to this emergency call.

There was not quite as much activity to be noted about the piers, as delayed shipments, frozen coals, etc., had an effect. A number of important loadings are scheduled, however, for the rest of the month, and March will show quite healthy figures for both the foreign and coastwise movement. During February a total of 59,756 tons of coal was loaded here for foreign ports, this being a slight decrease from the February figures of 1913.

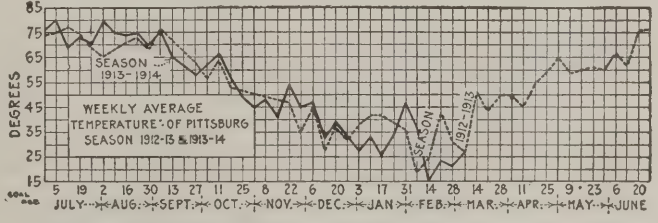
The several snow storms taxed the anthracite dealers here to the full, but the heavy orders on household account were gladly received.

CENTRAL STATES

PITTSBURGH, PENN.

Prices stiffer, but less improved than would be expected. Every prospect of mining suspension Apr. 1. Some stocking of coal by consumers. No important wage-scale developments. Connellsville coke market slightly easier but not quotably lower.

Bituminous—There has been a slight hardening in coal prices in the past week, so that circular prices are more generally obtained, but there is still some shading. The market is decidedly stronger than it was a fortnight ago, but it is not as much stronger as would be expected on general principles, seeing that the weather has been extremely cold and windy throughout the consuming districts, and it has become practically settled that there will be no wage agreement by Apr. 1. There is considerable stocking of coal, particularly by the railroads, but mine operations have not been increased materially, if at all, and are still not over 50 or 60% of capacity of an average. There have been no important developments in the wage-scale matter since the failure of the subcommittee of the Philadelphia conference to reach an agreement on any of the important points at issue. Circular prices remain: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.05; 1¼ in. domestic, $1.55, per ton at mine, Pittsburgh district.



Connellsville Coke—The coke market has eased off a trifle in general tone in the past week, though prices are hardly quotable at a lower level. One influence has been the end of the slow movement on railroads, caused by the bad weather, and another has been the failure of the iron and steel industry to show any further improvement. A fortnight ago the railroad movement suddenly slowed down, and while shipments kept up very well the coke was longer in transit, resulting in demand for extra shipments on contract, with a little demand in the prompt market. In the past few days the belated coke has been arriving in heavier tonnages and the tendency now is rather to ask for suspension or curtailment of shipments. As a result the spot market is a trifle easier. The contract market is not particularly affected, since there was hardly any negotiations. Practically all consumers are

covered by contracts to Apr. 1, but a few contracts expire then. There is now, however, little interest in the second-quarter market. The present iron and steel outlook is for stationary blast-furnace operations, hence no increase in consumption. The market remains quotable as follows: Prompt furnace, $2; contract furnace, $2@2.10; prompt foundry, $2.40 @2.50; contract foundry, $2.40@2.60, per ton ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending Feb. 28 at 313,870 tons, an increase of 10,710 tons, and shipments at 341,-784 tons, an increase of 17,614 tons. The shipments reported exceed the reported production by 27,914 tons, and it is stated that the Frick company, the steel-corporation subsidiary, moved 20,000 tons of stock coke in the week.

BUFFALO

Anthracite trade slacking off and not likely to be resumed. Demand for bituminous somewhat better. Winter conditions continue. Coke still dull.

Bituminous—The demand for bituminous is better than it has been lately, though the producer is somewhat handicapped by the special activity of slack, with which certain of the consumers appear to be stocking up against a possible suspension of some length next month. Opinions differ as widely as ever in regard to a suspension. Buffalo jobbers are sending out advices to their customers, but they are careful not to say that one thing or the other is going to happen. The safe thing is to buy a supply when it is to be had.

It is the desire of all operators to allow the mines to remain idle until such a time as the supply is so nearly exhausted there will be some snap to the market. Some members of the trade imagine that the final agreement may include a 30-day suspension, but this hardly seems probable. The difficulty is that the men want to work and there is not a sufficient number of operators who will close down in the face of any sort of demand for coal.

There is a pretty slow movement of cars on account of the snow, which is heavy in most parts of Pennsylvania, but does not interfere with traffic from here Northward or Vestward. There has not been much snow in the West this winter. Reports from the stocks on Western lake docks state that the surplus is not nearly so great as it was, but March will have to take more than the average amount to carry it off.

Coke—It is probable that the coke trade is a better barometer of the general business of the country than coal and the fact that it does not improve materially is significant. Prices remain quiet on the basis of $4.50 for best 72-hr. Connellsville foundry. It will not show much strength until iron is moving faster.

Anthracite—The demand is falling off fast and will be down to the usual low point of the middle of March when that date arrives. The weather is not cold and besides the orders will soon all be for April delivery. There is little coal here, as the mines have not run strong of late and the snow is heavy. Shipping agents are not making very prompt deliveries on that account. The heavy ice in harbor makes it difficult to move lake craft, though a little coal will be put afloat by one or two shippers. Opening rates will be paid, as the time is so near at hand.

TORONTO

Tendency to stock against a possible suspension and trade better.

Trade has been good in all lines. The yards are well stocked and deliveries coming forward freely with less difficulty with railroad blockades than was experienced last year. There is some disposition on the part of dealers to give large orders for bituminous so as to provide against a possible shortage as a result of labor troubles in the bituminous fields.

Quotations remain unchanged as follows: Retail, anthracite egg, stove and nut, $8.25; pea, $6.75; bituminous steam, $5.25; screenings, $4.35; domestic lump, $6; cannel, $7.50. Wholesale f.o.b. cars, three-quarter lump, $3.85; screenings, $3.

TOLEDO

Continued cold weather has cleaned up stocks. Great scarcity of Pocahontas. Fairly good demand of steam grades in anticipation of a possible shut-down of the mines. Pittsburgh No. 8 strong.

There is less coal on hand in the Toledo markets than any time heretofore this winter. A continued spell of the real winter weather cleaned the stock of domestics. Being now accustomed to the uncertain weather of this winter dealers do not care to take any gamble with it, especially now that spring is about due.

Pocahontas has been tight, with prices holding firm. The steam-coal market was slightly stimulated the past days as a result of the agitation over a possible shut-down at the mines. Some of the large factories are, however, still holding off negotiations for storage stocks, but they are watching conditions closely, and if the final meeting of the miners and operators should fail to arrive at an agreement there will likely be a stampede for coal. As it is, the factories seem loath to entirely abandon the hope of buying at the reduced rates after Apr. 1. On the other hand, most of the railroads have already a 35-day supply on hand.

Traffic is not moving as freely at Toledo as might be expected. Most of the dealers find considerable trouble in procuring shipments.

Prices are holding to the following:

	Pocahontas	Hocking	Jackson	Pomeroy	Massillon	Pittsburgh	Cambridge
Domestic lump..	$2.25	$1.25	$2.50	$1.75	$2.50	$1.40	$1.40
Egg.....	2.25	1.25	2.50	1.50	2.50	....	....
Nut.....	1.75	0.80	2.00	1.75	2.50	1.35	1.20
¾ lump.....	....	0.90	....	....	....	1.20	1.20
Mine-run.....	1.40	1.15	....	....	....	1.10	....
Slack.....	....	0.70	....	....	....	....	....

COLUMBUS

Movement improved, but demand is still far from absorbing the possible output. Car shortage hampered operations some. Price list well maintained and there is an increase in stocking-up orders.

The trade continues to improve under the influence of better orders for both domestic and steam grades. The price list is being upheld in every respect and there are few cases of cutting to force trade. The market is in a waiting attitude due to uncertainties in the future. The mine-run law together with the rather unseasonable weather has set aside all former precedents.

The steam business is fairly strong in every particular. Some of the larger steam users are stocking up, although that movement is not as large as might be expected under the circumstances. The fact remains that most of the steam consumers permitted their regular shipments to come forward during the winter, when their consumption was not large and consequently a considerable stock was accumulated; they can also secure West Virginia coal in sufficient quantities to keep them going. Railroads are said to have stocked up for about 60 days.

In the domestic trade demand is fair from dealers, but they are only buying in small orders, as their efforts are directed toward cleaning up, rather than collecting stocks. There is a fairly good demand for anthracite, Pocahontas and the rescreened varieties from West Virginia.

Because of the lack of equipment and the severe snow storm, railroads have been having difficulties in moving coal. Empties have been slow in being returned and many of the mines with orders, had to curtail production. As a result the Hocking Valley only produced about 50% normal and eastern Ohio the same. In the Pomeroy Bend district the output is estimated at 70 to 80%.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	$1.50 @ 1.40	.....	$1.50 @ 1.45	$1.50 @ 1.40
¾ inch.....	1.35 @ 1.30	$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.30
Nut.....	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run.....	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack..	0.85 @ 0.80	.....	0.90 @ 0.85	0.80 @ 0.75
Coarse slack.....	0.75 @ 0.70	1.00 @ 0.95	0.80 @ 0.75	0.70 @ 0.65

CLEVELAND

Moderately cold weather and a fair demand is keeping the market firm at low prices. The lake freight market has been complicated by an attempt to break the current rate for transporting coal. Chartering at 1913 rates continues.

Although operators have been expecting a flood of orders in advance of Apr. 1, the sales have been only moderate. A large number of companies have stocked, but it was done when the market was more abundantly supplied than at present. There is a tendency toward higher prices on some of the large sizes, but nothing of a substantial nature has developed.

Cars are not as plentiful as they were. The Wheeling & Lake Erie notified some of its shippers to load the cars as fully as possible and on other roads the supply is just about equal to production. The poorer equipment has been loaded with railroad coal and is standing on side tracks along the lines. This storing by the railroads is the only reason, so far as shippers are able to learn, for a shortage of cars.

The Pittsburgh Coal Co. last week canvassed the vessel offices for boats to carry coal to Duluth-Superior and to Port Arthur during 1914 at 25c. The rate to Lake Superior for the last few years has been 30c. and several million tons have

been placed at this rate, vessel managers having refused to consider the lower price. Simultaneously with the effort of the Pittsburgh Coal Co. to break the rate, announcement was made that 1,000,000 tons had been placed with vessel owners for Superior delivery at 30c. One hundred thousand tons of soft coal also were placed for Fort William-Port Arthur delivery this season at 30c. It is now doubtful if a lesser rate will be possible.

Spot sales are a little lower than sales for shipment and away from Cleveland sales are being made on shipment prices. The spot market is as follows:

	No. 8	Middle District	Pocahontas
Lump, 1¼ in.	$2.05@2.15	$2.15@2.25	$3.60
Lump, ¾ in.	2.00@2.10	2.00@2.05	
Egg	.....	.....	3.60
Mine-run	1.95	1.85@1.90	2.75
Nut	2.00@2.10	2.00@2.10	
Slack	1.95@2.00	1.85@1.90	2.60

DETROIT

Lower temperatures and uncertainties in the labor situation have stiffened up the market. Demurrage coal mostly cleaned up.

Bituminous—The local market is a weather proposition, although interruptions to transportation and possible labor troubles are also determining factors. The lower temperatures have helped the market materially, particularly as regards demurrage coal, but the possibility of the strike does not seem to create any important movement. The inclement weather interfered with operations at the mines and the movement on the roads. While a slight stiffening in the market is noted, this is more or less of an artificial nature due to the possibility of labor trouble.

Anthracite—Hard coal is in good demand with some grades commanding substantial premium, due to the difficulty in obtaining prompt shipments as a result of the inclement weather.

Coke—Connellsville 72-hr. foundry coke is quoted at $2.55, with Semet Solvay at $3, and gashouse at $2.65. Local ovens are reported as working full capacity.

HAMPTON ROADS

Shipments from Hampton Roads still slightly below normal. Demand light, although showing some little improvement.

The dumpings over the Hampton Roads piers for the week have been somewhat light, although there have been a number of large shipments both foreign and coastwise. While there is little demand for spot coal there has been a slight improvement and indications are that, unless the weather should turn considerably warmer, the demand will continue to improve. This is especially true on the inland trade.

Prices on all grades at tidewater and inland are the same as they have been for some weeks. The accumulation of coal at all piers is still somewhat above normal but not excessively so. Some of the accumulated coal is being assembled to take care of government colliers about due.

Export shipments for the week have moved to Canal Zone, Montevideo, Trieste, Port of Spain, Cienfuegos, Santiago, Havana and Dakar.

The total dumpings over the Hampton Roads piers for the month of February amounted to 875,783 tons; of this quantity the Norfolk & Western Ry. dumped over the Lamberts Point piers 440,236 tons, the Chesapeake & Ohio Ry. at Newport News 234,685 tons and the Virginian Ry., from Sewalls Point 200,862 tons.

LOUISVILLE

Consumption holding up well, in spite of moderating weather. Prices remain low, due to the lateness of the season and fear of discouraging buying. Car situation good.

The trade has been favored with a continuance of fairly severe weather, causing a continued demand for domestic grades, and buying on the part of the retailers has become quite general. Stocks seem to have been exhausted with remarkable rapidity, indicating that few consumers had any coal on hand.

The steam market is fair. The demand is all that could be expected, but the supply is now ample, due to the increased activity at the mines. Those concerns which made price concessions are finding it difficult to get back to a proper level in this department. Talk of possible labor trouble in various fields is becoming general, but seems as yet to have had no effect on the market.

The fact that some mixed coal is being furnished to railroads by eastern Kentucky mines is responsible for the appearance of pea and slack from that section, as there is always plenty of this grade from western Kentucky; the price is low, running around 15c. For nut and slack the price ranges from 55@60c. for low grades to as high as 85c. for the better grades.

SOUTHERN AND MIDDLE-WESTERN

INDIANAPOLIS

Heavy orders for screenings and steam grades. Mines would run full schedule, if sufficient cars were available. Premium prices offered. Domestic market a weather proposition.

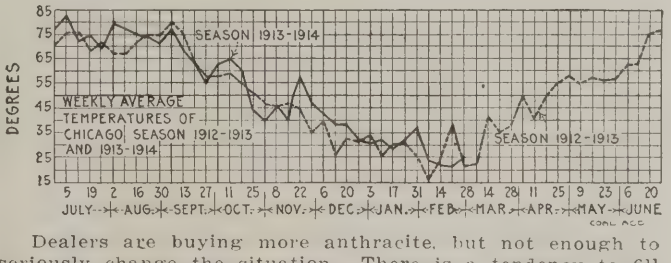
While the car service is reported improved, mines are not able to run at more than 80% capacity, and operators seem to have enough to put their mines on full schedule. One of the largest companies of the state says it will not now be able to catch up with orders by Apr. 1, when the wage contract ends, and this applies also to most other companies.

The rush of orders is due almost altogether to the fear of a suspension of work in April. Premiums are offered on all grades, with the exception of domestic lump, the demand for which is a weather proposition. Screenings can be sold for 90c., which is much better than the price prevailing up to the early part of February. There is a premium of about 10c. a ton over previous prices for steam grades. The mine price for domestic lump is around $1.75, with buyers showing anxiety as this coal is not put in stock. February weather made it necessary to consume more domestic coal than in January and December combined, much to the profit of the dealers. The early March weather has been a continuation of the February kind, and business holds good with the retailers. They have made no change in prices, and it is questionable if they will do so, even with a suspension of mining in April.

CHICAGO

Little change in the local market. Buying still comparatively heavy as a result of the continued cold weather. Retailers' storage piles being reduced considerably and they are forced to buy.

Despite the fact that the joint conference has been adjourned with no future date set coal buyers are not showing any trace of anxiety. With only a limited demand for domestic coal, mines are on a short production and as a result there is a reduction in the supply of screenings and the price is advancing.



Dealers are buying more anthracite, but not enough to seriously change the situation. There is a tendency to fill their needs up to Apr. 1 with odd cars or demurrage coal, which they can obtain at a low price. Steady conditions prevail in the smokeless market, but the coal is not unusually active. The Springfield market has experienced an improved demand for steam coal; the evident shortage in the screenings supply has resulted in an increase of 5 to 10c. a ton for this coal. This higher figure has brought out a bigger demand for mine-run, egg and steam lump. There is nothing of import in the coke market, the demand being quiet.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07@2.17	$2.55@2.65	$2.12@2.27	
Steam lump	1.97		1.97	
Egg		2.55@2.65		$3.70
Mine-run	1.87	2.20@2.25	1.87	3.30
Screenings	1.67@1.77	1.90@2.05	1.67@1.77	

Coke—Connellsville, $5.25; Wise County, $5@5.25; byproduct egg and stove, $4.90; byproduct nut, $4.75; gashouse, $4.50.

MILWAUKEE

Large stocks on hand and little apprehension over the possible labor difficulties.

If all upper lake ports are as well supplied with coal as Milwaukee is, a month or two of idleness at the mines this spring will not cause any great disturbance. It is estimated that there is fully 20% more coal on the docks here than at this time last year. This is true of all grades of domestic and commercial coal.

This condition is not altogether the result of a mild winter, as there has been a fair movement of steam coal right along. It is due in a large measure to the foresight of dealers,

who docked much larger stocks last year than has been their custom, in anticipation of labor complications at a time when supplies are usually at a low ebb.

February was a real winter month from the standpoint of temperature, and the draught upon stocks during that period was the heaviest of the season. From now on the movement is expected to be normal. Prices have been fairly well maintained throughout the season. Shippers and vessel men do not expect the upward movement of coal to begin until early in May.

ST. LOUIS

Coal markets generally stronger all along the line, but with prices still relatively low. Railroads and large consumers gradually accumulating surpluses. Car shortage.

Continued winter weather, cold and threatened snow, has kept the domestic market in fairly good condition, and a good volume of coal is moving. Standard coal, 2-in. lump, has touched 85c. in some instances, with an average of 90c. Carterville 6-in. lump sold around $1.15 and $1.25, while screenings from both have a tendency to increase in price.

As has been intimated before, several railroads and large consumers are buying in five- and ten-car lots and scattering their purchases over a wide territory so as not to cause any undue excitement, and an advance in prices. It is estimated that something like one thousand cars of mine-run coal from the Carterville and other fields were purchased during the past week, for shipment throughout the balance of the month. The screenings market is high enough at this time to warrant bringing in West Kentucky coal, and a local company with mines there has sold two lots of screenings.

In the past the steam plants have been loaded full with high-priced coal, and this year they are skeptical about buying. This will have the result of making some fancy prices in April to those who are not stocked.

There is practically no anthracite or smokeless moving, and the same applies to coke. On Illinois coals it is likely there will be a general advance on all sizes the coming week. There is a serious car shortage on the C. & E. I. and cars are not any too plentiful on the other lines.

The prevailing prices are:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	.....	$1.05 @ 1.10	$1.15
3-in. lump	.....	.....	$1.40	.....	.....
6-in. lump	$1.25 @ 1.50	.....	1.50	1.25 @ 1.35	1.25
Lump and egg	1.85 @ 2.15	2.15	.....	.....	1.15
No. 1 nut	1.20 @ 1.40	.....	.....	.....	.....
Screenings	0.75 @ 0.85	.....	.....	0.55 @ 0.60	0.60 @ 0.65
Mine-run	1.10 @ 1.20	.....	.....	.....	.....
No. 1 washed nut	1.50 @ 1.60	2.25	1.50	.....	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.75 @ 0.80	.....	.....	.....	.....

KANSAS CITY

Dealers refusing to buy ahead and situation unsatisfactory. Mines working moderately steady and prices fairly well maintained.

The situation in Kansas City and the Southwest is far from satisfactory. Dealers are buying with caution, ordering only for eleventh-hour demand, refusing to anticipate their wants far enough ahead to allow for transportation from the mines. This means that operators must maintain stocks at their sales offices in Kansas City and elsewhere, and the coal is left on track, causing demurrage charges to be added to the cost of marketing.

About five days a week seems to be the average at the mines. The market has been steady at the quotations which have prevailed since the first of the year. Cherokee and Mexican lump is quoted at $2, f.o.b. mines; nut, $1.85; semi-anthracite, $2.50, and Lexington lump, $2.

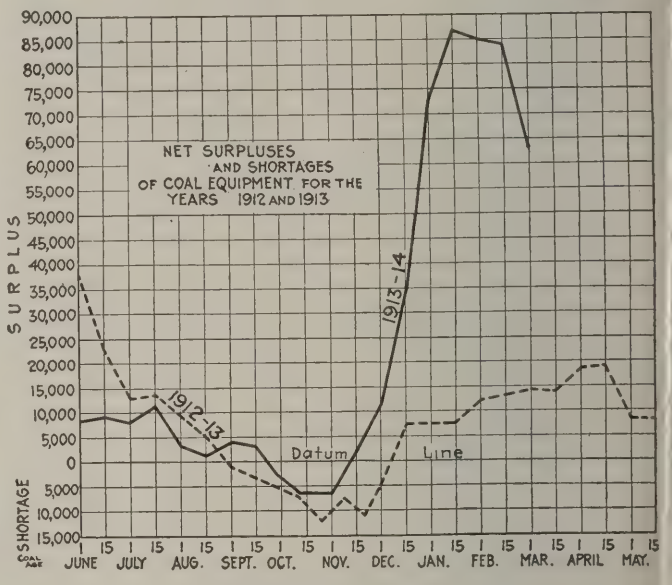
PRODUCTION AND TRANSPORTATION STATISTICS

ANTHRACITE SHIPMENTS

The hard-coal shipments for February touched the lowest for any normal month since August, 1909. Gross February shipments were 4,121,451 tons as compared with 5,175,732 tons in January, and 5,662,618 tons in December. The total shipments for the two months of the year are only 9,297,183 tons as compared with 12,010,588 tons last year.

Details of the anthracite shipments for February and the two months of this year and last year were as follows:

	February		2 Months	
	1914	1913	1914	1913
Phila. & Reading	746,793	1,165,449	1,761,919	2,422,581
Lehigh Valley	681,844	1,062,129	1,492,432	2,237,280
Cent. R.R. N.J.	563,650	761,070	1,268,141	1,574,437
Del. Lack. & West.	573,553	763,571	1,192,491	1,685,670
Del. & Hudson	442,378	567,371	1,029,271	1,220,548
Pennsylvania	426,100	491,062	962,218	1,067,614
Erie	533,307	655,919	1,239,610	1,373,154
Ont. & Western	153,826	207,598	351,101	429,304
Total	4,121,451	5,674,169	9,297,183	12,010,588



VIRGINIAN RAILWAY

The total shipments of coal over this road for January, 1914, were 407,109 tons, as compared with 453,886 tons for the same month last year.

COAL FREIGHT DECISIONS

I. C. C. No. 4606—Youngstown Sheet & Tube Co. vs. Pittsburgh & Lake Erie R.R. Co.

Rate of 70c. per net ton for the transportation of bituminous coal in carloads from the Pittsburgh, Penn., coal district to the Youngstown or Valleys district of eastern Ohio and western Pennsylvania, not found unreasonable or unjustly discriminatory. Complaint dismissed.

COAL SECURITIES

William J. Hoey reports the market on various coal securities for the week ending Mar. 7, as follows:

Stock	Bid	Asked
American Coal	80	95
American Coal Products	83	84
Amer. Coal Prod. Pfd.	104	106
Big Muddy Coal & Iron	75	100
Burns Bros.	50	53
Burns Bros. Pfd.	94	99
By-Products Coke	112	116
Central Coal & Coke	80	86
Central Coal & Coke Pfd.	78	86
Chicago Lumber & Coal	50	56
Chicago Wil. & Ver. Coal	25	32
Colo. Fuel & Iron Pfd.	140	160
Cumberland Corporation	10	14
Cumberland Corp. Pfd.	40	43
Del. Lack. & West. Coal	260	270
Elkhorn Fuel	4	10
Elkhorn Fuel Pfd.	55	70
Hocking Valley Products	1	4

Bonds	Bid	Asked
By-Prod. Coke, 6's, 1930	100	102
Carnegie Coal, 5's, 1917	98	101
Consol. Coal, Conv., 6's, 1923	100	102
Consol. Coal, Ref. 5's, 1950	88¾	91
Cumberland Corp., 6's, 1915	97	99
Erie-Pa. C. Col. Trust, 4's, 1951	90	91½
Fairmont Coal, 5's, 1931	93	96
Lack. Coal & Lum., 6's, 1961	57	59
Mononga. Riv. C., 5's, 1945	92	95
N. Mex. Ry. & Coal, 5's, 1947	96	99

Stock	Bid	Asked
Jef. & Cle'fd. C. & I. Pfd.	75	85
Kentucky Block Cannel	40	60
Lehigh Valley Coal Sales	185	195
Leh. & Wilkes-Bar. C. Co.	300	350
Mahoning Coal R. R.	700	750
Mahoning Investment	73	78
Maryland Coal of Md.	3	6
Maryland Coal of W. Va.	7	9
Maryland Coal of W. Va. (5% Bonds)	54	62
Midland Coal	80	90
N. Y. S. & W. C. Pfd.	15	30
Pocahontas Con. Collieries	92	101
Pocahontas Con. Coll. Pfd.	98	105
Texas & Pacific Coal	97	101
United Coal of Pittsburgh	3	9
Victoria Coal & Coke Pfd.	40	80

Bonds	Bid	Asked
New Mex. Ry. & C'l 5's 1951	96	99
New Riv. (Coal) 1st, 5's, 1934	75	83
Pleas. Val. C., 1st, 5's, 1928	88	92
Pocah. Collieries, 5's, 1937	94	98
Pocah. Con. Coll., 5's, 1957	85	87
Solvay Collieries, 5½'s, 1931	96	99
Sunday Creek Co., 5's, 1944	58	64
Vic. Am. F. 1st, & Ref. S. F. 6's, 1940	90	100
Vic. Fuel 1st S. F., 5's, 1953	75	90
Webster C. & C. 1st, 5's, 1942	79	84

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 12
Issued Every Saturday
Hill Publishing Company

NEW YORK, MARCH 21, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



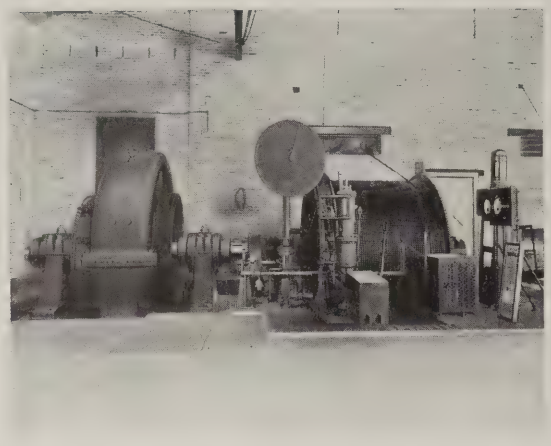
Old Method of Strip-Pit Mining, Scammon, Kansas

Note Primitive Method of Hoisting Water

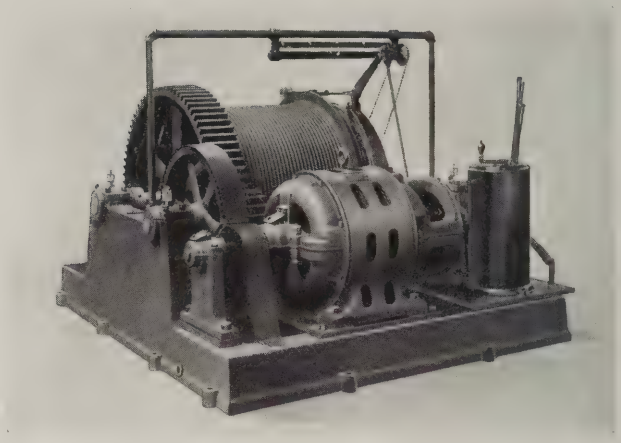
Modern Steam-Shovel Pit, Columbus, Kansas

This Small Marion Shovel Handles 25 ft. of Overburden

COAL AGE



Large Hoist Installation



Small Hoist Installation

Westinghouse Hoist Installations
Both Large and Small

The motors and control of Westinghouse Electric hoist installations, designed especially for your service, have embodied in their design features that assure

Maximum Output Under All Conditions

Liberal design of motor makes it possible to hoist increased loads for a long period to make up for time lost in delivering coal, or ore, to the foot of the shaft.

Reliability

Reliability means continuity of service, assuring against loss due to reduced output caused by motor or control trouble.

Ruggedness

The first two points are dependent upon ruggedness of mechanical and electrical construction.

Efficiency

Power consumption per ton output is an important factor. Westinghouse high efficiency means low operating costs.

Safety

All Westinghouse hoisting installations are designed with control arranged to prevent accidents due to overwind, failure of power and errors in judgment of the operator.

Our specialists in mining equipment will be glad to assist you in selecting the proper equipment for your mines. Their services are at your disposal if you will write to the nearest office listed here.

Westinghouse Electric & Mfg. Company

East Pittsburgh, Pa.

DISTRICT OFFICES:

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W.Va.
Boston, Mass.
Buffalo, N.Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Calif.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N.Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N.Y.
St. Louis, Mo.
Salt Lake City, Utah.
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
Syracuse, N.Y.
Tacoma, Wash
Toledo, Ohio.
Washington, D.C.

*Westinghouse Electric & Mfg. Co. of Texas.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MARCH 21, 1914 NUMBER 12

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 473

Motion Studies Applied to Coal Mining—Close observation has shown that 72 per cent. of a miner's time underground is lost in waiting for empties. There is hardly a motion in the entire cycle of handling coal from the face of the room to the railroad car that cannot be improved upon. COAL AGE, Vol. 5.

SYSTEMATIC TIMBERING AND MINE FATALITIES: *Page* 474

EXCERPTS FROM ADVANCED SHEETS OF THE PENN. BITUMINOUS REPORTS: *Page* 474

*A SMALL WATER LIFT: *Page* 474

*COAL HANDLING AT THE ATLANTIC COAST PIERS: *Pages* 476-480

A general description of the chief loading ports on the Atlantic Coast. The relative importance and growth of the various harbors are discussed. The development and comparative merits of different handling apparatus are also entered into. James Steelman. COAL AGE, Vol. 5.

WEST VIRGINIA'S AMERICAN RIVALS IN THE PACIFIC MARKET: *Pages* 480-482

The author declares that the Pacific rivals of West Virginia have such serious disadvantages in the quality and disturbed character of their deposits that they cannot seriously compete. W. A. McCorkle. COAL AGE, Vol. 5.

*SAFEGUARDING THE PAY-ROLL: *Page* 482

SAFETY FIRST: *Page* 483

Poem by W. E. Holland.

COAL PRODUCTION, PENNSYLVANIA: *Page* 483

*IMPORTANT DETAILS IN CONSTRUCTION OF COLLIERY PLANTS: *Pages* 484-492

Practical suggestions concerning the erection of an entire colliery plant. A plan for laying out the organization is given. Complete equipment of the various buildings is enumerated, and a method of handling the coal is described. M. L. Hyde. COAL AGE, Vol. 5.

SAFETY REQUIREMENTS: *Page* 492

An inquiry in reference to the legal performance of his daily duties by the mine examiner when he fails to report a miner's working place as dangerous, and as a result the miner is badly injured by a fall of rock in his place. A. L. H. Street. COAL AGE, Vol. 5.

*ADVANTAGES OF THE MODERN STEAM SHOVEL IN MINING SHALLOW SEAMS: *Pages* 492-493

EDITORIALS: *Pages* 494-495

Pumping in Coal Mining—Systematic Timbering to Prevent Accidents—Standardization—Cost of Living and Miners' Wages—One Advantage of the B.T.U. Method—The Panama Canal and Coal Mining.

*OBITUARY OF GEORGE WESTINGHOUSE: *Page* 496

DISCUSSION BY READERS: *Pages* 497-499

Mine Cars—The Mine Worker—Safety or Refuse Chambers in Mines—The Hookworm and Mine Sanitation.

STUDY COURSE IN COAL MINING: *Page* 499

INQUIRIE OF GENERAL INTEREST: *Page* 500

*Mensuration, the Circle.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 501

COAL AND COKE NEWS: *Pages* 502-505

COAL TRADE REVIEWS: *Page* 506-510

INDEX OF COAL LITERATURE: *Pages* 511-512

ADVERTISING INDEX: *Page* 32

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

The "Tax" Idea Is Dead

The Weekly Ad-Talk Page

There are some men who cry aloud because they are being compelled to wear a glove of quality, standardized and guaranteed by advertising, rather than an inferior article at an increased price.

These same skeptics have decided that "advertising is a tax on the people."

But in this country of ours advertising is an economic necessity. The distances are tremendous. A manufacturer cannot live on the trade of his county—his salesmen cannot travel a thousand miles over expensive railroads on missionary expeditions.

Branch offices are too expensive unless a demand is already created.

These economic principles have opened dollared possibilities for you.

Instead of listening to the story of one machine, combating with the insistent, compelling personality of the salesman, the buyer can weigh the merits of different types quietly and wisely.

In the privacy of the office, or the seclusion of home, the advertisements in this paper may be set side by side, compared and judged, the mind freely made up, and action taken on the conclusion.

Here, then, is the great benefit, reader, you derive from the selling section of this paper—the right to consider two or more articles absolutely on their merits, irrespective of persuasive personality.

Advertising has grown up. Its message is authoritative. Its guarantee is a contract that fair value will be given for your money.

Therefore your "buys" through a period of years reveal your up-to-dateness, or your lack of careful study.

As a great merchant once said, in an address before a class of business college graduates: "Advertising is an economizer of public time. It saves thought and worry. It tells the business news of the day."

COAL AGE

Vol. 5 NEW YORK, MARCH 21, 1914 No. 12

Motion Studies Applied to Coal Mining

Since Taylor, Gilbreath, Brandies, and others have written on the above subject, or "Scientific Management" as it is more familiarly known, much benefit has been derived from its application and much harm caused by a misunderstanding of the problems involved.

The average workman understands that by "Scientific Management" we propose to teach him how to lift 100 lb. of pig iron, or other material, in such a way that it will not feel any heavier than if he were lifting only a few pounds of material, and he, knowing that such a thing is absurd, very roundly denounces "Scientific Management" as a myth.

Perhaps a better definition of "Motion Study" would be to say that it is the application of common sense to industry rather than the more common practice of forever following tradition.

Not long since there was gathered round the tables of a banquet hall many mining men of experience in their particular branches of industry; a professor of mining engineering in one of our prominent universities was present, and asked the question whether or not efficiency engineering could be applied to advantage in coal mining. One engineer, who had made some motion studies in coal mining, and who had increased the efficiency of hoisting over 260 per cent. in one instance, was alone in his opinion that such a science could be employed to advantage in mining coal.

Perhaps no great industry in the country has shown less advance in the last 100 years than coal mining. For example, the miner of today in the anthracite field, cuts, shoots and loads his coal practically in the same way as did his father or grandfather.

How many operators are there who can give a lucid and sufficient reason for the details in the cycle of operations that have to do with getting the coal from the working face to the railroad car? Are all of the men, animals, material and energy employed to the best advantage of everybody concerned, and is there any lost motion? Can anyone with truthfulness answer the above question in the affirmative for any one mine in any field in the country? Is any man, animal or machine going through useless motion and if so, why? Can any one give the reason why, or why not, an 18-ft. room under given conditions is better than a 14-ft. room, or a 24-ft. room, or no room at all?

Mr. Operator, do you think you are treating your labor in such a way as to remove the present industrial unrest or to increase the present dissension existing when you ask a miner to go into the mines at 7 a.m., shoot his cut, timber his place, clean his coal, load the car that you give him at 8 or 9 o'clock, and load it quickly so that he becomes wet with perspiration, and then not give that miner another car until 12 or 12.30 p.m., or later; because perchance your haulage motor had to chase off to several other sections of the mine?

Do you think that you are working that miner to your best advantage, or his best advantage, and do you feel that while he is sitting on the "parting" wet from perspiration and cold from the swiftly moving current of air, which alas! often does not move at all at the working face, do you think that this group of coal loaders, waiting for a car, have kindly thoughts of you? Do you realize that on an average, as determined by observation, 72 per cent. of a coal-loader's time underground is lost in waiting for empties.

Is the plan of development in your mine such that you can concentrate your workings to the utmost, or does the mine's ramifications extend over 500 acres for a petty output of 500 tons and are you leaving 500 acres of pillars as you go? Is your plan of mining such that the further you go, the more scattered become your workings, or do the miners' working places bear a constant relation to one another?

The writer who has made motion studies of the above cycle of operations, i. e., getting the coal from the face to the railroad cars, ventures the assertion that not only are the present plans of development extravagant of capital, men, material and the natural coal resources, but that there is hardly a motion in the entire cycle that cannot be improved upon, and that a large percentage of same can be entirely eliminated, resulting in decreased cost to the operator and increased earnings to the miner.

Make motion studies of the cycle of operations yourself, forget tradition, apply common sense, and you will become appalled at the extravagance of present methods.

Systematic Timbering and Mine Fatalities

SYNOPSIS—The British Columbia Mining Department has issued a set of rules to govern the placing of all timbers in underground workings. It is hoped that the scheme of enforcing a systematized plan of timbering will reduce the accidents from roof falls.

Loss of life, largely unnecessary, is witnessed each year through faulty or inadequate timbering at the working faces of our coal mines.

British Columbia, spurred by the unwarranted increase in such fatalities during the past year, has taken a decisive step toward eliminating, or, at least, minimizing this danger, in the adoption of a "Special Rule—Systematizing Timbering."

This rule was referred to the mine managers of the province last year in a circular, sent out by the Chief Inspector of Mines at the direction of the Minister of Mines, which was, in substance, as follows:

"For a number of years past, the percentage of fatal accidents from falls of roof and coal at the working faces, has ranged from 35 to 60 per cent. of the total accidents occurring in coal mines. I regret to say that, during the first five months of the present year, there have been 12 fatal accidents—or three more than during the whole of last year—from these causes.

"Owing to the large increase in this class of accidents, the Minister of Mines deemed it necessary to avail himself of the powers given him, as set forth in Sec. 101 of the Coal Mines Regulation Act, and proposes in writing to the managers of the various collieries, a special rule, covering the question of systematic timbering and spragging at the working faces.

"Recognizing that, owing to the widely varying conditions in the different collieries in the province—even in the same field, and often in the same mine—that a hard-and-fast rule on systematic timbering would render such rule often impracticable, making the same invalid and often, even tending to bring about the very conditions it would be aimed to prevent; therefore, before formulating any such rule, the Minister, in keeping with his former policy, would like to avail himself of your assistance and coöperation in this very important matter, so the following proposed special rules are submitted for your consideration."

Special Rules for Systematic Timbering

(A) The manager of the mine shall cause to be posted, at a conspicuous place, near the mouth of the mine, a notice stating the minimum size of the different types of timber to be used in such mine, and the maximum distance between timbers, and between the timbers and the face and sides of the working face.

(B) In the event of two or more methods of timbering being used in one mine, then, in addition to the notice posted at the mouth of the mines, the notice shall be posted at the entrance, to each section or district, stating the method of timbering to be used in such section or district of such mine.

(C) It shall be the duty of the miner in charge of a working place—which shall include such working place and for a distance of 15 ft. back from the face—to keep the props, timbers, or other roof supports erected as designated in the notice of systematic timbering governing the mine, division, or sub-division of such mine in which he is employed.

(D) Nothing in this section shall prevent a miner from setting supports, or an official from requiring the miner to set supports in his working place at more frequent intervals than those specified in the notice aforesaid, if necessary for safety.

(E) Every miner in charge of a working place, shall set sufficient sprags or other supports for the undermined coal, provided that before commencing to mine, he shall set one sprag or other support, and not less than one for every six feet of such undermining.

(F) Temporary props shall only be withdrawn by use of a dog and chain or othr type of timber-drawing machine, unless permanent timber has been set before such withdrawal, and no permanent prop, timber, or other roof support shall be finally withdrawn without the use of such timber-drawing device.

The large majority of the managers in the province heartily approved the Minister's suggestions and all, with the exception of two or three, who have since complied, were in a position to start the present year under a method of systematic timbering.

The special rule, as finally adopted, is uniform throughout the province; the method of timbering under the rule having been provided for, to suit the local conditions of each mine affected.

The adoption of this rule is undoubtedly a step in the right direction, and the records of British Columbia for the current year should most certainly prove its justification.

Excerpts from Advanced Sheets of Penn. Bituminous Report, 1913

The following extracts taken from the forthcoming report of Mine Inspector Charles P. McGregor are worthy of careful attention:

Accidents—The responsibility for preventing accidents falls upon both the mine officials and the employees and if they would do their clear duty there would soon be a happy change.

Equipment—Even where many improvements (in the mine equipment) are in place, we too often find, in the mine, that brattices and doors are begrudged, roads badly kept; while a cheap, hard-worked mine official either wades contentedly in and out through mud and water or vainly strives to keep up a show of good order and repairs. But just as soon as operators supply thoroughly reliable plants and machinery and insist on everything being kept in proper order and repair underground as well as on the surface good results will be shown financially.

Certification—A good engine or electric motor is more easily obtained than a good mine foreman. * * * Many a worthy man is turned down, who though he can manage a mine cannot write out an examination paper; while another, whose whole experience has been gained as a miner, mining engineer or man of general work inside of the mine has, by night study and self-education, so improved his mind that he has been enabled to secure a mine foreman's certificate. In making an examination

imperative the law has done all it should do in the matter and it now rests with the Examining Board to carry on the work from this point. * * * There should be on our statute books an imperative law requiring a mine superintendent to hold a certificate of competency as well as the mine foreman.

The Superintendent—To secure an efficient superintendent or mine foreman a good salary should not be denied, and many coal companies have made large advances in recent years in this respect. The increased responsibility put upon mine officials renders this absolutely necessary and such encouragement leads capable young men to seek the office. Employers, however, might urge and encourage their officials not to be content with a certificate of competency, but to press on ever to higher and deeper knowledge in their profession and as a body they might institute other examinations in theoretical and practical mining, wherby real merit would be discovered and a higher order of certificates awarded.

Education of Workmen—The ignorant will always be thoughtless and

"The evil wrought by want of thought"

in our mines is but too amply seen in the list of fatalities by falls of slate and coal, mine cars and explosions of firedamp.

Many companies have already established well equipped evening schools. There should be on our statute books a compulsory education act compelling all boys from 14 to 18 years of age to attend evening schools.

Discipline—Hurry and confusion inevitably lead to accidents. Order and safety generally go together. Repairs put off or carelessly performed jeopardize the lives and limbs of the men, and the mine officials in charge should have a quick eye to detect flaws and adopt improvements as they appear. Neither personal talent nor energy will compensate for the want of discipline. Rules and laws must not be merely printed but obeyed. * * * It is not possible to estimate the value of discipline too highly. It is a most important element of success. The men, both young and old, should have this constantly impressed upon them. The special and general rules should be read and explained to them regularly and the conduct of the subordinate officials as to sobriety and punctual attendance to duty should be constantly observed and properly regulated.

You Can't Afford to Miss Our Next Issue

COAL AGE next week will contain a number of articles of great interest and value to every coal-mining man. First there will be a description of one of the largest retort-oven installations in England, with interesting notes relative to the advantages of the "Koppers" process. Then there will be a description of an uptodate coal plant in Virginia. Next will be an article on the prevention of coal-dust explosions, giving the most recent recommendations of noted British authorities on the subject of applying stone dust. Following that you will find an article on the construction of workingmen's houses. This article describes the introduction of hollow-tile for building miner's houses at the L. C. & N. Co.'s Hauto plant in Pennsylvania.

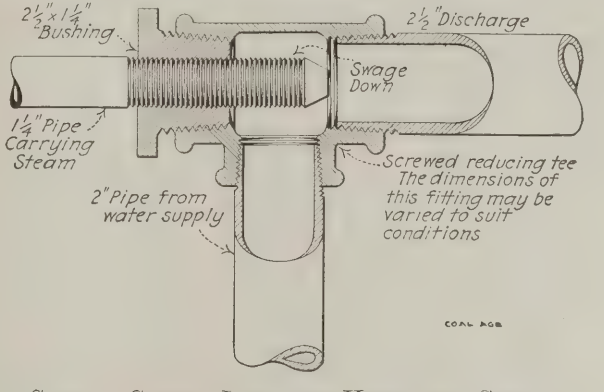
If none of the foregoing articles arouses your keenest interest, there are others that will surely appeal to you. One of these is entitled "Converting the Foreman to the Safety First Idea," and points out the tendency of the busy mine foreman to ignore the "safety-first" idea, until converted to it by the occurrence, under his charge, of some preventable accident. Still another article deals with "first aid to the injured," and gives practical suggestions regarding the best procedure in event of serious mine accidents.

We will also publish another of Mr. Braley's poems, which have become famous in every coal district of America. The next few weeks will witness the publication in COAL AGE of the most valuable and diversified list of articles ever collected for the benefit of coal-mining men.

A Small Water Lift

Where small amounts of water either under or above ground are to be handled about a mine, a steam lift, similar to the one shown in the accompanying drawing, may be easily made from pipe fittings.

One point should be noted, however, namely, that the tip of the nozzle should extend beyond the side opening or outlet of the tee, in order to produce the best results. If a device of this kind is properly constructed and installed, it is no trouble to make it lift water 6 ft. or



SIMPLE STEAM LIFT FOR HANDLING SMALL AMOUNTS OF WATER

more, while it can be made to discharge against a much higher head.

As will be clearly seen, this home-made lift works upon the well known principle of the injector. It may be argued, and rightly so, that this device is extravagant in the use of steam. While this is admittedly true, yet it possesses advantages which, to a large measure, offset its steam-heating capacity.

Among these advantages should be mentioned that it is small, light, can be easily and cheaply made, is simple in construction, has no valves or moving parts to get out of order, and is not nearly as liable to freeze up in cold weather as is an ordinary steam pump.

BY THE WAY

Be sure to forget the benefits you confer.

It isn't easy to blow and swallow at the same moment.

Three persons can refrain from quarreling if two are away.

Weakness of mind is not the only great fault a man may nave.

Coal Handling at the Atlantic Coast Piers

By James Steelman

SYNOPSIS—A general description of the chief loading ports on the Atlantic Coast. The relative importance and growth of the various harbors are discussed. The development and comparative merits of different handling apparatus are also entered into.

It is probable that few, outside of the circles immediately concerned, realize the extent of the business of unloading coal along our Atlantic seaboard. Every year, more than 44,000,000 tons—1,000,000 carloads—are dumped into vessels for shipment coastwise and to foreign points. If the work were carried on steadily, instead of in a more or less irregular manner, each ten-hour working day in the year would see about 3300 carloads deposited in holds.



Lehigh Valley R.R. Co.'s Plant at Perth Amboy, in New York Harbor

This is quite a business and requires equipment and other facilities having a capacity far in excess of the average tonnage handled, for the reason that the maximum and minimum requirements are widely separated. A coal pier will be operating at capacity one day and the next the plant will be idle. And yet, it must be ready for its maximum business or at least a considerable increase beyond its daily average. While the coal piers of the principal Atlantic harbors actually handle only 1,000,000 carloads per year they have a capacity of 3,000,000 loads. If operations could be continuously at capacity, an equipment of 65 per cent. less than the present one would suffice.

The Atlantic seaboard of the United States possesses four large deep-water harbors, New York, Philadelphia, Baltimore and Norfolk. These are the coal harbors and they have channels varying from 35 to 40 ft. in depth. The mean tidal fluctuations range from 1.2 ft. at Baltimore to 5.3 ft. at Philadelphia. The maximum variation in the tide, 6.3 ft., occurs at New York.

New York Harbor

New York harbor is the greatest. It alone possesses thirteen ports served by nine different railways. Its capacity is sufficient to take care of the total discharge of coal for the entire group of four harbors, if only operations could be made continuous and at capacity. Here we have what is by far the longest coal pier on the Atlantic coast. It measures 1800 ft. from bulkhead to end of slip; it is located at South Amboy, N. J. Two others, each nearly as long, are situated at Harsimus Cove and Port Liberty, N. J. In fact, there are in New York harbor nine coal piers whose combined length totals 13,490 ft., an average individual length of about 1500 feet.

There are others whose lengths are unknown but whose capacities are such as to lead one to suppose they also belong to the class of long piers. However, it is not always the long pier that really has the greatest unloading facilities. Thus, at Port Greenville, N. J., a part of New York harbor, there is a 400-ft. pier having as great a capacity as the one already mentioned having a length of 1800 feet.

At New York, the coal is delivered mostly to small vessels—lighters and barges ranging up to 3500 tons cargo

capacity—which distribute it locally. There are but few coal cargoes for ocean shipment taken on directly from the piers. So, while New York harbor delivers much more coal to vessels, its facilities for the direct loading of large ships are, it would seem, inferior to other coal harbors of the Atlantic group. However, New York operates its equipment much nearer to capacity than any of the others. According to J. E. Greiner's analysis, New York operates at about 51 per cent. of its capacity, while the others cling to the neighborhood of 30 per cent.

Varying Pier Heights

If we include plants now under construction, Norfolk harbor is entitled to rank next to New York in respect to coaling capacity. At New York, 4350 carloads may be discharged daily into vessels; at Norfolk, the new construction will bring the daily capacity up to 3180 carloads and cargoes up to 12,500 tons may be loaded directly from the piers.

This problem of loading directly from pier to vessel is made difficult by tidal fluctuations and more especially by the variations in the height of the hatches, occasioned by varying amounts of cargo on board. An empty ship on a flood tide presents its hatches at quite a different level than when loaded and floating on the ebb. The vessel moves up and down with the water and also with the variations in load. It is necessary that the dumping apparatus shall operate above the highest level attained by the hatch and shall also be able to deal satisfactorily with the lowest point. If the mode of dumping is a pure gravity arrangement, the pier should be from 33 to 43 ft. above the highest hatches to be loaded at mean tide.

In Norfolk harbor are located the highest piers of the group. The Norfolk & Western Ry. Co.'s Pier, No. 3, rises to a height of 70 ft. near the outer or sea end. The pier of the Virginian Railway Co. is only a foot lower, while two others now under construction will be about 91 ft. high. These four piers will put Norfolk far ahead of the other harbors in respect to its capacity for loading with the largest vessels. Philadelphia has a single pier of 66-ft. height already built and another of 62 ft. under construction, while Baltimore has two piers, 59 and 60 ft. high.

It might be thought, at first glance, that any arrangements that would take care of the highest condition of the vessel would, as a matter of course, also provide for the lowest condition. But the distance of fall must be kept within a minimum.

The number of piers at Norfolk will be 10 when the two now under construction are completed. Their average loading capacity is 318 carloads per day while at New York, the average is only 150 carloads. At Philadelphia, the capacity is 203 carloads and at Baltimore, 136 carloads. It will thus be seen that the piers at Norfolk, while not the most numerous, are yet much superior to those of the other harbors.

If we take note of the fact that New York has apparently no important piers under construction, we may say that Norfolk seems to be fast overhauling the northern harbor. It deals with the largest coal vessels and its daily loading capacity will soon be high. It is quite



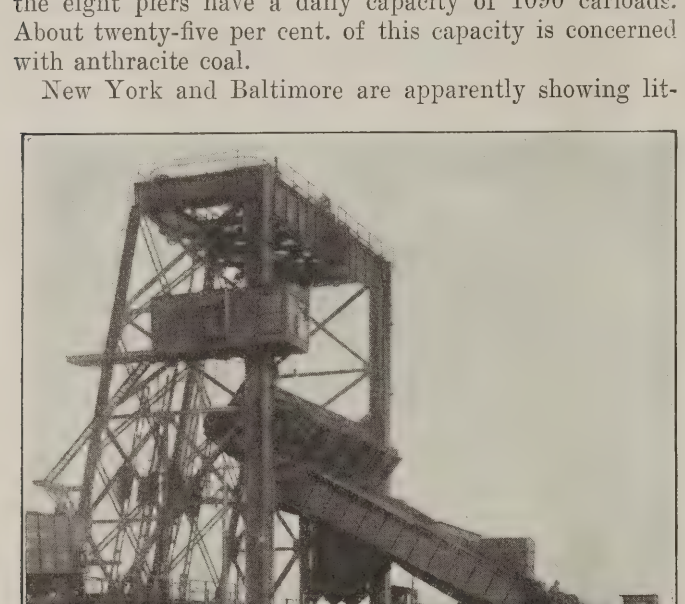
Carload of Coal Being Dumped at South Amboy Piers, New York Harbor

possible that Norfolk will become a great coaling point, for the reason that its business is chiefly for outside delivery. At New York, the metropolis and its environs constitute probably nearly the whole of the ultimate market except the bunkering coal.

The Principal Harbors

The harbor of Philadelphia undoubtedly ranks, at the present moment, next to that at Norfolk, having a daily capacity—if we include two piers now under construction—of 2640 carloads, or more than half that of New York. It has 13 ports served by three great railways, the Pennsylvania, the Baltimore & Ohio and the Philadelphia & Reading. No doubt, a very considerable percentage of the coal unloaded at this port is consumed locally, just as is the case at New York. At Baltimore, the eight piers have a daily capacity of 1090 carloads. About twenty-five per cent. of this capacity is concerned with anthracite coal.

New York and Baltimore are apparently showing little interest over increasing their capacities. It is possible that the demand for additional facilities is slight. At Norfolk and Philadelphia, the new construction under way means a total increase in capacity amounting to 1860 carloads per day, or over 40 per cent. of the entire capacity of the thirteen ports and twenty-nine plants in New York harbor. The total pier length of the new construction amounts to 3965 running feet.



Car Dump at the L. V. R.R. Pier, at Perth Amboy

If we separate the bituminous and anthracite capacities, we find at once that New York is far and away the leading harbor. Her capacity for anthracite unloading totals 2700 carloads per day or 62 per cent. of her gross capacity. It is not very clear how Philadelphia harbor stands in respect to handling anthracite coal, but it must be that her position is far below that of New York. Baltimore has a capacity of 260 carloads per day, while Norfolk confines her activities to bituminous coal alone.

Thirteen railroads participate in bringing coal to the piers of these four harbors, the principal ones being the Pennsylvania, the Philadelphia & Reading, the Baltimore & Ohio, the Chesapeake & Ohio and the Central Railroad of New Jersey. These five lines carry 72 per cent. of the coal that is discharged at these four harbors. No one road carries to all. At New York and Philadelphia, the Pennsylvania is the leading carrier and at Baltimore, it stands second. The Baltimore & Ohio serves precisely the same three harbors; it leads at Baltimore, delivering to the unloading piers nearly half of all the coal handled. New York harbor is served by nine railroads and all the others by three each.

Methods of Handling at the Piers

There are three principal methods of discharging coal at the piers. When the coal is brought by gravity alone from the cars to the bins on the pier, or to the holds of the vessels, the pier is rated as a gravity plant. There are in use at the four coal ports of the Atlantic seaboard five different types of gravity unloading arrangements. The simplest of these is where the loaded cars are simply run out on a level pier and returned in the same way. Locomotives are required for handling both the loaded and the empty cars. The expense of this method, under favorable conditions, is not excessive for the reason that a considerable number of cars may be handled at one time. Altogether, there are in operation six piers of this type, two at New York and four at Philadelphia. It is uncertain when those at New York were built, but none at Philadelphia were constructed since 1865. We may, in view of this latter fact, regard the type as obsolete or obsolescent.

Another type of plant is that where locomotives run the loaded cars out on a level pier and the empties are returned by gravity. New York possesses the only two piers in this class. Although apparently economical, because of the possibility of handling strings of loaded cars by single locomotives and because of the simple method of return, they do not appear to be at all popular. One reason for this is that it is quite often impossible to construct a grade track out to the end of the pier at a sufficiently high level.

This idea is confirmed by a consideration of the pier where the loaded cars are pushed up an incline to the deck and the empties returned either by locomotives or by gravity. This is a popular type, 21 piers being constructed on this principle, 11 are at New York and the remainder at Philadelphia and Baltimore. While New York has no high piers, none exceeding 40 ft., all those over 30 ft. are constructed as just described. There are seven with heights from 32 to 40 feet.

The next most popular type is where the locomotives push the loaded cars up to a crest from which they drift by a slight downgrade to their unloading positions, the empty cars being returned by gravity; 14 piers of this class are now in operation, all four harbors having two or more.

A modification of the last type of pier is one where the loaded cars come down grade toward the sea to the foot of a steep incline up which they are pushed or pulled, by a cable arrangement, to a point higher than the final height desired. From this position they are allowed to drift down a slight grade to their unloading positions. They are then returned by gravity. All the harbors have one or more plants of this character, all the highest piers at Philadelphia, Baltimore and Norfolk belonging to this type.

Increased Use of the Mechanical Plant

Of the 56 coaling plants already constructed at the four harbors, 49 are to be classed as of gravity type, and one more is now under construction at Philadelphia. In New York harbor, however, there are six mechanical plants which have all been constructed since 1900 and another is under construction at Philadelphia. At Norfolk, one plant already constructed (in 1909) and two others under construction, all include mechanical handling in some way.

If we weigh these facts against the single gravity plant under construction at Philadelphia, we see that the influence of mechanical methods has already begun to extend itself to the discharge of coal from pier to vessel. When the new construction now under way is completed, mechanical operation will be the chief or an important factor in ten plants whose total capacity will be 2990 carloads per day.

In New York harbor, there are at South Amboy, N. J., two mechanical loading plants; at St. George, Staten Island, one, and at Hoboken, N. J., three, making six altogether. These have a combined daily capacity of 1190 carloads. The three at Hoboken handle anthracite coal; one at South Amboy both anthracite and bituminous; the remaining two, one at South Amboy and the other at St. George, bituminous. In Philadelphia harbor, at Greenwich, a mechanical plant is under construction which will have a daily capacity of 300 carloads. There are no mechanical or semi-mechanical plants in Baltimore harbor but in Norfolk harbor there is a plant which combines mechanical and gravity features having a daily capacity of 300 carloads. At Lamberts Point, Va., and Newport News, Va., two great combination plants are under construction. When finished, these piers having a daily capacity of 600 carloads each will rank as the leaders on the Atlantic coast. They will be 1200 ft. long and have a height of 91½ ft.; either will surpass in height by 21 ft. the present highest pier, which is also located in the same harbor.

Method of Working the Car Dump

Five of the New York mechanical plants and the one under construction at Philadelphia operate on the same general principles. The car together with its load is made to ascend a steep incline, the power being applied by a locomotive or cable arrangement, to a device known as a "cradle." This is a piece of apparatus in which the loaded car is securely held and by means of which the whole may be elevated to the level from which the dumping is effected. This elevation is vertical; when the cradle and its car have reached the desired height, it is dumped over sideways. The coal runs onto an apron, and then into a chute which guides it into the open hatch of the waiting vessel. The cradle is then righted and lowered to its original position when it is ready to receive another loaded car. The empty car is returned by gravity.

In addition to the six plants at New York and Philadelphia, this method is employed in connection with a gravity pier and two others will be used in gravity piers now under construction, all three being in Norfolk harbor.

Another type of mechanical unloader is in operation at Hoboken, N. J., in the harbor of New York. This is a small plant, having a daily capacity of only 10 carloads. The coal upon being dumped is received by a hopper and then raised to the desired height by an endless chain conveyor which deposits it in bins from which it finds its way, by means of chutes, to the hatch openings.

The three combination plants differ, however, in the type of gravity pier employed in connection with the unloaders. Two great plants are under construction in Norfolk harbor on which the regulation railway cars are brought one by one into position on the cradle of a car dumping tower. When the car is overturned, the coal finds its way into a special form of car used on the dock. The empty railway car goes back by gravity to the yard and the loaded dock car passes by gravity or possibly by its own power, to the platform of an elevator which lifts it to the dock of the pier. It then drifts by gravity or



Virginian Railway Pier, at Sewall's Point, Va.

again under its own power to its position over the pockets. As already noted elsewhere, these plants will have a daily capacity of 600 carloads and will discharge on both sides which have 62 and 66 chutes respectively. They will probably be the two piers having the greatest capacity in the world.

The Practical Operation of a Coal Pier

The combination plant at Sewall's Point, Va., in Norfolk harbor is of recent construction, dating from 1909. The length of the pier is 1000 ft., both sides of which are used for coaling. There are 62 chutes, and the daily capacity is 300 carloads. The loads of the railway cars are overturned in a car dumping tower and find their way, load by load, into special dock cars. The former go to the yard under gravity and the latter are pushed or pulled up a steep incline by means of a cable to the shore end of the pier deck. This end is higher than the one next the sea, so that the cars pass along by gravity or "under their own control" to the pockets from which the coal is delivered to the vessels. The empty dock cars re-

turn by gravity, under brake control, to suitable positions near the car-dumping tower.

The practical operation of a large coal pier involves a multiplicity of activities. There is the office force, to begin with; on one pier the expense for this item amounted in 1911 to over $8000. Then there is the policing of the structure; for the same pier, the 1911 expense was $1416. These two items put a tax of a little less than one-half cent per ton on the coal discharged. Where the pier requires the loaded cars to be pushed or drawn up an incline, we have the items of locomotive service or of the other machinery operating on the incline.

Where no mechanical arrangements are provided for dumping the coal, there will be a considerable amount of labor required. Thus, for a good sized pier having a daily capacity of 300 carloads and actually averaging 200, there will be required, according to Mr. Greiner, about 64 men and one foreman. If conditions are favorable, a gang of eight men will unload a car in two minutes, but, when unfavorable, as where the coal has been frozen, three-quarters of an hour may be consumed by the same gang, with a single car. When the coal is delivered into the hatches, there is still the matter of trimming; that is, the upper surface must be shaped off. This is really a considerable item, costing in fact more than the unloading.

It appears that the expense of handling coal with the mechanical car-dumping equipment is distinctly less than where gravity and hand labor are depended upon for the service. Mr. Greiner estimates that gravity piers of the ordinary type are able to perform the duty of unloading into vessels at 6.32 to 6.41c. per ton; whereas the mechanical method permits a reduction of 1.76 to 1.85c. per ton upon these costs. However, there may be an expense for bringing the loaded railway cars to the cable, or to the car-dumping tower. Under such conditions, the gravity piers having a cable incline or the mechanical car-dumping plants would have to add something to their costs per ton. The mechanical plant will still show a distinct advantage amounting to 1.25 or 1.85c. per ton.

West Virginia's American Rivals in the Pacific Market

By W. A. MacCorkle*

SYNOPSIS—The author declares that the Pacific rivals of West Virginia have such serious disadvantages in the quality and disturbed character of their deposits that they cannot seriously compete. The Big Warrior canal, in Alabama, is not conceived on a large enough scale to promise brilliant success as a coal carrier. Pennsylvania is crippled by the diverse interests of her ports and of her railroads and is not encouraged to export coal by sea because there is already so generous a market at home. West Virginia will be easily chief of exporters when her canal system makes an all-water route available.

There are deposits of coal near the Pacific Ocean in our own country which demand consideration, and these, like some other coals of our Pacific rivals, merit consideration because they are located conveniently to the markets demanding them. Such are the coals of Alaska and Washington.

It is stated that there are enormous coal deposits in Alaska and that these coals are of prime quality. They may, in future years, become competitors with those of West Virginia, but I do not believe that they will ever compete with our coal until that far-off day when competition will not hurt us. With a distance of 6400 miles to the canal, with an inhospitable climate from 10 to 40 deg. below zero, with the necessity for every supply being brought long distances to the mines, and with labor to be imported and necessarily high, I believe that the cost of production will be so great that the product must reach shipboard at too great an expense for competition with our cheaply produced coal.

Competition with State of Washington

The State of Washington has six or seven coal areas which have been in operation to a limited extent since 1860, and are now producing about 3,500,00 tons per year, at an average price at the mines of $2.39 per ton of 2000 lb. As a rule, these coals are high in moisture and ash, and have a comparatively low heating value.

Forty-nine determinations which are representative of this state show an average of 10,923 B.t.u. Ninety-eight determinations of New River coal show an average heating value of 15,232 B.t.u., or almost 50 per cent. more than Washington coals. The average value of the smokeless coals at the mines, during the year 1912, including New River and Pocahontas, was a fraction under $1 per ton, so that the actual cost of our coals at Newport News or Norfolk is practically the same as the cost of the Washington coals at the mines. We do not believe that this coal will be a strong competitor of the West Virginia fuels.

The Alabama Fields Cannot Compete

In the popular mind the formidable competitor with the West Virginia coals for the Panama and American coast trade is the Alabama coal. An analysis of the situation shows that the popular belief is not founded upon fact. In the first place, a vast quantity of the best coals is reserved for several of the great steel-making corporations of that state.

The expectation of Alabama is to get its coals to Mobile by self-propelling barges. The coal will be transported along the Warrior River for 370 miles, passing through several locks. A channel depth of 6½ ft. with a width of 125 ft. is to be secured but the restricted dimensions

*Ex-governor of West Virginia.

Note—Abstract of last part of an address entitled "The Relation of West Virginia Coals to the Panama Canal," read before the West Virginia Coal Mining Institute, Charleston, W. Va., Dec. 8, 1913. The first part entitled "The Price War in the Markets of the Pacific" appeared Feb. 14 in Vol. 5, pp. 284-285. The second part entitled "West Virginia's Foreign Rivals in the Pacific Markets" appeared Feb. 21 in Vol. 5, pp. 360-361.

preclude the possibility of shipping large barges to their ultimate destination on the Panama Canal without reloading in transit. The river is tortuous and the water transportation today touches only the edge of the field. For many years much of the coal must be transported by rail to the river, loaded in barges and reloaded in seafaring vessels at Mobile.

The extent to which Alabama may become a competitor with West Virginia in foreign trade is practically answered by a study of the following figures, which show upon an analysis that Alabama can never become an enormous competitor with West Virginia in this field:

	Year	Alabama	West Virginia
Production	1912	16,100,600 tons	66,786,687 tons
Value at mines	1912	$1.29 per ton	$0.94 per ton

Alabama used 4,585,498 tons of coal in its coke ovens —equal to 28 per cent. of its entire production.

The United States Census returns, based on the business for the year 1909, show the following interesting comparisons:

Capital investment per one ton of annual production: Alabama, $3.17; West Virginia, $2.64.

Value of coal at mines: Alabama, $1.19 per ton; West Virginia, 86c.

Production costs, including wages, salaries, supplies, royalties and miscellaneous expenses in Alabama, $1.12 per ton, in West Virginia, 83½c.

Our New River and Pocahontas coals have far greater heating value than those of Alabama, and they can be delivered at Hampton Roads at a lower price than Alabama can quote either at Mobile or New Orleans.

The sailing distance from Hampton Roads to Colon is 1778 miles, and from Mobile to Colon, 1376 miles. This relatively small inequality in distance makes practically no difference in the rate to the Panama Canal, and shows almost conclusively that this field, which is largely engaged in consumption as well as production, will not be a formidable competitor.

For many years to come, the loading ability of Norfolk and Newport News will be superior to that of Mobile. The loading facilities at the West Virginia ports are as good as, if not better than, any in the world, and will only be surpassed by the wonderful loading machinery which is now being provided at both ends of the canal by the United States Government.

Alabama will certainly ship some coal in competition with West Virginia, but in the further harbors, and in the Panama market, she will not compete as vigorously as is popularly supposed.

New York City Too Valuable a Port for Coal Shipment

Let us consider briefly our competition with Pennsylvania for this export trade. The ocean port at which Pennsylvania coals are loaded, is New York Harbor. The great bulk of trade of Pennsylvania is not competitive with that of West Virginia. Her facilities for loading in the crowded harbor of New York will never be sufficiently great for the coals shipped from that port to dominate in the foreign markets. The harbor space is too valuable to be reconstructed for coal exporting and consequently its loading provision cannot compete with the great facilities at Norfolk and Newport News. In addition to this, her access to the shores is over a crowded and congested railroad. Our approach is over the railroads which have for their chief business the carrying of coal, and our loading points are those expressly provided for the freighting of a great ship at the rate of more than 1000 tons per hour.

Philadelphia, by reason of its natural situation, will not participate largely in export production. In fact, Pennsylvania as a whole, by reason of her enormous and increasing consuming ability, will be less and less a competitor in the more distant export field. She is devoting her energies largely to her great trade at the Lakes, in Canada and New England. While our coals are the equals of those of Pennsylvania, West Virginia does not compete in the Eastern part of the United States with that state, except on water-borne coals to Providence, Boston and Portland.

Pennsylvania to Decline in Exports

Pennsylvania will, year by year, relatively become less and less an exporter of coal. Her enormous consumption will mean the gradual relative reservation of her field for her own use and she will not seek new markets. This export market from its nature and the position of Pennsylvania will not be one sought by our great competitor in the coal trade.

This has been recognized by several of the great masters of the coal industry. E. J. Berwind, with the great foresight which has characterized his dealings in these matters, recognizing that these conditions will obtain, has invested millions in West Virginia coal, which he is using largely for the foreign markets, especially for the West Indies.

Even Maryland Is Not a Competitor

Maryland last year shipped less than five million tons of coal. While relatively not far from the market, the short haul does not give it the desired control. Our Fairmont region is further away, but is shipping West Virginia coal into Baltimore in competition with that of Maryland. The Maryland coals are unequaled for smithing purposes, and those who are familiar with the situation do not look upon her as a formidable competitor with West Virginia.

It will be noticed that I have included the Pocahontas field with West Virginia in this discussion, though part of that field is in Virginia. The Government of the United States, and largely the steaming trade also, have accepted the Pocahontas and the New River as the leading steaming coals of the world. One cannot consider them apart, even though an area of the Pocahontas deposit is in another state.

How Canals Will Help West Virginia

Another great factor which will aid in the cheap delivery of West Virginia coals is the river transportation of the state. West Virginia, with western Pennsylvania, is uniquely situated in this particular. She is on the line of the cheapest water transportation in the world. In this statement I include eastern Kentucky, which, in regard to river transportation, possesses practically the same advantages as are possessed by West Virginia, and a great part of this field is under the control of, and operated by, West Virginia capital.

The United States is making the most comprehensive water improvement along the Ohio and Mississippi Rivers which has ever been known to commerce. From Pittsburgh to Louisville, a distance of 608 miles, the Government is building 24 locks and dams. A great

and comprehensive scheme for the improvement of the Mississippi River is also under way.

Our present day demand for speedy delivery of freight and the unreliability of the water transportation heretofore provided have combined to make us indifferent to the great opportunity our rivers present for the carriage of merchandise.

This will be one of the great determining competitive factors in the near future. In twenty years the Government of the United States will have completed the slack-water navigation of the Ohio, and it will be the most perfect scheme ever conceived and executed. In all this vast distance there will be one placid stream of deep water, which will be, at most seasons, of unvarying depth. The Ohio River washes the whole western boundary of West Virginia, the Little Kanawha and Big Sandy are in process of improvement, and the Great Kanawha is already improved. All these streams reach into the heart of the state.

Coal at Colon for $3.50 per Ton

At Cabin Creek, practically the head of navigation of the Kanawha, the coal can be placed in barges at $1.15 per ton. From Cabin Creek to New Orleans is 1742 miles, from New Orleans to Colon is 1395 miles, making a total distance of 3137 miles. This distance must be contrasted with the 2159 miles from Thurmond to Colon by Newport News. It is estimated that coal will be transported from the West Virginia field to New Orleans at $1.25 to $1.50 per ton.

This West Virginia coal will be placed at New Orleans under its present conditions at a total price of $2.40 to $2.65. From New Orleans to Colon is 1395 miles and the freight is estimated at $1, thus placing West Virginia coal, at Colon, at $3.40 to $3.65 per ton.

Barges to Go Beyond Canal

The great objection to this method of transportation and this route arises from the fact that the coal under the present system of transportation must be removed from the barges and reloaded into sea-going vessels. This is no easy matter to accomplish.

The Government of the United States, investigating this question most carefully and looking to the future development of water transportation, proposes that steel river barges, with a draft of 6 to 10 ft. and a capacity of 500 to 1000 tons will, in a few years, be introduced, and these will have the added advantage that they can be towed on the Gulf and the Carribean Sea. The coal can be transported on these barges to all ports within the market zone of the canal. The Government Commission suggests that a barge drawing from 15 to 20 ft. of water can be loaded to a depth of 7 to 9 ft. at the mines, to a draft of 12 ft. at Louisville, Ky., and for six months of the year to 15 or 20 ft., at Vicksburg, Miss.

Summary

Under these conditions, according to the Government calculations, West Virginia coal costing $1 a ton and less at the mines could be shipped anywhere to the coasts of North or South America, and sold for $3 or less per ton. Our coal at this price would drive out all others, and would be less expensive by far than the coals at the Suez Canal. This ability to ship coal cheaply to the Gulf of Mexico would be shared by the Pittsburgh field, but with an added cost of transportation proportioned to the increased distance. It is idle to say that none of the coals of Pennsylvania, Maryland and Alabama will make their presence felt in the markets of the Pacific, but it is safe to assert that the coal of West Virginia will be the over-mastering influence.

I have based my argument on the New River and Pocahontas coals, for the reason that they have been adopted as a standard for steam purposes by the Government and by those in the market. This does not mean any disparagement to the great Fairmont or the Kanawha fields.

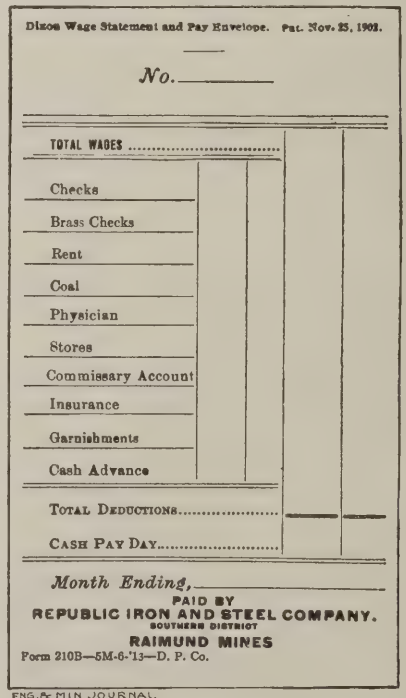
Generally speaking, I believe that the coals of the New River and the Pocahontas regions, which are what is known as the smokeless coals, and the No. 1 or Eagle seam and the No. 2 or Gas seam of Kanawha, which are semismokeless coals, will be the fuels which will be used at the canal. This will leave the other markets, which do not need such high-grade coals, open to the great Fairmont and Kanawha splint coals, which are well suited for steam raising and gas making.

Safeguarding the Pay Roll

By A. H. Sawyer*

It is stated that an employee sometimes fails to receive his wages because someone else has previously given his name and obtained the money without question.

To guard against such practice, the Republic Iron & Steel Co. uses the Dixon patent wage statement and pay envelope; the envelope is shown herewith, the statement is a duplicate of the form on thin paper. The statement and envelope are made out in one operation by means of a sheet of carbon paper, thus avoiding any discrepancies in number, name, items or balance due.


Dixon Wage Statement and Pay Envelope. Pat. Nov. 25, 1902.

No._____

TOTAL WAGES .....

Checks
Brass Checks
Rent
Coal
Physician
Stores
Commissary Account
Insurance
Garnishments
Cash Advance

TOTAL DEDUCTIONS.....

CASH PAY DAY.....

Month Ending,_____

PAID BY
REPUBLIC IRON AND STEEL COMPANY.
SOUTHERN DISTRICT
RAIMUND MINES

Form 210B—5M-6-'13—D. P. Co.

ENG. & MIN JOURNAL

Form of Envelope Duplicated on Paper Slip

The statement is handed to the employee previous to payday and is signed by him and presented to the paymaster on payday. The company is thus protected in that it retains the original statement duly receipted by the employee. The employee is also safeguarded in that he receives the envelope which is the exact duplicate of the statement which he presents to the paymaster. This seems to be as simple and efficient a system as can be devised.—*Engineering and Mining Journal.*

*Mining engineer, 412 American Trust Bldg., Birmingham, Ala.

"Safety First"

By W. E. Holland*

Is there a slogan for all mankind?
Yes, "Safety First."
One thing we should always keep in mind
Is Safety First.
When danger comes that's beyond our ken,
May we quit ourselves like noblemen,
And give our help to each other, then,
In Safety First.

You leave your home, to the mine you go,
Then, Safety First;
To barter with danger and death below;
Again, Safety First.
All through the day your vigil keep;
Your mind alert, you must not sleep;
Or you'll have cause to wail and weep
For Safety First.

In your neighbor's place the roof is loose,
Think, Safety First.
"I'm not his keeper" is no excuse;
But, Safety First;
He may be green, knows not the way
To protect himself, or again: he may
Be bold and ignorant enough to say;
"What's Safety First?"

When you prepare your daily shot
Mind, Safety First;
To the shot firer's dangerous gambling lot
Give Safety First.
"He's being well paid," you may reply;
On his safe return his babes rely;
And he, like you, needs a good supply
Of Safety First.

Then, be a Man and take a stand,
For Safety First;
Let it be said throughout the land
There's Safety First.
Let every man, in his own mind,
Feel for himself and all mankind;
And strive with a record hard to find,
For Safety First.

Coal Production, Pennsylvania

Reports received from the second and seventh bituminous districts of Pennsylvania show the coal production and other data of interest, as follows:

Second Bituminous District, C. B. Ross, mine inspector: Advance report shows a total number of 57 mines, of which 56 are in operation; seven of these being gaseous and 49 nongaseous mines. The report shows four new mines opened and three old mines abandoned. The coal production for this district is reported as 9,037,469 tons, of which practically 81 per cent. is the result of pick mining; 5.5 per cent. compressed-air machines; and 13.5 per cent. electrical coal-cutting machines.

The total number of persons employed in the mines is reported as 5809; the total number of accidents underground, 33 fatal and 40 nonfatal accidents. There were 273,863 tons of coal produced per fatal accident underground; and 176 persons employed underground per fatal accident in the mine.

Seventh Bituminous District, Charles P. McGregor, mine inspector: Advance report gives a total of 35 mines in the district, of which 33 are in operation, 20 being gaseous and 15 nongaseous mines. There were three new mines opened during the year and none abandoned. The report shows a total production of coal, for this district, for the year 1913, of 6,271,110 tons, of which practically 82 per cent. was mined by electrical coal-cutting machines and 18 per cent. by pick mining.

The number of persons employed underground is 7266. There were 15 fatal and 56 nonfatal accidents underground. This makes the fatality rate as follows: 418,074 tons of coal produced per fatal accident; and 485 persons employed underground per fatal accident in the mine.

*Mine inspector, District No. 1, Albia, Iowa.

Short Course in Coal Mining at Colorado School of Mines, Golden, Colo.

Opens Wednesday, Apr. 1, 1914. Ends Wednesday, May 27, 1914.

The following is a brief epitome of the subjects taught:

1. MINING. Opening new areas. Use of explosives. Haulage and loading. Drainage and pumping. Power. Surface equipment. Air requirements. Dust explosions. Ventilation. Mining methods. Elementary surveying. Mining machines.

2. CHEMISTRY. Elementary definitions. Composition of air, water, and mine gases. Combustion, and chemical principles involved in gas explosions. Theory of the safety lamp. Composition of coals. Practical laboratory work on coal and gas analysis.

3. MATHEMATICS. Weights and measures. Arithmetic, from ground rules and decimals to ratio and proportion. Simple physical problems, elementary algebra and use of logarithms. How to use the formula commonly required in coal mining.

4. MECHANICS AND DRAWING. A short course in mechanics, drawing, mapping, and the use of instruments.

5. GEOLOGY. Elements of geology, with special reference to coal deposits, with laboratory work on rocks, supplemented by short trips in the vicinity of Golden.

No fees for instruction. In the laboratory, material actually consumed will be charged for, also two or three textbooks, total expense not to exceed $5.

The course will materially aid candidates for positions in coal mines to pass the required state examinations under the laws regulating coal mining.

For further information address Wm. G. Haldane, acting president, Colorado School of Mines, Golden, Colo.

A New Byproduct Coke-Oven Installation

The H. Koppers Co., of Chicago, have recently closed a contract with the Lehigh Coke Co., a subsidiary of the Bethlehem Steel Co., for the construction of what is claimed to be the second largest byproduct coking installation in the world. The plant will consist of over 400 ovens, and will consume 6000 tons of coal per 24 hr. The construction will continue about two years, and will provide for the dismantling and rebuilding of a portion of the present installation which has not proved satisfactory. The approximate cost of the work is estimated at four million dollars.

Care must be exercised, in coal mining, to see that all stoppings are promptly and properly made and canvas curtains hung as soon as required, and that they are always kept in proper condition.

Important Details in Construction of Colliery Plants

By M. L. Hyde*

[This Article Is Unusually Long for Presentation in a Single Issue of Coal Age. However, the Subject Is One that Will Interest Most Coal Men, and Is of a Character that Will Appeal to Many for Filing Purposes. We Are, Therefore, Printing the Entire Article in One Installment, Believing that Such a Plan Will Best Suit the Convenience of Our Readers.—Editor.]

SYNOPSIS—Practical suggestions concerning the erection of an entire colliery plant. A plan for laying out the organization is given. Complete equipment of the various buildings is enumerated, and a method of handling the coal is described.

The rapid strides being made in our coal-mining industry place us all in a position where at any moment we may be called upon to undertake the construction of a new plant, and I have prepared this paper in the hope that it may be of some service to those who must meet the many complex problems such a task imposes.

After the property has been purchased and a plant site and tonnage capacity decided upon, the most important details in their order are:

1. The estimate of construction and operating capital required to put the plant on an operating basis. Few of us are familiar with estimating, and we either rely on consulting engineers who do not face the directors if the appropriation is inadequate, or we do the work ourselves; in either case we usually regret our choice, for detail after detail usually looms up that has been overlooked.

2. The plan of underground layout showing method of winning coal, ventilation, haulage systems, etc. Concerning these details, the practical operator is presumed to be well informed; further, the conditions are so varied as to be far beyond the scope of a paper as short as this must necessarily be.

3. The plan of surface layout showing relative location of mine openings, railroad yard, plant buildings and townsite. If construction and operating costs are to be kept a minimum; the modern colliery must have its plant concentrated and equipped with labor-saving machinery wherever practicable to do so. Particular attention will therefore be given the most important details coming under this division.

Estimating the Cost

In order to make an estimate cover fully the problems presented, we must arrange a basis on which to work. I would suggest that each unit be figured under three separate subdivisions, namely, improvement, equipment and operation.

An improvement account should represent the permanent, immovable unit; comprising, in the case of a building, the excavations, foundations for building, foundations for all machinery in said building, the building proper including all materials and labor going into its makeup, as concrete, brick, steel and woodwork, windows, doors, roofing, painting, light and phone wiring, heating and water piping, hardware, etc.

An improvement account in the case of a mine would represent the actual cost of bringing the mine to a given capacity in a given time; including the sinking of shafts or slopes, entry driving, sufficient room necks for the required capacity, all permanent timbering, ditching, sumps, overcasts, doors, regulators, stoppings, underground shops, office, underground storage for both empties and loads, all light and signal wiring and the labor in laying all permanent haulage tracks and power wires.

An equipment account should represent the more or less permanent yet removable units.

In the case of an office, we must figure on the lighting fixtures, furniture, typewriters, phones, safe, stoves, filing cabinets, etc.

In the case of a shop, there are the motors, transmission machinery, machine tools set on foundations, permanent small tools, such as dies, etc., that are stamped and must be accounted for in the inventory, tool-cabinets, lockers, etc.

In the case of a mine, we must consider the signal and phone apparatus, enameled signs, mine cars, locomotives, animals, mining machines, shot-firing magnetos, drills, pumps, motors, steel rails, ties, power and trolley wire, steam and water-pipe lines, car-hauls, etc.

The Operating Account

An operating account should represent the materials used in operation and of a less permanent nature than those in the equipment account.

In the case of an office, we have the heating coal, stationery, postage, lamps, printed forms, books, salaries of office force, porter, etc.

In the case of a shop, there are forge coal, bits, all small tools, oil, waste, lamps, wages, etc.

In the case of a mine, operation charges must cover the cost of timbering after the improvement period is closed, the cost of mine ties, spikes, brattice cloth, lamps, all wiring except permanent power and trolley, trolley hangers, etc., powder, tamping cartridges, tools, machinery upkeep and replacing of broken parts, all wages for entry driving, timbering, etc.

During the construction period covered by the estimate I should figure all of the accounts as operating, for example; the power house must manufacture power for running the shop, fan, hoist, etc., yet in the end it is doing so for the benefit of the mine improvement account, and the operating of all such units should be figured up for the time allotted for the construction of the mine, and then charged proportionately to the different improvement accounts enjoying them.

Laying Out the Organization

We should now lay out the organization required, and the wage cost of maintaining its officials or unproductive labor, as follows:

Mine Manager, to act as general supervisor, engineer

*General manager, Pembina Coal Co., Entwistle, Alta.

Note—A paper presented to the Canadian Mining Institute, February, 1914.

and surveyor, and to handle all mine construction. His employment should commence at an early date so that he may become familiar with every detail of the plant.

Master mechanic, and two or three erection assistants, all familiar with erection and pipe fitting. Under him will also come engineers, firemen, blacksmiths and pumpmen.

Chief electrician, and two or three erection assistants, all familiar with erection and wiring of electric machinery.

Surface foreman and gang of laborers familiar with grading, tracklaying, etc.

Tipple boss and gang of coal cleaners and yard men.

Boss carpenter and gang of erection, heavy- and light-framing carpenters.

Stable boss and drivers, to handle the stable and teams.

Accountant in charge of office, to handle books, cash, etc.

thaw house if dynamite or monobel is used, washroom, foreman's office, ventilating plant, narrow-gage tramroads for local transportation of supplies, and water and lighting systems.

Next, the cost of all permanent plant improvements with their equipment and operating costs during the construction period; including railroad yards, track scales, mine opening with shafts or slopes, boiler room with coal bins and conveyor, ash-handling cars, ash skip and bin, hoist-engine room, engine-room change house, supply room, machine shops, man-hoist engine room, tipple, mine office, pipe and bar-iron rack, oil house, man-hoist headframe, fan, water tank, mine closet, fire-hose reel shed, lamp room, powder magazine, thaw house, yard-track system, water, lighting and drainage systems, fencing, signs, engineering equipment, outside power and pipe lines, etc.

Then the cost of all townsite improvements with their

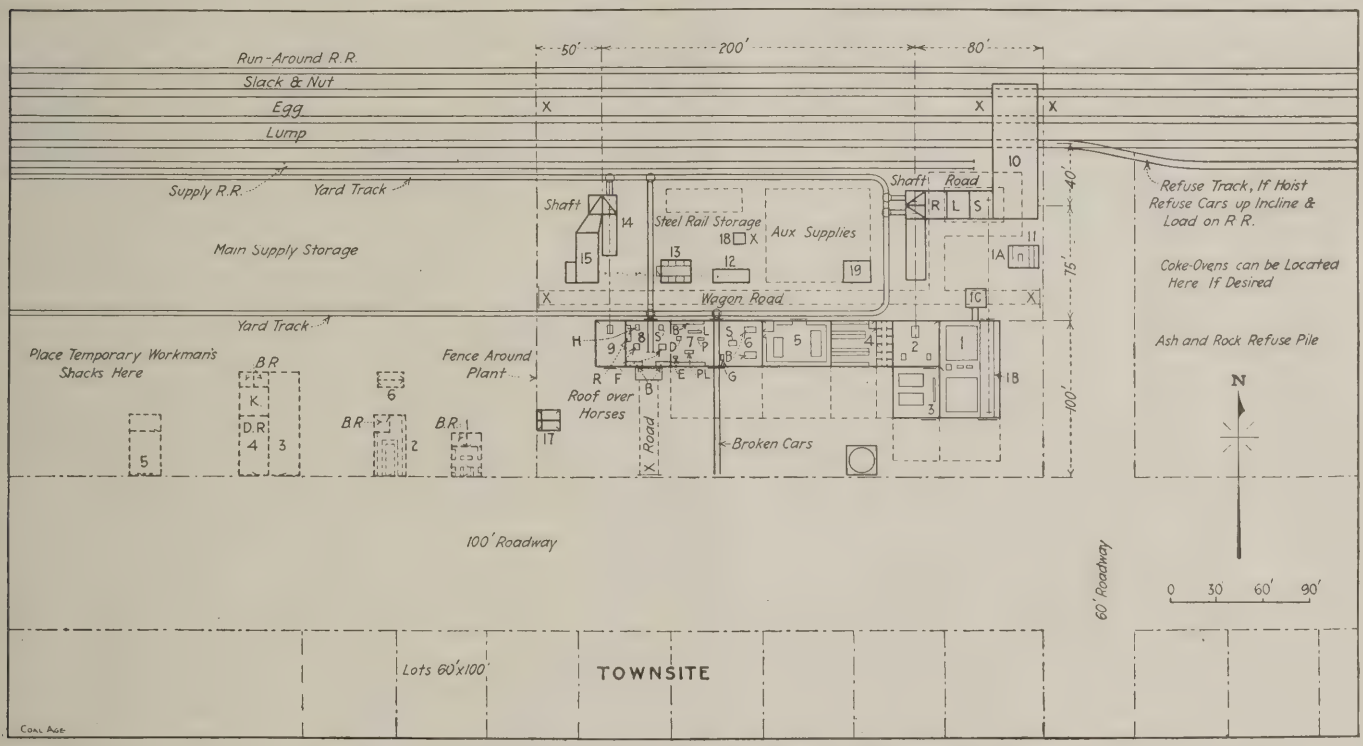


FIG. 1. A STANDARD DESIGN FOR MODERN COLLIERY PLANT

Payroll clerk to handle payroll, correspondence, filing, etc., and under him a time clerk to keep the distribution of wages.

Supply-house foreman, to check and store all incoming supplies, issue supplies, keep record of stock on hand, distribution of supplies issued, etc.

Store manager and clerk in charge of the store, its purchases, etc.

Arrangements should also be made to have a doctor give part of his time to the colliery during construction.

Next comes the cost of clearing and grading the property; this needs no comment.

COST OF TEMPORARY UNITS

Then the cost of all temporary units to be used during construction with their equipment and operating cost, also the cost of tearing them down, less value of material salvaged. The temporary units usually required will include an office, store, cook house, bunkhouse, stable, closet, power house, supply room and shop, oil house, equipment and first year's operating, less receipt from rentals, including main office, store, hotel, club house, hospital, school, church, officials' homes, tenements, outhouses, lighting, water, drainage and sewer systems, fencing, sidewalks, streets, etc.

Then as a last consideration, there are miscellaneous requirements, such as the expense account covering fire and workmen's compensation insurance, hospital fees, traveling expenses, coal analysis, advertising, litigation, phone and telegraph service, entertainment, personal expenses, etc. The working capital account covering selling costs and freight charges on at least two months' shipments, during which time no returns can be anticipated, must also be allowed for.

Before going further, underground and surface layouts will be required, and in their completeness lies our protection in the accuracy of the estimates.

The underground plan should show the proposed development of the entire plant in rough and the work to be done during construction in detail.

The surface plan should show the relative position of the mine openings, all temporary and permanent plant improvements connected with the operation of the mine, and the townsite layout.

I believe that most mines having a daily capacity of 500 tons or over can be brought, so far as the plant improvements are concerned, to a standard design more or less approaching that shown in Fig. 1. This covers a shaft mine of one to two thousand tons capacity; but, with small alterations, such as the location of the fan, the layout is applicable to either drift or slope mines, and with increased or decreased size of building to any capacity mine.

The drawing is self-explanatory, showing the townsite located either to the north or south of the plant to avoid our prevailing west winds carrying boiler-room smoke over the houses; also located close enough to the plant that long walks to and from work are eliminated and so that no employees or children need cross the railroad yards.

The temporary units are set near the plant but so as not to interfere with the construction of any of the permanent improvements and yet allow of a minimum amount of land being cleared.

The permanent units are set along the line of yard tracks: this allows the railroad-grading contractor to grade the site at the same time as the yard. The location also allows of all supplies and heavy machinery being unloaded to the best advantage. Machinery for the mine can be sent down with the one handling and power-plant and machine-shop units unloaded direct to yard-trucks and skidded from them to their foundations.

A railroad yard approximately 330 ft. long by 235 ft. wide will be all that is required by the average mine. This can be fenced with a high galvanized wire fence on three sides, and none but employees on duty allowed through the gates. A fire-hose shed placed central with reels carrying 300-ft. lengths of hose will protect every unit. A night watchman can visit every unit and the storage yards at short intervals. Every person entering or leaving the gate is under observation from the mine office. The problem of lighting, drainage and sewage is a very simple one. All refuse from tipple and boiler room can be stocked along railroad tracks or loaded to cars at a minimum expense, and in case the piles should catch on fire, the flames and fumes would be carried away from the plant and town. I would mention that to make this layout entirely satisfactory, either fireproof or slow-burning construction must be used.

The Various Surface Improvements

Passing to the details of the various surface improvements and their equipment, we have first, the temporary structures. These are required to get the working organization in shape as quickly as possible and must last at least one or two years. The buildings should be cheap and built of standard dimensioned lumber that can be easily salvaged. The equipment can, in most cases, be permanent, and later transferred to the permanent improvements; for this reason their location should be as close as possible to said permanent unit.

Flat roofs will give best results and a standard width of 20 ft. can be established, with walls 10 ft. high on one side and 9 ft. on the other as per Fig. 2. They should be set on posts, one foot off of ground to avoid the necessity of drainage ditches around them, and should be

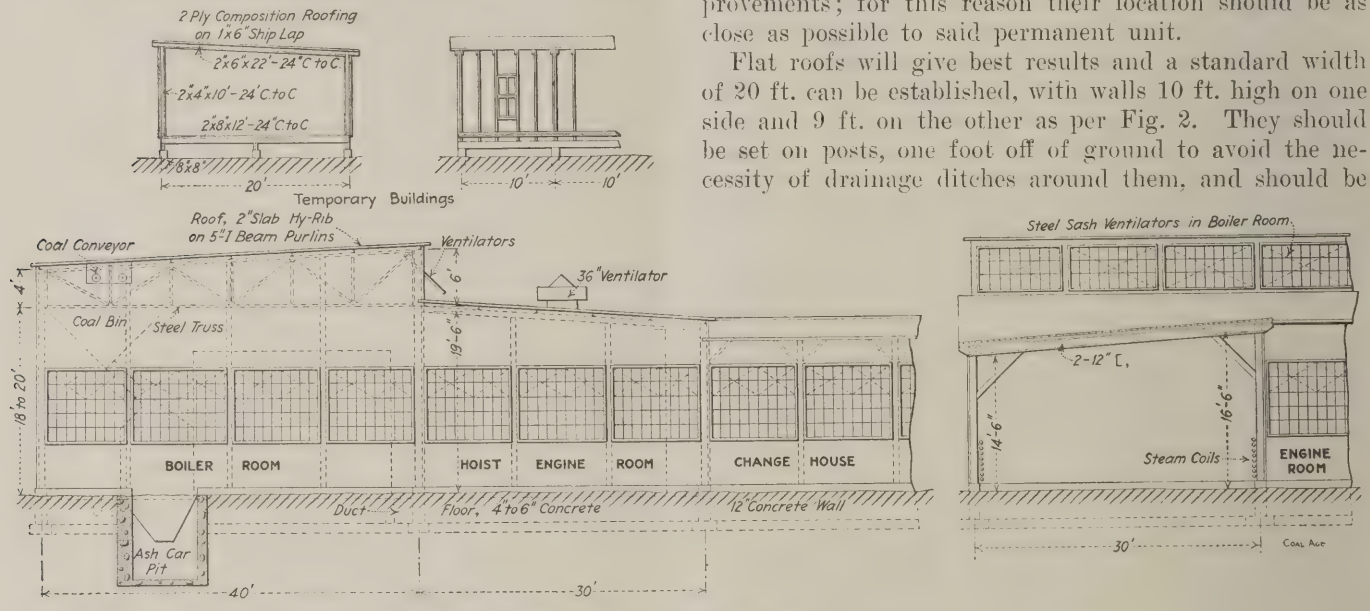


Fig. 2. Construction Details of Temporary Surface Buildings

constructed entirely of 10-, 12- and 14-ft. lengths of 2x4-in., 2x6-in., 2x8-in. and 1x6-in. shiplap sheathing, one-ply building paper and two-ply composition roofing. All studding, sheathing and siding should be driven light with short nails. Both bunk and cook houses should be lighted from the roof, by rubber glass skylights: the cost is less than windows and the lighting better.

A Temporary Office

A temporary office should be about 20x30 ft. For equipment, it should contain superintendent's desk, two high desks and two low desks, one each for accountant and payroll clerk, two stools, six chairs, safe, stationary cabinet, stove, filing-system cabinet, drawing table, typewriter, telephone, fire extinguisher, engineering equipment including transit, drawing instruments, etc., for which an allowance of $1000 should be made. First-aid equipment, including pulmotor, first-aid cabinet, stretchers, medicines, etc., for which at least $350 should be allowed.

As to operation, we must consider salary of force during construction, including superintendent, payroll clerk, time clerk, draftsman, watchman, porter, stationery, supplies, heating coal, and an allowance of at least $2000 for printed forms covering departmental reports. In the

back of the office should be two 10-ft. square bedrooms, furnished, one for superintendent and mine manager, and one for office force. This furniture can be transferred to the hotel later and should be permanent.

The Company Store

The company store should be 20x40 ft. The equipment should consist of manager's desk, chair, cash register, scales, stove, fire extinguisher and telephone, all permanent. As to operation, there are salary of manager and clerk for three months, and $5000 allowance for stock. After this period, the store receipts should cover its operation.

In the back of the store should be a 10-ft. square bedroom for the manager and clerk, fitted with permanent furniture.

Other Buildings

Cookhouse—Size, 20 ft. wide by 70 ft. long, 40-ft. dining room in front. Equipment: 2 stoves, 2 tables and 4 benches. Kitchen, 20 ft. square. Equipment: Range, sink, table, counter, chairs, fire extinguisher and $500 allowance for utensils, dishes, etc. The range and dishes being permanent. Two rear bedrooms 10 ft. square with double bunks, two chairs and table in each, should be furnished for the cooks. Operation: This building should at once be rented to a reliable man and his wife; under no conditions should the company attempt to run it during construction.

Bunkhouse—Size 20 ft. by 70 ft. Equipment: Twenty to 40 double-deck, 2-ft. 6-in. wide by 6-ft. 6-in. long steel-spring bunks with cotton pads, 2 stoves, 2 tables, 4 benches, 2 wash sinks, and fire extinguishers. Operation: This building should be under the same people controlling the cookhouse. Attention is here called to a double-deck bunk made by Haggard and Marcusson, of Chicago, consisting of 2 steel spring cots set one above the other on a frame work of steel angles, and costing approximately $7 delivered, plus $2 for the pad or $4.50 per man. This makes a strong sanitary bed, economical in space and one that can afterwards be used in the hotel or company boarding house. Wood bunks with straw are one of the most serious vermin and disease breeders in a construction camp and I strongly recommend the additional expense required for the steel ones. They can also be used in the office, store and cook-house bedrooms.

Stable—Size 20 ft. by 40 ft. This will house 4 to 6 horses and a carload of hay and grain. Equipment: Wagons, sleighs, horses, harness, blankets, fire extinguisher, etc. Operation: Wages of boss and drivers, repairs, shoeing, feed, etc.

A water closet with private compartment for officials should be placed near the bunkhouse and operated by people running same.

Laundry—A small shack should be built and equipped with stoves, copper boiler, etc., for this purpose. It should then be rented to a Chinaman and an understanding had of the prices to be charged; invariably much trouble is experienced during construction in this quarter.

Pig Pen—The disposal of garbage is a serious item and a dozen pigs will prove the most desirable outlet. These can be kept by the stable boss and sold through the store to the cook house.

Temporary Buildings at Mine

Foreman's Office—Size 12 ft. by 20 ft. Equipment: Desk, drawing board, high desk for time keeper, table, chairs, phone, stove and fire extinguisher.

Shop—Size 20 ft. by 20 ft. Equipment: Forge, hand blower, hand drill press, swage blocks, mandrels, stove, fire extinguisher, etc. Operation: Wages of blacksmiths and machinists, small tools, blacksmith coal, oil, etc.

Supply House—Size 20 ft. by 20 ft., and forming extension to shop. Equipment: High desk, stool, stove, phone and fire extinguishers, also stock of repair parts for machinery, packing, hardware, picks, shovels, rope, tackle, wire, etc., also yard stock including mine props, ties, rails, trolley wire, bar iron, square timber, building lumber, mine-car lumber, bricks, lime, cement, gravel, etc., also oil-house stock, including all oils, grease, etc., and lastly powder-magazine stock, including explosives, detonators, squibs, etc. From $10,000 up should be allowed in estimate to cover this stock. Operation: Wages of foreman, freight, express and handling of supplies.

Miner's Washroom—Size 15 ft. by 20 ft., and forming extension to supply house. Equipment: Stove, wash sink, benches and fire extinguisher. Operation: Wages of keeper, heating fuel, soap, etc.

Boiler Room—The size of this building will depend on whether or not shafts are being sunk requiring compressed air; if not, hoisting engines with boilers attached, will be all that is required for erecting tipple and main building, in which case no boiler room will be needed. If shafts are to be sunk, a 60- or 70-hp. vertical boiler is easily salvaged and fills all requirements nicely. With this unit should be estimated such hoists, compressors pumps, drills, and other miscellaneous machinery as will be required during construction. Operation: Wages of firemen and engineers, cost of fuel, water, oil, waste, removal of ashes, etc.

Estimate must also cover cost of sinking well for water-supply, also ditch and pipe line.

Each of the above mentioned units except boiler room can be built inside the lines of the permanent foundations of main building and when this is roofed they can be torn down and their equipment replaced in permanent structure at small expense. The boiler room should be located on a line, and central with the two shafts, and sinking engines placed on each side of boiler.

The temporary oil house and thaw house or powder magazine, will be merely shacks and require no special mention.

Outside Tramroads—It may be necessary to handle supplies a considerable distance from railroad station until yards are put in. In this case a tramroad of 16-lb. rails should be estimated on, also a given sum for its operation.

Tipple—This will vary according to location of mine opening and no details can well be given here. From shaft mines, all material, during sinking, will be handled over temporary headframes, and from drift mines a chute with bar screens will fill all requirements. This structure with equipment and operation including cleaning of coal, removal of waste and handling of railroad cars should be carefully estimated on.

Outside Lighting—Several large Milburn type carbide lamps will be required, also carbide for their operation.

The above units cover all temporary work required and as soon as supplies are on hand, the construction of both

the temporary and permanent plant can commence. The clearing of the property should be done in April, the grading in May, and the permanent building from June to November.

Permanent Units

The tipple equipment should include cages, head sheaves, ropes or car hauls or conveyors, dump hopper, bar screens, weigh pan, scales, inspection table, shaker screens, picking tables, chutes, boxcar loaders, motors, transmission machinery, phone, tally boards, signs, fire extinguishers, etc.

In designing this unit we have one of four different mine-opening conditions to meet. First, where the opening is above tipple dump requiring either retarding conveyors, gravity planes, tramroads or carhauls. Second, where opening is on approximate level with tipple dump requiring either locomotives or rope haulage. Third, where opening is below, requiring either engine planes, incline-conveyors or car hauls. Fourth, where seam is directly below, requiring cages and a headframe.

Conveyors Can Be Used Advantageously

Under conditions number one and three, conveyors can be used to best advantage where a capacity of 100 tons per hour or more is required, having the following advantages over lowering or raising mine cars on planes: They eliminate one man at the head of incline who handles the lowering machinery and at least one man at the foot; they have a capacity far greater than can be obtained from either cars or monitors on planes; and, running in a covered truss, are not subject to damage from storms as are open-track layouts and fewer mine cars are needed, as the length of time the car is kept out of the mine is much shorter.

Whether the conveyor drags, retards or carries the coal, there is absolutely no breakage during transit, and, where the scraper type, dragging coal on the bottom strand, is used, there is a perfect discharge to the tipple screen. so that in comparison with delivering the mine cars direct to the tipple and dumping the coal but once, the advantage is in favor of the conveyor.

The tipple should be a steel structure of minimum height, equipped with self-dumping cages, if a shaft mine, and should have the ability to load in either open or box-cars any sizes the market may demand or any combination of such sizes. It should have a bin in which rock can be dumped direct without having to pass over any of the coal-sizing machinery with the extra wear imposed due to its gritty nature. Next should come a bin for run-of-mine to be sold locally, this should also be arranged so that the coal does not have to pass over the sizing machinery as it must be sold at a close price to employees and homesteaders. Next to this should come a slack bin delivering either to wagons or to a conveyor which feeds boiler-room coal bins.



Fig. 3. General View of Tipple Building Showing Refuse Bin and Location of Picking Table

Method of Handling the Coal

Coal for market should be dumped direct to a hopper and from this should flow to an apron conveyor 5 to 6 ft. wide by 20 to 25 ft. long; this acts primarily as a feeder delivering the coal in a uniform stream to the screens; it acts also as an inspection table where the checkman can see from his office the entire carload spread out and traveling at a very slow speed. He can, furthermore, stop this feeder with a given load of coal on it and pick out and weigh the rock in case of a dispute between himself and the miners' representative. In screen-coal mines, the coal should flow from dump hopper over a bar screen to weigh pan and thence to above feeder.

From the feeder the coal passes over a short chute fitted with a butterfly valve to allow of its being dumped direct to local coal bin or with this valve closed to a shaker screen 5 to 8 ft. wide, by 25 to 35 ft. long, depending upon capacity desired.

In case of clean coal, this screen can lead direct over the different loading tracks, or a Marcus-type screen can be used to even better advantage if the coal is dry.

Where the coal is dirty and requires hand cleaning, I would in most cases recommend the following path from feeder, assuming four grades of coal are required: On entering the shaker screen, the coal should pass first over the nut perforations through which both nut and slack drop on to a slack screen, which should always be of the Cross Patent Lip type, consisting of 12-in. long slots set in rows with a 1-in. drop at the end of each; this tends to continually turn the coal over and bring the fines on the bottom. These slots are wider at the bottom than the top and are, therefore, self-cleaning. This screen is the best for slack, because in most seams carrying dirt bands, they usually break in thin lenses that will not go through round holes small enough to keep oversize coal out. The slack passing through cross screens goes to a slack bin and thence to boilers; or the screen should be so arranged that it can be blinded and the slack allowed to flow on to railroad cars.

The nut passing over the slack screen should go to a conveyor running at right angles to the shaker and there be picked and afterwards discharged to railroad cars on any track.

The lump and egg passing over the nut screen are separated on an egg screen and each is sent to a conveyor on which they are picked and then discharged to any of the railroad tracks. The different chutes should be so arranged as to gather from any of the three conveyors, and by this method any size or combination of sizes can be loaded on any track.

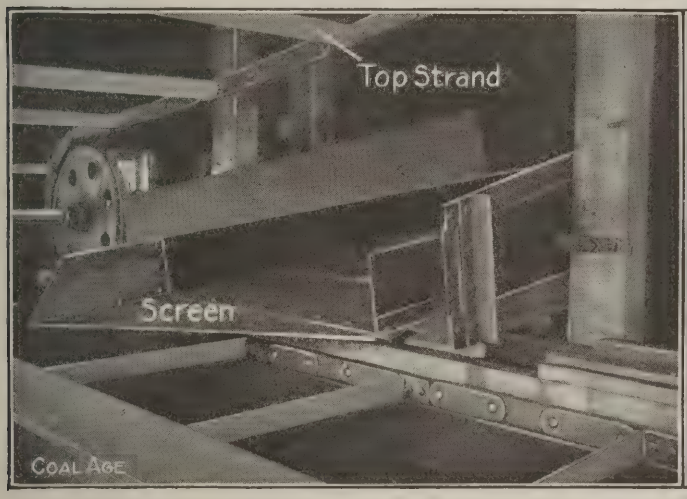


FIG. 4. INTERIOR TIPPLE VIEW SHOWING LIP OF SCREEN AND PICKING TABLE



FIG. 5. ANOTHER VIEW SHOWING WHERE LUMP, EGG AND NUT COAL ARE PICKED

DETAIL OF CAGES

I would recommend in most cases self-dumping cages with dumping rollers at top of dumping platform as greater leverage and consequent reduced strain on both cage and headframe is secured. The cages should be designed to allow the car to project beyond ends of cage, so that in a dumped position, the car would be lifted the minimum distance above apron, insuring a small drop to friable coal and no spilling down the shaft. The guide irons should be so curved that during the dumping period the car is rapidly dropped to the dumping position and while dumping is moved very slowly. Horns are preferable to drop rails for rapid work. Detaching hooks and double bridle chains should form part of the equipment of every cage. Wood floors are preferable to steel, being lighter and less slippery.

The prime reason advanced by the advocates of platform cages and the automatic pushing of the cars from same to cross-over or rotary dumps, is the question of saving in breakage. With the cross-over dump there is none, and with the rotary not enough to warrant the excessive extra cost of the tipple, extra cost of power to operate pushers and empty car hauls, and wages of at least two extra men in handling cars to dumps. In fact with our modern self-dumping cages, I do not believe a rotary dump can do the work as quickly and with as little breakage.

DETAILS OF SHAKER SCREEN

The shaker screen should be of the single unbalanced type in preference to two screens working in so called balance. This statement will probably create much dissension, but a single screen driven by connecting-rods from oval-faced eccentrics keyed on an eccentric shaft, which in turn is carried on an independent framework from the tipple structure, will not put as much vibration in the tipple as a pair of screens. We have now in operation in a wooden structure an unbalanced screen 34 ft. long of the double-deck hanger type. This screen has a capacity of 150 tons per hour and makes four grades of coal. It has given us no trouble from vibration whatever, in fact, far less than I have experienced from carefully designed balanced screens carried on an independent steel framework figured with a fiber stress of but 4000 lb. The single screen costs but little more than half as much as a pair of screens and dischargs over much simpler chutes to the different conveyors.

In designing these screens, there should be a bearing on each side of each eccentric, the eccentric should be fitted with spring compression grease cups so that in case they tend to heat, more oil will be fed. The driven pulley on the eccentric shaft should in all cases be fitted with

a friction clutch for starting and stopping. No plates should be less than one-quarter inch thick and no reinforcing angles less than five-sixteenths of an inch.

Details of Picking Table

Figs. 3, 4 and 5 give an idea of the arrangement and operation of the picking table. Each table should lead from the screen over all tracks; each should have an independent motor drive and friction clutch for starting and stopping. They should be of the scraper type with a double strand of steel bar link chain carrying steel cross bars, of the same depth as the chain link, at 24-in. intervals. A strong and satisfactory picking table is made up of two strands of chain having 3-in. by ½-in. by 12-in. pitch links, 1-in. pins, 3-in. by ½-in. crossbars, 48-in. sprockets, and a speed of 40 ft. per minute. The coal is carried by the bottom strand on a ¼-in. steel trough, and discharged through openings to hinged chutes over the tracks. All picking is done on the 25 ft. or over length between the screen and the inside railroad track; the refuse bins being below the floor of this room and discharging to wagons, cars or conveyors, as shown in Fig. 3. The return strand travels back overhead on guide rollers.

This conveyor carries the coal as uniformly spread out as does the apron type; is fully as easy to pick from and can discharge all or part of its contents at any number of openings with a minimum breakage; the cost is much less, and but little more power is required to operate it; also, less headroom is required and a less expensive supporting structure is needed. With the apron conveyor, coal can be carried on the top strand only and discharged at one point only, over the head sprocket.

With this tipple construction, the bottom strand of conveyors need clear railroad tracks by but 18 ft. It is, therefore, an easy problem to design chutes for loading open or box-cars with but little breakage.

For loading box-cars with coal under 6 in. in size, the Ticknor Manierre loader made at Milwaukee is the cheapest in first cost, requires the least power and loads with the least breakage of any loader that I know of on the market. It has a further advantage in that one loader placed between two tracks, 19-ft. centers, can load cars on either track. For lump coal, I believe the Christy made at Des Moines, to be one of the most satisfactory.

Main Plant Building

The main plant building should be located as shown in Fig. 1. It should be so designed that extensions can be made in any department at a minimum cost and should preferably be fireproof and of a skeleton steel type with brick, or Hy-rib cement-plaster walls. A wooden frame with corrugated iron siding and partitions serves the purpose when first cost is a strong factor, being practically fireproof. The roof of this building should be nearly flat and made up of 2-in. Hy-rib on 5-in. I-beam purlins or 2-in. by 4-in. tongue-and-groove, kiln dried mill flooring with Barrett Specification Roofing, if the cheaper type is used. With this construction the building is easily heated, lighted, ventilated, cleaned, inspected and protected from fire.

At the tipple end comes the boiler room with hoist engine and engine room back to back against it, giving a most economical steam piping layout and allowing of extensions as desired. Next come the miners' change room, supply house, carpenter shop, machine shop, blacksmith shop and lastly the man and material hoist-engine room.

Boiler-Room Equipment

Boilers, stokers, draft equipment, stack, etc., must be included in the boiler-room equipment. For feeding boilers, slack coal will be brought direct from tipple by a wire-rope conveyor. Ashes will be handled in side-dump cars running in a tunnel underneath the boilers and discharging to a hopper leading to an ash skip, which in turn discharges to an ash bin from which the ashes are drawn to a wagon on the same street and at close proximity to the point where refuse from the tipple bin is taken.

Water-tube boilers should be installed in units of from 200 to 300 horsepower, and of not less than 150 to 175 lb. steam pressure. "Safety First," economy, and low first cost are conserved by their use. A rupture in any given tube is purely local and causes no serious damage, while with a return-tubular type an explosion would be the result. They are about 15 per cent. more economical in fuel and require approximately but two-thirds the cubical boiler-room space. The first cost of the plant installed will also be less.

No recommendations can be made relative to stokers as each coal requires special consideration. The fact that a good stoker will burn low-grade slack, eliminate smoke, and reduce the cost of fire-room labor usually warrants its installation.

With low-grade fuel many advantages are offered by an induced-draft system, since it is cheaper in first cost than a chimney and allows thick fires with strong drafts, thus promoting complete combustion.

Hoist Engine-Room Equipment

In the hoist-engine room, we must consider the main hoist, signals, phones and overwinding device. A Corliss hoist requires approximately 43 lb. of steam per horsepower and a slide valve 50 lb. or more, showing a saving of at least 15 per cent. in favor of the former. Exhaust steam may be used, but the greater first cost would keep this plan from being a profitable investment. Electric hoists are very expensive, and not warranted directly at the power plant, where low-cost fuel and mixed-pressure turbines can be used.

Engine-Room Equipment—If electricity is required, the mixed-pressure turbine-driven generator will prove most satisfactory and by storing exhaust from hoist in regenerators will allow of manufacturing power at no cost outside of upkeep. The turbine excels a reciprocating engine on account of the expansion which can be given to the steam at low pressure. At high pressures, the high-class reciprocating engine is more economical, but the advisability of installing both types of units in a new plant is a question.

If compressed air is required, the high-speed vertical compressors are very economical and generally satisfactory, and furthermore require but small floor area.

In addition, there will be required in the engine room, a switchboard, tool and clothes lockers, fire extinguishers, phone, desk, and boiler-feed equipment, including pumps and heaters. An open heater adds approximately 16 per cent. to boiler efficiency and therefore saves that much handling of coal and ashes. Closed heaters are not recommended for mine work. They are under pressure,

subject to temperature strains, hard to clean, do not save the exhaust condensed in doing the heating, and make no provision for the settlement of solids. Turbine-driven centrifugal feed pumps in duplicate complete the equipment with the most efficient and fool-proof machinery to be had.

Change-Room Equipment—Benches, clothes hangers, wash basins, shower baths, supply cabinet, fire extinguishers, etc. One shower bath should be allowed for every 25 employees.

Supply-Room Equipment—Shelves, bins, scale, phone, fire extinguishers, etc. This building should have a small office for a supply foreman.

Carpenter-Shop Equipment—Two benches, combination saw and grindstone.

Machine-Shop Equipment—Two benches, open-gap lathe, pipe machine, with set dies for making bolts, planer, large power-driven drill press and emery wheel.

Blacksmith-Shop Equipment—Two forges, 200-lb. power-driven hammer, combination hand punch and shear, two benches and pipe rack for local supply of bar iron and pipe. A 25-hp. motor with transmission machinery will be required for driving tools in all three shops. There should be a roof furnished over the back door of blacksmith shop, that horses waiting to be shod may be kept under cover.

Man and Material Hoist-Engine-Room Equipment—Steam or electric-driven geared hoist with phone and signal apparatus and overwinding device.

In the general arrangement of this building it will be noted that mine cars can be brought in for repairs over a minimum length of track from either shaft and that all supplies are carried near the shop where required.

The location of the other permanent units is clearly shown in Fig. 1. These can all be built at a moderate cost, using either skeleton steel or wood with cement plaster. The pipe and bar-iron rack can be built of 3-in. piping with standard fittings. No mention will be given the equipment of these various units except the oil house, which should have Bowser or equal self-measuring two-barrel tanks for every grade of oil used.

Steam heating will be required in the tipple, main plant building, mine office, oil house, lamp room and water tank; fire extinguishers should be placed in every room in every building, also buckets of sand wherever electrical machinery is in use.

The distribution of outside lights, layout of roads, yard tracks, etc., is clearly shown and their cost easily estimated. Care must be taken to cover the cost of outside power lines including poles, wiring, etc.; outside pipe lines, including supports, piping, covering, etc.; outside water lines, including ditching, piping, hydrants, etc.

Townsite Units—The design and estimating of the units will be taken up by themselves in a future paper, meriting as they do a special discussion.

Before closing, I want to give a few hints on purchasing the plant.

We have three choices before us. First, the manufacturer who maintains an engineering department, specializing on one or more of our wants, and who, free of cost, will make plans to cover all requirements. Such a manufacturer will also bid on the business against all competition, and, if successful, will be personally responsible, rectifying all errors without any additional charge. Second, the contracting engineers who either agree to build whole or part of the plant for a fixed sum, or cost plus either 10 or 15 per cent. These concerns usually have superb engineering organizations and good salesmen, but they must in turn buy everything from the manufacturer above mentioned, and in turn place the responsibility on him, nor can they buy cheaper in competition than ourselves. On a lump-sum basis, contracting engineers can, and often do, save their clients considerable money and a great deal of worry through his dealing with one responsible concern only, but so far as a "cost plus" basis is concerned, I can see nothing to recommend it in this class of work for we must stand the brunt of all mistakes and pay a commission on them besides. Third, we can build



FIG. 6. SHOWING COURSE OF COAL THROUGH TIPPLE

our plant, or part of it ourselves. I would recommend doing the work part under condition one and part under condition three.

THE TIPPLE BUILDING

In the matter of building the tipple, I should ask the Link Belt Co., the Jeffrey Manufacturing Co., Head Wrightson, Ltd., and one or two others of that class to send their representatives, which they do without cost, and have them go over the ground. I would then carefully analyze all suggestions and give each company a general idea of the requirements, requesting plans and bids. Any of these concerns could also erect the main plant building, water tank, fan and track scales at the same time the tipple was being put up.

Machinery in Main Plant Building—I should ask the reputable boiler people, such as the Babcock and Wilcox Co., The Stirling Co., The Waterous Co., and one or two others to make plans and specifications covering the boilers, heaters, pumps and steam and water piping. I would also make arrangements for the use of their erector to place all heavy machinery such as engines and generators; the latter being purchased in competition from any of the reliable concerns.

The shop machinery with its transmission can be purchased complete from such firms as the Canadian Fairbanks Co., Ltd., Mussens, Ltd., etc. These people will gladly make, without charge, a layout for setting the different units; and their erection I should leave to my master mechanic, who can also erect all heating piping, etc. All wiring and erection of motors can be done by the chief electrician. All building of the temporary and

small permanent units by the boss carpenter, and all clearing, ditching, etc., by the surface foreman.

The grading of railroad yards should be let complete, including the placing of ties, laying of steel and switches, to a contractor specializing in this work and having the necessary teams, scrapers, camp equipment, etc., to do it; also one capable of putting up a bond.

For designing the small units and doing general drafting work, I should borrow a draftsman from the people furnishing the tipple, returning him at the end of the construction period.

Finally, after the estimate is made complete and covers every unit with its equipment and operation, at least 15 to 25 per cent. should be added for protection, in covering the many details that will still crop up.

Safety Requirements

By A. L. H. Street*

SYNOPSIS—An inquiry in reference to the legal performance of his daily duties by the mine examiner when he fails to report a miner's working place as dangerous and as a result the miner is badly injured by a fall of rock in his place. Another inquiry, asking if a mine is worked in compliance with the law when a night shift of miners is permitted to enter the mine and dig coal when no night boss is present and no one has charge of the mine.

An Illinois miner asks advice concerning the duties of Illinois mine managers and examiners, as follows:

1. There being a bad roof in a working place, the mine examiner took the miner's check, marked the miner out, marked the roof for loose rock and entered same on his report. The room was timbered that day and the miner worked the following morning, when the same conditions existed but were not reported by the examiner, and the presence of loose rock was not marked that day. Entrance checks were not held nor was the place marked off. The miner was injured before he could remove enough coal to place props to secure the roof. The place not being marked out and checks not being held, the miner, presumably, believed that no immediate danger existed. Did the mine examiner violate the law by not holding the miner's check and by not marking each day the place where dangerous conditions existed?

2. The mine is worked by both night and day shifts, but no one is in charge of the night shift. Is this mine being worked in compliance with the law?

1. That the Illinois coal-mine law was violated on the facts above stated appears from the following abstract of provisions of the law as found at pp. 430, 431 of the 1913 Session Laws. Section 21 requires a certified mine examiner at every coal mine, and makes it his duty to examine the underground workings of the mine within eight hours preceding every day upon which the mine is to be operated; to carry a rod or bar for sounding the roof; to inspect all places where men are required to pass or work, and to observe whether there are any recent falls or dangerous conditions in rooms or roadways; to inscribe in some suitable place on the walls of each room, not on the face of the coal, with chalk, the month and the day of the month of his visit, etc. When working places are discovered in which there are recent falls or dangerous conditions, he must place a conspicuous mark or sign there as notice to all men to keep out. On completing his examination, he is required to make a daily record of the same in a book kept for that purpose, for the information of the company, the inspector and all other persons interested; and this record must be made each morning before miners are permitted to enter the mine. The examiner is further required to take into his possession the entrance checks of all men whose working places have been shown by his examination and record to be dangerous, and to give such entrance checks to the mine manager (boss) before the men are permitted to enter the mine in the morning. Section 20 requires the mine manager to examine the examiner's report every morning and, if working places are reported to be dangerous, he must withhold the checks of men working in such places until he has advised them of the danger existing and instructed them not to work in such places until the reported danger has been removed, except for the purpose of removing the same. When a miner is permitted to enter a place of work, he is entitled to assume that the manager and the examiner have performed the above stated statutory duties.

2. Although the Illinois Mine Law seems to contain no express requirement that a boss be put in charge of night shifts, it contemplates that there shall be some one in charge, as is shown by the following summary of provisions contained in Section 20: Where there is a night shift mining coal, the mine manager is required to see that an examination of the working places is made by the "person in charge of such night shift, or some competent person authorized by him," before the men enter such places of work. The mine manager is, also, required to see that the top man and bottom man are on duty when miners are being hoisted or lowered. In mines in which the works are so extensive that all the duties devolving upon the mine manager cannot be discharged by one man, competent assistants must be appointed.

*Attorney-at-law, St. Paul, Minn.

Advantages of the Modern Steam Shovel in Mining Shallow Seams

Since the advent of the steam shovel into the coal-mining field, the old method of strip-pit mining has almost entirely disappeared, and where one is found it is usually on a small scale. As first manufactured, the steam shovel did not seem to adapt itself successfully to coal operations; however, a rotary-type shovel has since been designed, which does the work so well that new shovel installations are constantly being added to operations in the various fields.

Some idea of the amount of money invested in this type of steam shovel can be gained by reference to the Ellsworth-Klaner Construction Co., of Pittsburg, Kan. This company has in operation two of the model 270 Marion shovels, of revolving type. These shovels each weigh about 250 tons, and, ready for operation, cost approximately $50,000. They represent the largest type of revolving shovel built, equaling in size those used on the Panama Canal works. They are equipped with a 5-cu.yd. dipper, and a 90-ft. beam.

The two owned by the Ellsworth-Klaner Co. have twin boilers and operating together, have moved as



IN THIS OLD PIT, 14 FT. OF DIRT HAS TO BE REMOVED TO REACH 40 IN. OF COAL. NOTE LARGE NUMBER OF MEN AND HORSES NEEDED FOR THIS METHOD

much as 6700 cu.yd. in one working day, lifting and depositing the load on top of the dump. By comparing this record with that made on the Panama work, where one shovel moved 4823 cu.yd. in one day, dumping it onto flat cars instead of hoisting it onto a high dump, the wonderful labor- and time-saving facilities of this method of top-vein mining can be readily appreciated.

The accompanying illustrations, and those on the front cover, serve to emphasize the value of the steam shovel in coal-mine operations.

The photograph of the old method of strip-pit mining was taken near Columbus, Kan., and is admirably calculated to indicate to the observer the great waste of labor, effort and time formerly required in working the top beds, where the crust was too thin to permit of underground development. In this particular operation it was necessary to remove 14 ft. of dirt in order to reach and expose from 3 to 3½ ft. of coal.

The labor was also most arduous, requiring the maintenance of a large force of men and many teams. The great expense and small output resulting from this method have tended to discourage extensive operations, and the advent of the steam shovel has therefore found an immense field in readiness for it.



THIS LARGE TYPE REVOLVING SHOVEL COSTS ABOUT $50,000 AND HAS A 5-CU.YD. DIPPER

Editorials

Pumping in Coal Mining

The April 4 issue of COAL AGE will be devoted altogether to the subject of pumps and pumping in coal-mining work. We are anxious to make this particular number of our paper the most interesting and complete issue of the kind ever printed. With this idea in mind, we invite all our readers to send us notes and articles descriptive of ideas and installations relative to the subject of pumping. All matter should be in our hands not later than Mar. 27. Wherever possible, photographs and drawings should accompany the text.

Systematic Timbering to Prevent Accidents

Everyone familiar with coal mining knows that roof falls kill more men than any other cause. Here and there occasionally in the United States we witness a spasmodic effort to enforce some definite scheme for safeguarding the men from falls of rock. Practically nowhere has an entirely satisfactory method of handling the timbering problem been evolved. British Columbia, alarmed by its increase in coal-mine fatalities, now comes to the front with a set of rules which, if enforced, are likely to better conditions in that field.

Attention is called to these rules and regulations, which are published elsewhere in this issue. This is a move in the right direction and is worthy of the notice of American operators, mine inspectors and miners.

Standardization

The standardization of methods and details of equipment in coal mining, as in all other industries, is one of the first elements of success. That it is unnecessary to draw the attention of the management of large operations to this need is evident from the great advance that has been made in that direction, by the leading coal companies.

While the average mine operator readily recognizes the need of standardization in the details of his own equipment and the methods of operation; and the manufacturer, likewise, recognizes the same need in the shop and factory, there is a growing necessity for the more universal application of this principle in the coal industry. Standardization in the details of manufacture of American watches, automobiles, engines, power generators and all classes of machinery and equipment, is recognized as one of the chief factors in the success and growth of these industries. The application of the principle by each operator and manufacturer, however, has been, to a large extent self-centered.

There is, at the present time, a growing necessity for the standardization of mining methods and equipment that will be general. While it is commonly recognized by all familiar with coal-mining conditions that such a general standardization of much of the equipment must be made with due regard to the varying conditions in mines, it is clear to anyone giving the matter careful thought that a great advance can be made in this direction. We naturally look to the Federal Bureau of Mines as the recognized agency through which such general standardization can be best effected. The bureau has already done much to secure the enactment of more universal state mining laws and the establishment of a more universal signal system in mines. There is great need for a more universal system of examination and certification of mine officials.

Few operators recognize the advantage that would accrue and the reduction in first cost that would result from the adoption of a more universal standard mine-track gage. The manufacturers of mine equipment are, today, required to bid on the rolling stock, adapted to any and all gages, varying from 18 in. to the standard railroad gage, 4 ft. 8½ in. The question of a more standard or universal mine-track gage has recently been raised, in manufacturing circles, and attention has been drawn to the fact that, while the need of certain variations in track gage is an absolute necessity under the varying mining conditions, a considerable reduction in the cost of furnishing this equipment would be effected by the adoption of a classified list of standard mine gages, say 24, 36, 42 in. and the standard railroad gage, 4.7 ft. The question is asked: Why order a 34-in. gage when a 36-in. gage would answer every purpose; and, yet, such various orders are given and bids required.

COAL AGE earnestly invites a discussion in its columns by manufacturers of mining equipment and practical mining men, regarding the advantages and disadvantages of the general adoption of such a classified list of mine-track gages. There are arguments on both sides of the question.

Cost of Living and Miners' Wages

It is interesting to compare the cost of living with miners' wages. To this end we take the figures compiled by J. K. Johnston from 1897 to 1912 and the index figures of the Department of Labor for all commodities which is a percentage comparison with the average cost of those same articles from 1890 to 1899. It will be seen that the percentage of advance in the cost of living is 48.94 per cent. This compares very closely with the increase in the selling price of coal in Allegheny, Washington and Westmoreland Counties of Pennsylvania. That increase, as figured by Mr. Johnston, was 53.62 per cent.

But the increase in miners' wages is very much larger than the enhanced cost of living and, of course, that is as it should be, because production constantly involves less labor and consequently the workingman should year by year be enabled to buy more articles than ever before. We seriously doubt, however, if other workingmen have done

nearly as well. In fact, this truth is indicated by the smaller increases secured by the per-diem men. The market for their labor is probably influenced unconsciously more by outside conditions than is the demand for the labor of miners.

COMPARISON OF WAGES AND COST OF LIVING, PITTSBURGH DISTRICT

Year	Wages per Ton Lump Coal	Wages per Ton Run-of-Mine	Wages per Day Max.	Wages per Day Min.	Index of Living Cost
1897	$0.55	$0.3558	$1.78½	$1.52½	89.7
1898	0.66	0.4272	1.90	1.75	93.4
1899	0.66	0.4272	1.90	1.75	101.7
1900	0.80	0.5171	2.28	2.10	110.5
1901	0.80	0.5171	2.28	2.10	108.5
1902†	0.80	0.5171	2.28	2.10	112.9
1903	0.90	0.5817	2.56	2.36	113.6
1904	0.85	0.5494	2.42	2.23	113.0
1905	0.85	0.549†	2.42	2.23	115.9
1906	0.90	0.5817	2.56	2.36	122.5
1907	0.90	0.5817	2.56	2.36	129.5
1908	0.90	0.5817	2.56	2.36	122.8
1909	0.90	0.5817	2.56	2.36	126.5
1910	0.95	0.6140	2.80	2.49	131.6
1911	0.95	0.6140	2.80	2.49	12.92
1912	1.00	0.6464	2.95	2.62	133.6
Per cent. advance	81.89	81.69	65.25	71.80	48.94

† Year of anthracite strike.

Figuring on the rate for lump coal, we see that the miner now gets $1 where he formerly got 55c. With it he can buy only what he could have purchased for 67.14c. in 1897. So the increase in the purchasing power of his wages has been 22.07 per cent., or about 1.38 per cent. per annum.

So much for figures; but it must be remembered that the Department of Labor bases its estimates on wholesale prices and the miner buys from the retailer.

In 1897 the company stores of the State of Pennsylvania were largely relied on to make up all the losses in the producing end of the industry and to furnish the profits. As one operator stated: "In the nineties, storekeeping was highway robbery."

Today we are disposed to think that the charge against the company store is that it does business on so large a scale that its low prices injure the business of the village stores at which farmers trade. Prices are now in nearly all cases reasonable and coercion to trade at the company store is certainly extremely rare and always closely veiled. In fact the evil practices of past days are perhaps entirely eradicated.

One Advantage of the B. T. U. Method

Disregarding the various merits and demerits of the B.t.u. method in general, it is probable that all will agree as to the desirability of the system under certain conditions. One such instance has recently been called to our attention.

An official of a large manufacturing concern was induced by a fuel-testing company to have a report and analysis made on a certain large consignment of coal. It was understood that the fuel was a high-grade "Fairmont," W. Va., product. When the analyses were completed, it was found the ingredients were such as to preclude any possibility of the coal having originated in the Fairmont district. It was also proved that it was impossible to ship Fairmont coal to the point in question (because of excessive freight rates) at the price under consideration.

Further investigations on the part of the official disclosed the fact that the coal was not a Fairmont product, a low-grade Pennsylvania fuel having been substituted. In tracing the matter through, it was ultimately discovered that this was but one of several schemes by which an unscrupulous purchasing agent had been defrauding his company for a number of years.

The National Mine Accident

The statement made in our editorial, Mine Visitation, COAL AGE, Mar. 7, p. 415, in reference to the fatal accident that unfortunately occurred in the National mine of the Lackawanna Co., at Scranton, Penn., Monday night, Feb. 23, was based on the account given of this accident in the Scranton *Daily News*, Feb. 25.

We are advised by Supt. C. E. Tobey, of the Delaware, Lackawanna & Western R.R., Coal Mining Department, that the statement was incorrect in saying that the parties were lowered on the cage, and further, that they returned to the foot of an incline plane and watched the loaded cars going up and the empties coming down, there being no incline plane in that section of the mine. Mr. Tobey states that the parties walked quietly and secretly into the mine after dark, of their own accord, through one of the manway openings.

The editorial was written for the purpose of emphasizing the danger of strangers and persons unfamiliar with mining, visiting mines unaccompanied. All mine openings of any nature should be so protected and guarded that it would be practically impossible for any person to enter the mine surreptitiously. As stated in the editorial mentioned, it is common practice in the anthracite district to permit no unauthorized person to enter a mine without having a duly certified pass. The danger is not confined solely to the intruder, as an open light carried by such a one may ignite a body of gas with disastrous results; or, the ventilation may be deranged by the setting open of a door or the displacement of a brattice by a careless or ignorant person; or the signal system may be tampered with and put out of commission or made to give false signals, with fatal results. Every mine should be safeguarded at every point, in the surest manner possible.

The Panama Canal and Coal Mining

British mine owners for several years have had one eye on the Panama Canal, and the other on some special pieces of American coal acreage. Representatives of two important English syndicates have spent much time in this country recently looking the ground over. Because of its superior grade of coal and nearness to tidewater, the New River field in West Virginia has attracted their closest attention. Operators in this district have been quick to grasp the situation, and the price of New River coal land has been boosted materially.

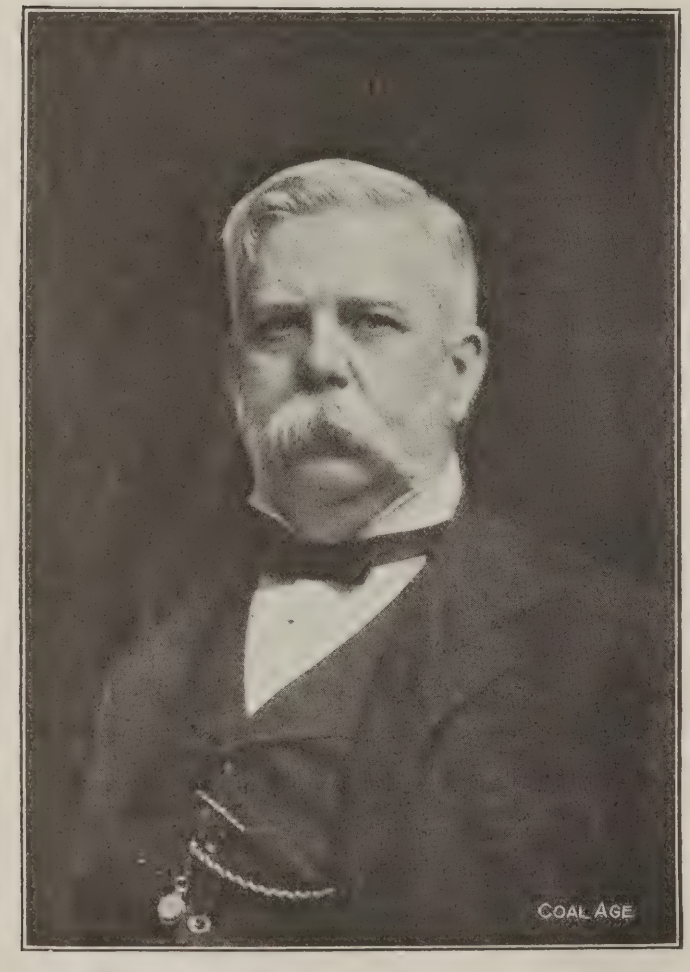
After reading President Wilson's recent message to Congress on "Canal Tolls," one group of English capitalists recalled their representative, the explanation being that American coal lands were not so attractive, if the British ships can use the canal on equal terms with American shippers. One of these English syndicates has something like $25,000,000 to spend. This shows only one effect on American industry that will result through approval by Congress of President Wilson's canal policy.

George Westinghouse

George Westinghouse, famous as an inventor, an engineer and head of the Westinghouse interests, is dead; the end having occurred at his New York residence on Mar. 12. In him the United States has lost one of its most conspicuous and deserving citizens—one whose name was known and honored throughout the world.

George Westinghouse was born in Schoharie County, N. Y., on Oct. 6, 1846, to George and Emeline Vedder Westinghouse. His father was an inventor, and the seed of genius which was his flowered to splendid proportions in the son.

Prior to his 15th year, Westinghouse perfected his first invention, a rotary engine; and less than two years later successfully passed examination qualifying him as an assistant engineer in the United States Navy. It was in this capacity that he served throughout the greater part of the Civil War, resigning at its close to continue his college studies. He entered Union College, where he completed his sophomore year, withdrawing at that time to enter a more active field of endeavor.



RECENT PHOTO OF MR. WESTINGHOUSE

Shortly thereafter, while en route for Troy, N. Y., a delay occurring through the collison of two freight trains, suggested to him the need of an automatic brake. He began work at once on this idea and developed an automatic brake attached to the couplers. This was tried but proved unsuccessful, as did also a similar invention operated by steam. His first thought of using compressed air as a medium was the result of reading an account of its use in digging the Mont Cenis tunnel, 3000 ft. under ground. He readjusted his plans at once, and soon perfected drawings of the air brake, brake cylinder and valves. Later, a practical trial was obtained, and the invention demonstrated a success.

The first patent was issued on Apr. 5, 1869, and the Westinghouse Air Brake Co. launched in the following July.

In 1870, the manufacturing works were completed, and Mr. Westinghouse went abroad to introduce the air brake into England.

Many changes and improvements were being made in the brake all the while, and business flourished. At an early date, the automatic feature of the brake was invented, thereby removing the danger of the parting of trains on steep grades; and, in 1886, the "quick-action" brake was perfected, the improvement consisting in what is known as the "triple valve," by which it is practicable to apply in two seconds all brakes on a 50-car freight train.

About 1880, Mr. Westinghouse became interested in the operation of railway signals and switches by compressed air, and soon thereafter developed and patented the "Pneumatic Interlocking Switch and Signal Apparatus," whereby all signals and switches are operated from a given point.

In 1886, the Westinghouse Electric Co. was formed for the manufacture of lamps and electric-lighting apparatus. The business rapidly developed, and in 1889 and 1890, this company absorbed the United States Electric Co. and the Consolidated Electric Light Co. In 1891 all of these properties were reorganized into the Westinghouse Electric & Manufacturing Co., which now owns extensive works in East Pittsburgh, employing over 22,000 people.

The question of the steam turbine and its application was investigated by Mr. Westinghouse; and in collaboration with the late Admiral George W. Melville, U. S. N., and John H. MacAlpine, he brought out one of the most ingenious devices of modern engineering—the mechanical reduction gear for reducing the inherently high speed of a turbine to the slow speed of a ship's propeller or direct-current dynamo.

Mr. Westinghouse rendered an invaluable service to the electrical development of the world when, in spite of opposition and ridicule, he remained steadfast in his efforts to perfect the alternating-current system and in his belief that this class of high-tension transmission would make distant electrical distribution possible. This system was perfected by his engineers, one of whom, Nikola Tesla, in 1887, invented the alternating-current induction motor. The world today, lighted by distant waterfalls and central stations, recognizes its debt to the foresight and perseverance of George Westinghouse.

Originating with one of the most important inventions connected with railways, the growth of the various Westinghouse industries has been largely identified with railway progress, and it is interesting to note that this progress has represented increased security of life, increased carrying capacity, and reduced cost of operation.

Mr. Westinghouse was connected with a large number of industries at home and abroad, many of which bore his name. He was president and director of Westinghouse Air Brake Co., Westinghouse Machine Co., Nernst Lamp Co., Union Switch & Signal Co., Société Anonyme Westinghouse, Paris, Cooper Hewitt Electric Co., Pittsburgh Meter Co., Société Italiane Westinghouse, Italy, East Pittsburgh Improvement Co., Westinghouse Brake Co., Ltd., London, Westinghouse Cooper Hewitt Co., London, Westinghouse Friction Draft Gear Co., Westinghouse Metal Filament Lamp Co., Ltd., London. He was also chairman of the board of directors of Westinghouse Electric Co., Ltd., London, and director of Westinghouse Electric & Manufacturing Co., Traction & Power Securities Co., Westinghouse Metallfaden Gluhlampenfabrik, Vienna.

The Westinghouse companies employ 50,000 men on whom 150,000 persons are dependent. The total capitalization of all the companies is $200,000,000.

Owing to his many achievements in mechanics, electricity, steam and gas he had many honorable distinctions conferred upon him. His alma mater, Union College, conferred upon him the degree of Ph.D. He was decorated with the order of the Legion of Honor; with the order of the Royal Crown of Italy, and with the order of Leopold of Belgium. He was the second recipient of the John Fritz medal. He received the degree of doctor of engineering from the Koenigliche Technische Hochschule, of Berlin. He was an honorary member of the American Society of Mechanical Engineers, of which body he was also president of 1910. He was one of the two honorary members of the American Society for the Advancement of Science. He was an honorary member of the National Electric Light Association of America. He was awarded the Scott premium and medal by the Franklin Institute of the state of Pennsylvania. He received the Edison gold medal for meritorious achievements in the alternating-current system of electrical distribution. He received the Grashof gold medal from the Society of German Engineers in Germany, which acknowledged him the greatest American engineer.

Mr. Westinghouse was married Aug. 8, 1867, at Brooklyn, N. Y., to Marguerite Franklin Walker. They had one son, George, who is a graduate of Yale, and who was recently married to the Hon. Evelyn Violet Brocklebank. His wife and son survive him.

Discussion By Readers

Mine Cars

Some time ago, attention was called, in a foreword, COAL AGE, Vol. 4, p. 639, to the size and kind of mine cars best adapted for use in coal mines. This has always been a matter of interest to me, and I beg to submit a few practical considerations that must be taken into account before deciding on the size and style of mine car that can be used to advantage in a given mine.

In coal mines, where it is necessary to take the cars to the working face to be loaded, the height of the seam practically limits the height of the car.

A bad roof or a heaving bottom will often require the driving of narrow entries, which, again, limits the width of the car that can be used under such conditions.

The length of mine car is generally limited by the width of the hoisting shaft. There should always be a safe allowance made for clearance in the shaft, varying from, say 6 to 12 in. at each end of the car. Unless otherwise specified, an actual clearance of 6 in. should be allowed and a further deduction of 6 in. should be made for the bumper and end board of the car, at each end; making the inside length of the car 2 ft. shorter than the clear width of the shaft.

The required capacity of mine cars is largely determined by the conditions in respect to the desired output of the mine, length of haul underground, grades of haulage roads and the kind of haulage employed; the last named item limiting the number of cars that can be hauled in a single trip. In deciding upon the capacity of cars, it is important to have due regard to the size and weight of car that can be handled under the conditions existing in the mine. This is determined practically by the condition and inclination of the tracks, the kind of tracking used, and the size of car wheels and condition of the rolling stock in general.

While men can push cars weighing 3000 lb. and carrying a load of 2½ tons, such cars are difficult to start and stop. In order to have the car always under control, it may be necessary to equip every car with a brake or to employ sprags, which are short, bobbin-shaped oak sticks that can be thrust into the wheels between the spokes, to prevent the wheel from turning. To insure safety and ease of handling, cars should not have a capacity exceeding, say 2 or 2½ tons, depending on the condition, inclination and kind of track.

Mine-car wheels are a most important factor in underground haulage. The size or diameter of the wheel and the manner of mounting, facility of lubricating and resistance to wear, both in the journal boxes and on the tread of the wheel, all exert an important influence on the ease with which the car is moved along the track and made to perform its office with the least interruption and delay. Mine cars having wheels 14 to 16 in. in diameter are much more easily moved than cars with wheels 8 or 10 in. in diameter.

The track gage is an important factor, which must be decided largely in accordance with the physical conditions in the mines. Narrow gages permit an easier movement of the cars than is the case on broad-gage roads, under similar conditions. Narrow gages also admit of the use of sharper curves than is possible with broader gages. In common mining practice, in this region, the mine-track gage varies from 28 to 42 in., depending for the most part on the size of the car employed.

The wheel base, by which is meant the distance between the axles or the wheel centers, is also an important consideration. This rarely exceeds 42 in., and is often only 30 in. Cars with a short wheel base can be used on sharper curves, and when derailed they are more readily replaced on the track. Improved wheels with roller bearings have been used for mine cars with great success.

Bituminous-mine cars are built in a great variety of shapes, styles and sizes. These seldom have a capacity of over 100 cu.ft., or, say 2½ tons, the average capacity being from 1.5 to 2 tons. The cars are usually built with outside wheels, the sides being flared above the wheels to provide an increased capacity. The cars are built for varying gages, and both loose and fixed wheels are used. Though wooden cars are generally employed, there are many steel cars in use. The latter have numerous advantages and some disadvantages. Though the first cost is higher than that of wooden cars, steel cars greatly outlast the latter.

GEORGE STOCKDALE.

Percy, Penn.

The Mine Worker

In his article, "One Reason Why Workmen Are Dissatisfied," COAL AGE, Jan. 3, p. 3, I doubt not that Ernest L. Bailey is honest in the opinions he there sets forth. My observations, however, have not led me to the conclusion that the laboring man "contemplates the division of the world's goods as a panacea for unhappiness and an end of toil"; or, that he regards his work "in the light of a makeshift against that time when the apportioning committee will hand him out his pro-rata share of the world's wealth."

I am not now speaking of labor leaders or agitators of a certain class, nor, yet, of the idler who does as little work as possible for as much pay as possible. I refer to the average, conscientious laborer or miner, who is anxious to give a day's work for a day's pay. I have faith enough in humanity to believe that the average laborer or miner is a conscientious worker.

In his social relations, the true mine worker is right in his belief that he has certain inalienable rights and can justly claim a few things above a place to sleep, food to eat and clothes to wear. His claim that he has a right to own his own home should be warmly supported by his employer. His ambition to furnish his home with comfort, not to say luxuries, should be encouraged. His tastes are simple, his needs few, and he has little desire or place for luxuries.

The mine worker has a right to a common-school education for himself and his family. The conditions of labor should be such that the conscientious worker will be able to keep his children in school during their younger years. Surrounding conditions should never be such as to permanently separate him from his family and forbid him the comfort and pleasure of home life.

Every worker has a right to certain diversions that serve to make life enjoyable as well as profitable. His work is made more efficient when he is able to devote a small portion of each day to social pleasure, exercise and study or reading. The hours so employed by the worker are as important and as remunerative to the employer as to the employed, because the worker is made stronger and more efficient and works with greater zest. It should be possible for the man who works by the day or week to be able to enjoy a brief respite or vacation that he can spend as he wishes on a hunting or fishing trip, or visiting old friends.

What it takes to secure these things for the worker constitutes, in my opinion, a "living wage," and is the honest worker's right. It is true, he may make his own choice of the manner in which he spends his time and money. He may choose between a bank account and a piano; or make a considerable sacrifice to secure an education for himself or some member of his family; but this sacrifice is at his own option and differs from that often forced upon him by untoward conditions under which he must work.

The average true worker does not want his employer's wealth. He knows he is a producer. The suggestion is unworthy of sober thought, that the true workman envies the possessions of another and desires that the owner of an industry should be dispossessed and his wealth distributed. The honest toiler is naturally independent and prides himself on his ability to do for himself and his own. He despises the dishonest workman who depends on the efficiency of another to cover his own lack. He has no use for the parasite in society or industry.

GEORGE N. LANTZ.

New Straitsville, Ohio.

Safety or Refuge Chambers in Mines

While there has been an occasional mention of the adoption of safety chambers in mines, as providing a means of escape from the effects of the afterdamp of mine explosions, one can but feel that insufficient attention is being given to this matter, in a practical way.

At the present time, we hear much of the "Safety First" idea. Would it not be well, now, to turn our attention, in some measure, to what might be called the "Safety After" idea? Much study has been given to the cause and prevention of mine explosions. The experiments, at Bruceton, have proven beyond a doubt that coal dust is explosive and that its presence in the mine workings is a menace to safety. There have been many suggestions to render the mine immune from explosions; but, after all has been done, explosions still continue.

It is true that much time and money are spent in the development of mine-rescue work, and the training of rescue corps, which we are forced to believe has been satisfactory only in a limited sense. In some cases, the heroic efforts of would-be rescuers, equipped with rescue apparatus, have resulted in sudden death to themselves. This is no reflection on those who have thus braved death to rescue others; but is, rather, a testimony of their courage and devotion to duty as they understand it. We must agree that, to attempt to save men suddenly enveloped in a death-dealing atmosphere, in darkness, among falling roof and timbers and surrounded by everything that conspires to kill, is a dangerous if not a well-nigh impossible task.

Is it not true that we have been studying this matter of rescue from its most dangerous side? The question may be asked: Do not these devoted rescuers brave a greater danger, in many cases, than that faced by those whom they would rescue? In every mine explosion, those who escape death are the ones who are fortunate enough not to have been caught in the path of the explosive blast, and who continue to breath mine air as yet not contaminated with the poisonous gases of the explosion. They have felt the concussion of the explosion that took place in another portion of the mine and they know too well its meaning. They realize the danger that confronts them, and their minds run riot, as to what to do or where to go. No time is to be lost; overtaken by the deadly afterdamp, their fate is sealed. Under these conditions, with no alternative, they rush toward daylight and safety, forgetful of or willing to hazard, as their only means of escape, the deadly atmosphere of the main roads leading out of the mine.

No argument is required to show what a boon to these men, would have been one or more properly equipped safety chambers, located at convenient points in the mine, to which they could have retired, instead of being forced to accept the only alternative of escape by passing through airways laden with deadly gases. Had such refuge places been provided, the survivors of the disaster in the mine, instead of being powerless and defenseless, would have been provided with all that was needed to insure safety.

The plan of such refuge chambers is simple and can but appeal to all practical mining men. A borehole or two would place the chamber in communication with the surface and permit of the ample ventilation of the place by the introduction of fresh outside air, and provide also a way of supplying food and other necessities. The chamber should be well secured against roof falls or the invasion of the deadly afterdamp of the mine. There should also be provided suitable first-aid equipment and restoratives. Would not the Federal Bureau of Mines do well to elaborate this scheme?

CHARLTON DIXON.

Pittsburgh, Penn.

The Hookworm Danger in Mining

The interesting and well illustrated article on "Concrete Vaults in Colliery Villages," COAL AGE, Feb. 7, p. 256, by Pennsylvania Mining Engineer, describes a great advance. All owners of coal-mining villages should read the article. It is from defective closets and, more often, from no closets at all that the hookworm spreads rapidly.

This subject has received little attention, while typhoid fever, and "swatting the fly" have received their full share. The hookworm revels in coal dust, particularly if it is damp. To lessen one danger, we increase

that from another source. We sprinkle the mine to prevent dust explosion, and thereby invite the development of the hookworm. The native hookworm has long existed in the Southern states, but after making careful investigation among the miners, in a section of West Virginia, I find many indications of its presence there, also. What is true of West Virginia, in this respect, is probably true of other coal fields in the states. Dr. Anders, a good authority and the author of a very popular textbook on the "Practice of Medicine," without special reference to the prevalence of the worm among miners, states: "The importation of infected Italian, Hungarian and Polish laborers into this country, may be accountable for the propagation of the parasite in the United States.'" At certain mines in West Virginia these classes of labor abound.

This parasite, the hookworm, became such a menace to health and detriment to labor, that it has been fought abroad by governmental commission. It is said by an authority on the subject that its presence renders certain of the most fertile portions of the earth uninhabitable.

West Virginia is famous beyond all states for the number of fatalities in its coal mines; and, strange to say, many of these fatalities are indirectly due to this small worm. The female worm never exceeds 0.25 in. in length. I have practiced medicine in the coal fields of West Virginia for many years and can usually tell from the "facies" and general appearance of a miner when he is infected with hookworm. Often, as I look on the dead face of a miner who has been killed by a fall of slate, because he did not prop his roof in time, I can read there the ravages of the worm. It causes weakness and carelessness. Ths man is sick though he does not lose flesh. He harbors a creature that looks like a miniature canthook. It is located high up in the intestine, which on account of its conformity is too steep for any other creature to hold on. He retains his position there by holding on with two hooks; while he bites with four teeth. He cannot be dislodged by the usual old-fashioned methods as easily as with a new remedy. He probably does more harm by poisoning the blood than by extracting anything from it.

To better this condition among miners, it is more important to have sanitary closets *inside* than outside the mine, and to enforce the most rigid discipline that such closets be used. There would seem to be no danger from the urine. The positive diagnosis of the disease is made from a microscopic discovery of the eggs. The adult worm is seldom passed except as the result of medicinal measures.

THOMAS R. EVANS, M. D.

Thurmond, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

3. (a) Calculate the value of the pressure potential for the entire mine mentioned in the preceding question, the airways being 6x10 ft. in section and about 16,000 ft. long, including the return, assuming as before two equal splits; and (b) calculate from this pressure potential the power that will produce the desired circulation of air; namely 75,000 cu.ft. per min. and the resulting water gage.

Solution—(a) The total rubbing surface is $s = 2\ (6 + 10)\ 16{,}000 = 512{,}000$ sq.ft. For two equal splits, the area of passage in this mine is $a = 2\ (6 \times 10) = 120$ sq.ft. The mine pressure potential is then

$$X_p = a\sqrt{\frac{a}{k\,s}} = 120\sqrt{\frac{120}{0.00000002 \times 512{,}000}} = \textit{say}\ 13{,}000$$

(b) The power on the air, calculated from the pressure potential, is then,

$$u = \frac{q^3}{X^2_p} = \frac{75{,}000^3}{13{,}000^2} = \textit{say}\ 2{,}500{,}000\ \textit{ft.-lb. per min.}$$

The water gage, calculated in the same manner, is

$$w.g. = \frac{1}{5.2}\left(\frac{q}{X_p}\right)^2 = \frac{1}{5.2}\left(\frac{75{,}000}{13{,}000}\right)^2 = 6.41\ \textit{in.}$$

4. What volume of air will 10 hp. circulate in an airway 6x8 ft., in section, and 2500 ft. long?

Solution—The sectional area of this airway is $a = 6 \times 8 = 48$ sq.ft.; the rubbing surface $2\ (6 + 8)\ 2500 = 70{,}000$ sq.ft. The power potential is therefore

$$X_u = \frac{a}{\sqrt[3]{k\,s}} = \frac{48}{\sqrt[3]{0.00000002 \times 70{,}000}} = 429.1,\ \textit{nearly}$$

For 10 hp. on the air, the quantity of air in circulation in this airway is

$$q = X_u \sqrt[3]{u} = 429.1\ \sqrt[3]{10 \times 33{,}000} = \textit{say}\ 30{,}000\ \textit{cu.ft. per min.}$$

5. (a) What quantity of air will be circulated, in the airway, in the last example, under a 3-in. water gage; and what power on the air will be necessary to develop this quantity and gage? (b) What was the original water gage when 10 hp. circulated 30,000 cu.ft. of air, in this mine?

Solution—(a) Since the square of the pressure potential is equal to the cube of the power potential

$$X_p = \sqrt{X^3_u} = \sqrt{429.1^3} = 8890,\ \textit{nearly}$$

Then, $q = X_p \sqrt{p} = 8890 \sqrt{5.2 \times 3} = \textit{say}\ 35{,}000\ \textit{cu.ft. per min.}$

The power required to produce a 3-in. water gage is

$$H = \frac{35{,}000 \times 3 \times 5.2}{33{,}000} = \textit{say}\ 17\ \textit{hp.}$$

(b) The previous water gage due to the circulation of 30,000 cu.ft., in this mine, under 10 hp. can be calculated in several ways; but most simply, thus,

$$w.g. = \frac{10 \times 33{,}000}{5.2 \times 30{,}000} = 2.1\ \textit{in.}$$

The Coal Age Pocket Book

The calculation may also be made from the potential; thus,

$$w.g. = \frac{q^2}{5.2 X^3_u} = \frac{30{,}000^2}{5.2 \times 429.1^3} = 2.1\ \textit{in.}$$

Area of Passage—It is important to notice that the potential value for any mine is determined by its area of passage with respect to the resisting power of its rubbing surface. For a single air current the area of passage is the sectional area (a) of the airway. For 2, 3, etc., equal splits the area of passage is 2a, 3a, etc.; for n equal splits the area of passage, for the mine, is na.

The unit of resistance being k, the resisting power of the entire airway or mine is indicated by ks; and the potential values of the mine with respect to power and pressure of circulation, respectively, are thus expressed

Mine power potential, $X_u = \sqrt[3]{\frac{(n\,a)^3}{k\,s}} = \sqrt[3]{n^3}\sqrt[3]{\frac{a}{k\,s}}$

Mine pressure potential, $X_p = \sqrt{\frac{(n\,a)^3}{k\,s}} = n\,a\sqrt{\frac{n\,a}{k\,s}}$

It should be observed that the mine power potential varies as the number of equal splits or currents, which is not true of the pressure potential of a mine. This fact has an important application, since, for the same mine, the rubbing surface being constant, the number of splits (n) is equal to the power-potential ratio. An example will serve to make this clear.

Example—Suppose it is desired to ascertain quickly how many equal splits would pass the same quantity of air (75,000 cu.ft. per min.), in Example 3, on the preceding page, under a 2-in. water gage, where two splits of air gave a water gage of 6.41 in.

Solution—The area of passage for two splits in this mine is $na = 2 \times 60 = 120$; and the rubbing surface being $s = 512{,}000$ sq.ft., the mine power potential is

$$X_u = \frac{n\,a}{\sqrt[3]{k\,s}} = \frac{120}{\sqrt[3]{0.00000002 \times 512{,}000}} = 552.6\quad (2\ \textit{splits})$$

The power potential for a circulation of 75,000 cu.ft. of air under a 2-in. water gage is

$$X_u = \sqrt[3]{\frac{q^2}{5.2\ w.g.}} = \sqrt[3]{\frac{75{,}000^2}{5.2 \times 2}} = 814.8\quad (n\ \textit{splits})$$

Since the number of equal splits varies as the power potential, the split ratio is equal to the power-potential ratio, which is n : 2. Hence,

$$\frac{n}{2} = \frac{814.8}{552.6} = 1.47$$

$$n = 2 \times 1.47 = \textit{say}\ 3\ \textit{splits}$$

The reference, thus far, has been to the equal division of the air current, and the rules and formulas given above apply strictly, only to mines in which the air current is divided at or near the main entrance and passes through the mine in two or more separate and equal splits.

Inquiries of General Interest

Mensuration--The Circle

Can you give a formula, without the use of trigonometry, for finding the sectional area of a circular segment or the area of that portion of cross-section lying beneath the flat arch of a tunnel and above the springing line? The clear span of the arch is 12 ft., and the rise at the center, 3 ft. The arch is an arc of a circle.

California, Penn. READER.

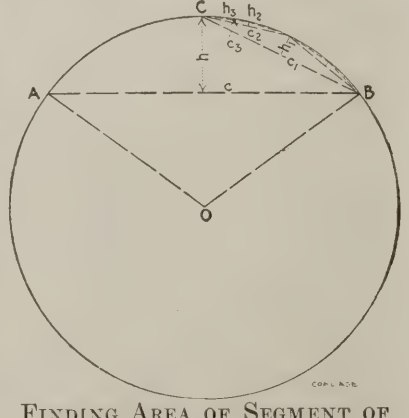
The simplest method of calculating the segment of a circle is to divide the half-chord of the arc by its radius, which gives the natural sine of the angle corresponding to half the arc. If the chord (c) of the arc and the rise (h) *only* are given, the radius (r) can be found by dividing the sum of the squares of the half-chord and the rise, by twice the rise of the arc or height of the segment, as expressed by the formula

$$r = \frac{(c/2)^2 + h^2}{2h}$$

Having found the radius of the circle, calculate the entire area (πr^2) of the circle, and multiply this total area by the ratio of the angle subtending the half-arc to 180 deg., which will give the area of the sector included between the arc and the two radii drawn to its extremities. To obtain the area of the segment subtending the arc, subtract from the area of the sector just found, the area of the triangle formed by the chord and the two radii mentioned. The area of this triangle is equal to the half-chord ($c/2$) multiplied by the radius of the circle less the rise of the arc ($r - h$). This is the usual and simplest method of calculating the area of a segment of a circle.

In order to avoid the use of trigonometry, in this calculation, it is necessary to adopt the same method of approximation that is used in finding the value of π for calculating the area of a circle. This method is as follows:

Referring to the accompanying figure, the first step is to calculate the area of the sector $OACB$; and from this subtract the area of the triangle OAB, as before. The area of the sector is equal to the length of the arc ACB multiplied by one-half of the radius OB. The length of the arc ACB not being given, may be calculated, approximately, as just stated, by finding the length of one of a number of small equal subchords, whose sum will approach very closely to the actual length of the arc.



FINDING AREA OF SEGMENT OF CIRCLE

Calling the original chord and rise of the arc c and h, respectively, and designating each subchord and corresponding rise, for each successive equal division of the arc, by c_1h_1; c_2h_2; c_3h_3, etc., it is evident that an expression of the total length of the arc ACB can be found by taking the sum of, say n equal subchords. Each successive subchord being calculated from the preceding one, the nth subchord will finally be given in terms of the original height or rise and the radius of the arc.

Without showing the development of this method, it will be sufficient to give the two basal formulas employed for finding the length of a subchord from the chord and rise of twice the arc subtended by that subchord. Since any chord of a circle is a mean proportional between the diameter and the rise of twice the arc subtended by that chord, the length of a subchord c_1 (see Fig.) is given by the formula

$$c_1 = \sqrt{2rh} \qquad (1)$$

This formula makes it possible to calculate the length of a chord of half an arc when the rise and the radius of the arc are known.

Again, since the half-chord ($c/2$) of an arc is a mean proportional between the rise (h) of the arc and the diameter of the circle less the rise of the arc ($2r - h$), the rise of any arc is equal to the radius minus the square root of the sum of the squares of the radius and half the chord subtending the arc, as expressed by the following formula (see Fig.):

$$h = r - \sqrt{r^2 - (c/2)^2} \qquad (2)$$

Now, applying formula (2) to find the rise (h_1) of the arc CB, corresponding to the first subchord (c_1), by substituting the value of this subchord, as given by the formula 1, in formula 2 and simplifying, the following simple formula is obtained, which gives the rise of the first half-arc, in terms of the rise and radius of the original arc; thus,

$$h_1 = r\,(1 - \sqrt{1 - h/2r}) \qquad (3)$$

This process can be extended and applied for finding the rise corresponding to an indefinite number of equal subdivisions of arc. If there are n subdivisions, the length of subchord (cn), which is approximately the length of the corresponding arc, is found by substituting the calculated rise (hn) in the formula

$$cn = 2\sqrt{hn\,(2r - hn)} \qquad (4)$$

Finally, multiply the length of this subdivision of arc by the number of subdivisions (n) to obtain the length of the original arc ACB; and, again, multiply the calculated length of arc ACB by one-half the radius r, to obtain the area of the sector $OACB$; and from this area of the sector, subtract the area of the triangle OAB to obtain the area of the segment ACB. These areas are given by the following formulas:

$$\text{area of sector} = nr\sqrt{hn\,(2r - hn)} \qquad (5)$$

$$\text{area of segment} = r\,[n\sqrt{hn\,(2r - hn)} - c/2] \qquad (6)$$

Examination Questions

Miscellaneous Questions

(*Answered by Request*)

Ques.—If, on entering the mine as a fireboss, you found one of the splits completely shut off from the intake air, by a heavy fall of roof, what would be your duty in this case?

Ans.—The bituminous-mine law requires the fireboss to "place a danger signal across the entrance to every working place and every other place where explosive gas is discovered or where immediate danger is found to exist from any other cause." (Art. 5, Sec. 1.) He is also required (Sec. 2), immediately after completing his examination of the mine, to make and sign a pen-and-ink record of the same, in a book kept at the office for that purpose. The law states: "This record shall show the time taken in making the examination, and, also, clearly state the nature and location of any danger that may have been discovered in any room or entry, or other place in the mine." The fireboss must also "immediately report the location thereof to the mine foreman," whose duty it should be to see that the danger is removed as quickly as possible; and, till this is done, and the section examined and reported safe, no one must be permitted to enter that section of the mine.

Ques.—In making the examination of a mine for firedamp, could it happen that a fire would be found burning in one of the rooms turned off one of the headings; and what would be your duty in such a case?

Ans.—It frequently happens that the fireboss, in making his morning examination, finds that a fire has started at or near the working face. In most cases, this is due to the ignition of a gas feeder, by the flame of a shot; and, no one being present to extinguish the feeder, the coal became ignited and the fire gained considerable headway before it was discovered by the fireboss on his morning round.

The fireboss should at once give the alarm, so that steps can be taken to extinguish the fire, assuming that he is not able to do this himself. In some cases it may be possible to short-circuit the air so as to prevent the smoke and gases from the fire penetrating further into the mine workings. This should be done at once if it will not render other portions of the mine dangerous. It may, also, be practicable and necessary to reduce the circulation of air passing over the fire. In any case, no time must be lost in giving the alarm and securing efficient help.

Ques.—What should be the height of the motive column formed when the depths of the downcast and upcast shafts are each 300 ft., the temperature of the downcast shaft being 32 deg. F., and that of the upcast, 48 deg. F.?

Ans.—The height of the motive or air column, in terms of the *downcast* air, is calculated as follows:

$$hd = \frac{(48 - 32)\ 300}{460 + 48} = \frac{4800}{508} = 9.45\ ft.$$

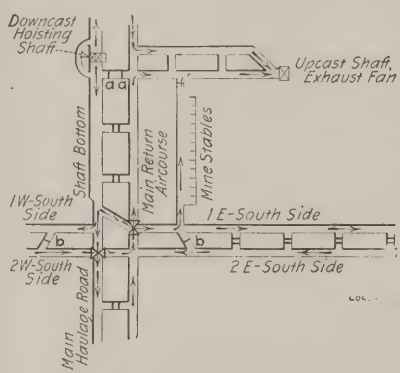
In like manner, the height of motive column may be calculated in terms of the *upcast* air, as follows:

$$hu = \frac{(48 - 32)\ 300}{460 + 32} = \frac{4800}{492} = 9.76\ ft.$$

Ques.—How should a stable in a mine be constructed and ventilated.

Ans.—A mine stable should be constructed in as nearly a fireproof manner as possible. It should be sufficiently high to permit of good ventilation, without producing a high velocity of the air current. The roof must be well secured against falls. It should have a good cement floor, be well drained, and ample provision should be made for the storage of the daily feed and refuse.

As shown in the accompanying figure, a mine stable should be located in close proximity to the bottom of the shaft, for the more economical handling of supplies and refuse, and the rescue of the mules, in case of emergency. The stable should be so arranged with respect to the intake and return airways, that it can be ventilated by a small scale of air taken from the intake current, which is returned at once to the main return airway and conducted out of the mine without passing through any other section of the mine. As shown in the figure the circulation of air through the stables should be controlled by double doors at the return end.



SHOWING ARRANGEMENT OF MINE STABLE

Ques.—How is air put in motion for the ventilation of a mine?

Ans.—Air, like other fluids, moves from a point of higher pressure to a point of lower pressure. There is always required, therefore, a certain excess of pressure in the intake airway over that in the return. This excess of pressure is created by means of a blowing fan at the intake opening, or an exhaust fan or furnace at the return opening or upcast shaft. The difference of pressure between the intake and return airways is called the unit of ventilating pressure.

Ques.—How many systems of ventilation are there in mining?

Ans.—There are two general systems of ventilation, known as the "blowing system," in which the air is forced or blown through the mine, under a pressure greater than that of the atmosphere; and the "exhaust system" in which the action of the mine ventilator causes a vacuous condition in the return airway, and the atmospheric pressure at the intake opening forces air into and through the mine. The mine is then said to be ventilated under a pressure less than that of the atmosphere.

Coal and Coke News

Washington, D. C.

President Wilson has signed the Alaska railroad bill, which is designed to give him the power to construct a railroad in Alaska, located at his own discretion, in such a way as to furnish means for opening up the coal fields and other natural resources of the territory. The bill as already well known provides an appropriation of $35,000,000 to be obtained as needed through the issue of bonds, but $1,000,000 of which is made available in advance by means of direct appropriation from the Treasury. The understanding is that there will be no delay in starting the work and Secretary Lane, of the Interior Department, has already had a long conference with the President about the selection of the men who are to participate in the locating and constructing of the new line.

An interesting phase of this matter, however, is found in the fact that it is one element in a large program of Alaskan exploitation, which is primarily intended for the opening up of the coal fields and has in view the substitution of government enterprise for private control and operation of the mining possibilities of the territory. It is now intended to push as a completion of the scheme, the bill providing for the so called "Alaska Development Board," which is to consist of three persons appointed by the President to "have jurisdiction and control over the care, use and disposition of all reserved and unreserved public lands, including forests and waters and resources—mines, minerals and mining." While it may not be that there will be any effort at direct government operation of the mines of Alaska, even if the whole program that the Administration has in mind goes through, several such schemes are already on foot and may have more or less importance.

Representative Bryan has introduced a bill intended to provide for the immediate and rapid development of Alaskan resources at a greater speed than seems likely to be possible under the very broad general policy of development that has been mapped out by the Administration in connection with its Alaskan railroad plan. His scheme is to organize a service to be known as the "Alaska Mining Service," for the purpose of getting out coal. The "Alaska Mining Service" would be "charged with the duty of operating coal mines on lands reserved to the Government and the distributing stations and of selling coal," in a manner to be prescribed. The bill then goes on to indicate methods of leasing at the discretion of the President and to prescribe the methods of employing men in the event that the President deems it preferable to do the mining himself. In the event of leases, the land thus leased is not to exceed 3,200 acres, and no person interested in common carriers is to be allowed to own or have any interest as a stockholder or otherwise in any lease. The charge for the lease is to be at the following rate: "25c. per acre of the leased premises for the first year; 50c. for the second year; $1 for the third year," and thereafter the same charge per annum throughout the continuance of the lease. A certain percentage of the proceeds of the enterprise are to be set aside and kept for the purpose of improving, extending and developing the transportation and other facilities for coal mining in the territory of Alaska.

HARRISBURG, PENN.

It is reported here that American coal is blamed for the total failure of the new coke-oven plant at South Bethlehem. Practically every one of the 300 ovens will soon be useless.

In Germany the ovens would have worked to a nicety, but the American coal generated so much greater heat that the insides of the coke ovens have been unable to withstand it. The entire battery of 300 ovens erected at a cost of between $6,000,000 and $8,000,000 are an almost total loss and will be torn down.

The Didler-March Co., a German concern, was the constructing company, and the financial banker was the Deutsches Bank, of Germany. On the latter, it is said, will fall the heaviest loss.

It is also said that the brick used in the construction of the ovens, especially the inside, was of an inferior kind. When the Germans received the contract to erect the first coke ovens of their kind in America, they started a brick-making plant at Valentine, N. J. Unfortunately, this burned down some time ago and the Germans had to look elsewhere for constructing material.

They were practically swindled, it is alleged, for the quality of brick was decidedly inferior and melted under the intense heat.

Money ran like water in the building of the plant. Wages were high, and policemen who were employed to guard approaches to the plant, were paid 50 per cent. more than the policemen of Bethlehem. The Germans are acknowledged to have the best patents on the methods of coking in the world, and their efforts to guard against the stealing of these patents were costly. A force of high-priced detectives was employed for a time.

When the furnaces were first started it was calculated that 150 carloads of coal a day would be required. This, provided the ovens worked all right. But they didn't. Nevertheless the 150 cars of coal continued to arrive each day, and soon the yards were overflowing, and heavy demurrage charges resulted.

But things have not changed with the formal transfer this week of the plant to the operating company, the Lehigh Coke Co. Another start is to be made. The worthless plant is to be dismantled and new batteries of between 400 and 500 ovens are to be built, and will use about 5000 tons of coal a day.

The original contract called for the erection and operation of the plant by the Germans, C. M. Schwab to furnish all the coal and get all the coke and gas, the Germans to receive the byproducts from which they hoped to make millions of dollars a year.

* * *

One of the most striking articles that has come from the Anthracite Operators' Press Bureau, is the one issued about Mar. 12. It cites the reason of one of the best known mining officials in the anthracite region for granting the check-off to the United Mine Workers.

The article is as follows:

If over a half century "on the job" carries any weight of conviction, a letter recently received by Samuel D. Warriner, president of the Lehigh Coal & Navigation Co., presenting a miner's view of the United Mine Workers' recent request for the check-off in the anthracite region of Pennsylvania should be of interest.

"Having been during a period of over fifty years a member of several miners' organizations, including the U. M. W. of A.," he wrote, "I have always believed in the protection of labor to obtain fair and living compensation in so far as the same can be accomplished between employer and employee in the most peaceable manner."

In stating his views on the question of the check-off—the retaining of union dues and assessments from the employees' wages to turn over to the union—the veteran miner voiced his protest on the ground that it was "unconstitutional and against the liberty and free will of every fair and intelligent wage earner."

His views on the disposition of the assessments, fees and monthly dues after they are collected by the check-off, were even more drastic. He pointed out that they could be used to create additional officials and to increase the salaries of the existing officials. "The whole amount of funds collected," he said, "could be used to further their careers and maintain their official positions irrespective of any protest presented by any local of the union which learned of any imposition by the officials in the shape of discrimination, graft or speculating with the funds."

"Not only these things are true," he continued, "but I have found from experience that political capacities are more or less maintained from union funds to promote any alleged union officials and have read of many who were back-sliders to that which they represented before their promotion.

"Verily, the same it is, and has been, with all boards of committees, commissions and investigations, when the hard and loyal wage earner is made an object to maintain any army of officials."

PENNSYLVANIA

Anthracite

Scranton—Among the graduates of the night school classes of the Scranton Technical High School on Mar. 12, was William C. Jones, aged 66, employed as a miner during the day, who has completed the night school course with an average of 82 per cent. He intends to complete the high school course.

Williamstown—Rescue work in recovering the bodies of John Welker and Harry Lynch, miners, who were killed by an explosion of gas in the old slope of the Williamstown colliery on Mar. 10, was completed on Mar. 12. Tons of rock and coal had fallen on top of the unfortunate men, and the work of recovery was exceedingly difficult and dangerous. The little mining town feels shocked after this accident, coming so soon after two other miners lost their lives by an explosion of gas three weeks ago. This makes five fatal and fifteen nonfatal accidents this year for the community.

Pittsburgh—The Public Service Commission has announced that the date for the argument in the matter of the complaint against the Philadelphia & Reading and Pennsylvania railroads as to the cost of transporting anthracite coal from the mines to Philadelphia, which was fixed for Mar. 30, has been postponed until Apr. 13. The postponement is necessary for the reason that some of the attorneys interested in the case have made prior engagements to appear before the Interstate Commerce Commission on the 30th.

Mar. 25 has been agreed upon as the date for argument of the action in equity brought by the Peoples Coal Co., of Scranton, to test the constitutionality of the anthracite coal tax act of 1913.

Bituminous

Pottsville—Joseph Jones, a timekeeper employed by the Lehigh Coal & Navigation Co., at Coaldale, on Mar. 9, pleaded guilty to four charges of embezzlement and one of larceny and was sentenced to two years in jail. By means of fictitious names placed on the pay-roll, Jones, in eighteen months, defrauded the company of $5400, using the money to speculate.

Pittston—Several graves in St. John's Cemetery have been affected by a cave-in at No. 2 mine of the Pennsylvania Coal Co. The cave-in is 40 ft. in diameter, and, owing to the fact that the ground is still unstable, it is impossible to remove the bodies. Officials of the company admit that the whole cemetery is undermined.

Wilkes-Barre—By a decision of Judge Garman, of the Luzerne County Court, in the famous suit of the Pennsylvania Central Brewing Co., against the Lehigh Valley Coal Co., over the destruction of an artesian well the court refuses a new trial and judgment notwithstanding the verdict to the defendants, thus sustaining the verdict of $8000 given the Brewing Co. for the destruction of the well.

The case was one of the most unusual tried in the lower courts in some years and was based on a conflict of surface and mining rights, the right of the plaintiff to the water under the ground from a well sunk on its property as against the right of the defendant company to mine its coal under the ground regardless of the well.

WEST VIRGINIA

Charleston—A classification of the 23 fatal accidents occurring in the West Virginia field during the month of February shows that four occurred on the outside and nineteen on the inside of the mines. Death came to nine from falls of slate and coal; six from car and motor accidents; two from electrocution; two from explosions; two from falls in the shaft; one from machinery, and one from the kick of a mule. Compared with the record of 38 deaths of the month previous and that of 33 for February, 1913, the Department of Mines has every reason to be encouraged by this report.

OHIO

Columbus—Lake vessels owned by Ohio companies come within the scope of the workmen's compensation act, and if their employees who are hired in Ohio are victims of accidents which happen in waters beyond the jurisdiction of the state, they are entitled to recover from the Ohio State insurance fund. If an employee of an Ohio corporation which pays into the workmen's compensation fund is injured or killed while in the performance of his duty in another state, recovery may be had under the compensation act. Should the employee elect to sue for damages in the outside state the company would be allowed to use the same defense it would have if the action were brought in Ohio.

Urban—John Downey, a well known coal dealer of this section, recently was shot and killed by George Lee, a tenant in one of his houses following a dispute.

Massillon—The tipple and power house of the Massillon-Elm Run Coal Co. near here were saved from destruction by fire recently when a neighbor started the pumps and quenched the flames. The fire started from a miner's lamp.

KENTUCKY

Whitesburg—W. H. Potter, of Mater, Ky., near this place, has leased 400 acres of fine coal land to Louisville and Cincinnati promoters for immediate development. The property lies around the mouth of Boone's Fork, on the edge of the main coal field in that section.

Frankfort—The House Committee on Mines and Mining has reported favorably a bill fixing the salary of the Chief Mine Inspector at $3000 a year and creating two additional assistants.

Lexington—State Mine Inspector C. J. Norwood, Perry V. Cole and T. J. Barr, comprising the State Board of Examiners for applicants for mine-foreman certificates, have issued 23 certificates to those who successfully passed the examinations begun Feb. 23, as follows: First-class, George Coburn, McRoberts; G. H. Darbyshire, Jenkins; John E. Dent, McRoberts; David J. Llewellyn, Jenkins; M. B. Mitchell, Raymond; C. F. Rainey, Warren, and W. R. Rainey, Warren. Second-class, H. S. Adkins, Rigley; J. C. Angel, Bradel; F. L. Long, Lower Greasy; F. F. McCoy, Warren; J. Dunn, Van Lear; Herschel Poge, Beach Creek; W. A. Ross, Warren; John D. Simpson, Excelsior; C. C. Ward, Williamport; George C. Wolfe, Van Lear. Four other applicants received third-class certificates, entitling them to act as foremen only in nongaseous mines employing not more than 25 men.

INDIANA

Evansville—It is understood that M. L. Albers, of 1 Liberty Street, New York, is endeavoring to secure several of the mines which were recently reported as being under option to the Deep Water Coal & Coke Co., with the idea of operating them before the opening of the Panama Canal. Albers is said to represent a New York syndicate.

OREGON

Portland—Word was received here from Seattle, Mar. 10, that title to a coal claim near Glacier, Whatcom County, estimated of great value, has been awarded by the United States Land Office at that place to six joint claimants: Mrs. Mary Wheatmar, Seattle; John P. Stuart, Blaine, Wash.; Harry C. Smith, Clarence C. Keplinger and Joseph M. Frankvitz, Bellingham, Wash., and Douglas H. Hinton, Glacier, Wash. Each owns 160 acres of the land, which is located in the forest reserve, about 140 miles from Seattle. The claims were filed in 1909. In 1911 the government brought action to annul the claims on the ground that the land was chiefly valuable for timber and not for coal. The final hearing came up Mar. 10. State Geologist Henry Landee, president of the state university; F. R. Whitlock, consulting engineer, and Charles Newhill, efficiency engineer, testified that the coal found was pure anthracite.

MISSOURI

Webb City—One miner was killed and one seriously, but not fatally, injured, when the hoist at the Burt-Robinson mine broke on Mar. 12. The men dropped about 200 ft. Charles Tow, 30 years old, was killed, every bone in his body being broken. Lewis Harris, 25 years old, probably will recover.

Princeton—Drillers on the Kesterson farm struck coal at a depth of 470 ft. The vein was about 5 ft. thick, and covered with about 2 ft. of slate. R. H. Brennan has leases on the land, and must bore five holes, according to the terms of his contracts. Railroad connections and other favorable factors have directed the attention of a good many operators to the Princeton field.

KANSAS

Frontenac—A good deal of interest was aroused here recently when a miner found a nail imbedded in a lump of coal mined at a depth of 50 ft. The nail, which was 2½ in. in length, and rusty, gave no indication of how it found its way into the ground at that depth.

OKLAHOMA

Huntington—The Central Coal & Coke Co., of this place, through the influence of Robert Barr, superintendent, has furnished each of its mines with a first-aid outfit, consisting of bandages, splints and other essentials, to be used to relieve the suffering of injured miners as much as possible before bringing them to the surface.

Oklahoma City—Operators of Oklahoma left for Washington recently to confer with government officials regarding the sale of coal lands in the McAlester field on which leases are held. Of the 438,000 acres of segregated Indian land to be sold, 100,000 is held by operators under 30-year leases, of which 18 years is to run. The operators wish to retain the leases and to secure departmental regulations for the protection of the land, regardless of their disposition. Included in the committee was W. E. Beaty, of the Dow Coal Co.; Carl Sholz, Rock Island Coal Co.; and J. H. Hibbon, superintendent of mines of the Missouri, Kansas & Texas Ry.

FOREIGN NEWS

Brussels, Belgium—Seven miners were recently drowned in a mine at Bracquegnies, near here, by the bursting into one of the galleries of a subterranean stream.

Ekaderinoslav, Russia—Twenty-four men were killed in an explosion of gas in a coal mine here on Mar. 8, caused by a miner opening his safety lamp in a gas-filled chamber in order to light a cigarette.

London, England—Heavy orders for German coal were recently placed by one of London's large gas companies. In connection with this, it is interesting to note that Berlin gas companies are also users of English coal, shipments of which are frequently sent up the Rhine as far as Mannheim, passing on their way within a short distance of the Essen coal region, probably the most important coal district on the continent.

CONSTRUCTION NEWS

Adamson, Okla.—The Dow Coal Co. is sinking a slope mine here, and expect to sink another shortly, and also to install a shaft at Savanna.

Newark, Ohio—The Dixie Coal Co. has purchased a tract of land along the B. & O. R.R. tracks and will start at once to erect large coal pockets for retail purposes.

Coal Hill, Ark.—Rafter Coal Co. will develop 153 acres of coal property acquired here, with a daily output of 150 tons. This company was recently incorporated as the Peoples Coal Company.

Nashville, Tenn.—The St. Bernard Coal Co., of Earlington, Ky., which recently acquired the plant and business of the Pinner Coal Co., is planning the erection of two additional screening plants in Nashville.

Columbus, Ohio—The New Pittsburg Coal Co., of Columbus, has received word that the Pittsburg Coal Co. will soon start the erection of docks at Allouez, Wis., which will cost $500,000 and require two years to complete.

Wasioto, Ky.—The Asher Coal Mining Co., recently organized with $60,000 capital, are beginning work on a first-class mining plant, near Wasioto, on the Cumberland Valley Division of the Louisville & Nashville. T. J. Asher is managing the new operation.

Harlan, Ky.—The Cumberland-Campbell Coal Co., recently organized at Welch, W. Va., by James B. Flannigan, Welch; Ely L. Glade, Chicago; J. M. Clay, Louisa; and J. W. Waldron and T. J. Flannigan, Welch, will start a million-dollar operation on Martin's Fork, near here, where they will build two good-sized industrial cities. Work to start within two weeks.

Pound, Va.—The Indian Creek & Pound River R.R., an extensive lumber carrier, makes the announcement that the road will be extended from Pound down Pound River to a connection with the Carolina, Clinchfield & Ohio R.R., now being completed through "The Breaks." The extension will be about ten miles long and will pass through a rich coal and timber section.

Bethlehem, Penn.—The Lehigh Coke Co. will shortly begin construction of a $4,000,000 plant for the manufacture of coke and coal byproducts to supply the blast furnaces and foundaries of the Bethlehem Steel Corporation. When completed the plant will be the second largest of its kind in the world, consisting of 424 ovens with a capacity for carbonizing daily 5000 tons of bituminous coal.

Fleming, Ky.—The Mineral Fuel Co. are getting well under way in the construction of their third industrial mining city on Yount's Fork four miles from Fleming, several hundred hands being at work. Already mining operations have been begun at two of the company's mines in Fleming. Two more mines will be in readiness immediately. The coal tonnage will be largely increased by April 1.

Gate City, Va.—The Clinch Mountain & Southern R.R. Co., with headquarters at Abingdon, Va., announces the building of a coal and lumber road from Gate City to Abingdon, 20 miles, construction of which is to start by April 1. The road will tap a large part of the rich timber holdings of the Clinchfield Coal Corporation where developments will soon start in the coal and timber properties. Construction will be rushed.

Hazard, Ky.—The Haley Coal Co. will begin operations immediately upon a mammoth coal mining plant on Lost Creek, seven miles from the main line of the Lexington & Eastern R.R. in Perry county, and have arranged with the L. & E. to build a spur line to the new development, construction of which is to start at once. This, according to information, will be one of the biggest coal operations in Perry county.

Newark, Ohio—The announcement is made by the officials of the Pan-American Coal Co., of this city, that extensive repairs and improvements will be made at the mines of the company located in several different mining districts of the state. It is proposed to install the Marcus picking tables, similar to those in use at the mines of the Pocahontas Coal Co., at Coalwood, W. Va. The nine mines of the Pan-American Co. have a capacity of 1600 tons daily.

Philadelphia, Penn.—The Lehigh Coal & Navigation Co., of this city, will add to the equipment of its mines at Lansford, Penn., six 15-ton and nine 8-ton electric mining locomotives manufactured by the General Electric Company. New electrical equipment for the No. 5 shaft at this colliery includes a 150-hp. induction motor, three 500-kv.a. transformers, control equipments, switchboards and accessories, which will also be installed by the General Electric Co.

St. Louis, Mo.—At the instance of the Laclede Gas Light Co., a bill recently was introduced in the St. Louis council, providing for the condemnation of nine streets on which the company wishes to establish a coke-manufacturing plant at an estimated cost of $1,500,000. The streets involved lie south of Broadway and south of Catlan St. in South St. Louis, adjoining the River Des Peres. No payment in consideration of the vacation of the property is provided in the bill.

INDUSTRIAL NEWS

Vinita, Okla.—C. C. Jenkins recently opened a stripping mine of 4 ft. of coal at his farm, two miles northwest of here. Prospecting is being done in that section by others interested in the situation.

Virginia City, Va.—The Virginia City Colliery Co.'s plant here, recently purchased by C. W. Lambert and William T. Williams, is being revived and extended with all latest improvements in modern machinery. They will begin shipping coal by Apr. 1.

Viper, Ky.—G. H. and Kemper Brashear have purchased the old Brasher coal-land tract, on Mace's Creek, near here, and will put in a $50,000 coal development, beginning work Apr. 1. A 1-mile spur line of the Lexington & Eastern R.R. will be built to the property.

Birmingham, Ala.—Protest against increased rates on coal from the Birmingham district to Memphis, Tenn., by the Frisco lines has been filed with the Interstate Commerce Commission by the Empire Coal Co. of Birmingham. It is claimed that these rates are higher by 10 cents per ton than for the same distance from Kentucky and Illinois.

Fleming, Ky.—The Mineral Fuel Co. here will open and begin active mining operation in five new mines at Fleming, Haymond and Yount's Fork by Apr. 1, and the output will be about doubled from the company's mines. Increases will also be made from time to time during the spring and summer months. Contracts were closed a few days ago for the entire output of the company's plants.

Pittsburg, Kan.—The Cherokée & Pittsburg Coal & Mining Co. has been made the defendant in a damage suit for $500. The plaintiff is Matthew Knowll, a farmer residing near Pittsburg. Mr. Knowll alleges that failure of the mine owners to have the mine entries under the farm propped, has caused his farm to sag and give way in certain places. He asserted further that the farm is now unfit for raising crops.

Cherryvale, Kan.—Smelting companies of Kansas, many of which were practically put out of business by inability to get gas or oil for fuel during the past winter, are, in several instances, trying crushed coal successfully for this purpose. The Edgar Zinc Co., of Cherryvale, has spent $100,000 in installing coal-burning kilns, and has resumed capacity operations, under the personal supervision of President S. C. Edgar, Jr., of St. Louis.

Pittsburgh, Penn.—A deal was consummated on Mar. 13, for a consideration of $6,000,000, whereby H. C. Frick bought 10,000 acres of coal lands in Perry Township, Greene County, Penn., from J. V. Thompson, of Uniontown. The deal was closed after Mr. Frick had completed the arrangements for the sale of his property on Sixth Ave. and Cherry Way to the Fort Pitt Hotel Co. A splendid hotel of 900 rooms will be built by the Fort Pitt people on the site purchased.

Columbus, Ohio—A new operating and jobbing concern which has opened offices in Columbus is Hatton, Brown & Co., which has main offices at Roanoke, Va. The Western branch is in charge of F. G. Hatton, president of the company, who will divide his time between the Columbus and Roanoke offices. It is the first effort of the company to enter the Western field. The company has mines in the Clinch Valley, Va., and controls the output of mines in the Pocahontas field in West Virginia and in eastern Kentucky. Another product is Wise County coke.

Whitesburg, Ky.—Contracts closed with the Northwestern Fuel Co., of Minneapolis, Minn., following a recent visit to the mines of the Consolidation Coal Co. by a number of officers of that company, calling for immediate delivery of large quantities of coal, have resulted in renewed activity at the mines, which is hampered only by a lack of labor. Manager E. Drennen stated recently that there is a marked scarcity of efficient labor, which is the more regretted on account of the fact that the company proposes to open a number of new mines during this spring and summer. All plants now open will run full time for the remainder of the year, it is announced.

New Orleans, La.—In order to facilitate the handling of coal in cargo lots for export, the dock commissioners have under consideration a plan for setting aside a well equipped wharf for the handling of coal. This will be a part of the general movement to increase the exports through this port. With the river furnishing cheap transportation to the greatest coal fields of the country, the dock board is of the impression that the providing of proper facilities at this port will result in a large cargo movement, especially after the canal is opened. It is pointed out that during nearly half the year weather conditions at Hampton Roads interfere with the handling of coal, while here there would be no such interruption.

PERSONALS

Patrick Quinn, superintendent of the Sunshine mines at South Fork, Penn., is to be chosen head of the Sterling Coal Co.'s operations at Bakerton to succeed the late John B. Reed.

Benjamin Reene, recently rounded out his 55th year of service in the mines. Starting at the age of 11 as a slate picker, he worked his way up to a mine foremanship, and is at present with the Cranberry Colliery of A. Pardee & Co. in that capacity.

B. R. Smith has been appointed joint sales agent for the Corona Coal & Coke Co., the Birmingham Fuel & Iron Co. and the Roden Coal Co., succeeding the late John R. Ryan, general sales agent for the two former companies, who died about two weeks ago.

H. A. Rapelye was recently appointed Sales Engineer in the Pittsburgh District for the Terry Steam Turbine Co., of Hartford, Conn. His offices are in the Oliver Bldg., Pittsburgh, Penn. Mr. Rapelye has had a broad experience with turbine apparatus, and has been for the past two years the commercial engineer of a company prominent in the field of prime movers and auxiliaries.

H. J. Meehan, who was recently appointed general manager of mines for the Cambria Steel Co., began his duties on Mar. 14. Mr. Meehan was formerly Superintendent for the Lackawanna Coal & Coke Co., at Wehrum, Penn. During the four or five years that he was with the Lackawanna Co., he increased its output from 400 tons to 2500 tons daily. Mr. Meehan's headquarters are at Johnstown, Penn.

J. L. Forepaugh has been appointed lake freighting agent of the North-Western Fuel Co. with offices in Cleveland. He succeeds A. E. Williams, who resigned last month. Mr. Forepaugh was formerly a division superintendent for the Great Northern R.R., and of late has been a traffic manager for the North-Western Fuel Co. in St. Paul, Minn., where the company has its principal office. The appointment of Mr. Forepaugh was effective March 1.

OBITUARY

James Anderson, vice-president and general manager of the Pacific Coast Coal Co., and engineer of the Pacific Coast Coal Co., died on Mar. 13, at his home in Seattle. Mr. Anderson was 58 years of age, and was considered an authority on coal mining in the Pacific Northwest.

William R. Borders, president of the Bank of Sparta, of Sparta, Ill., and president and general manager of the Boyd Coal & Coke Co., of Sparta, was one of the victims of the Missouri Athletic Club fire in St. Louis, in the early morning hours of Feb. 9, in which 29 or 30 other persons lost their lives. Mr. Borders was 55 years old and a bachelor, and had interests scattered all over the country. At the time he was on his way to Texas, having stopped over in St. Louis for the night. The remains were taken from the ruins on the 13th and the burial held at Sparta.

Fred Rainecke, secretary, treasurer and general manager of the Reinecke Coal Co., of Madisonville, Ky., died at St. John's Hospital in St. Louis, Monday morning, Mar. 9, where he had been confined for some time. Mr. Reinecke belonged to a family of pioneer coal operators in the Illinois field adjacent to East St. Louis, and located there many years ago with his father and brothers. Some few years ago they sold their Illinois interest and removed to the West Kentucky field, where their mining interests are among the most prosperous and uptodate in the entire field.

NEW INCORPORATIONS

Burnwell, Ala.—The Burnwell Coal Mining Co., with operations in Walker County, has increased its capital stock from $50,000 to $100,000.

Logan, W. Va.—The Iroquois Collieries Co. has been incorporated here by Edward H. Jewett, Leonard C. Davies, Richard B. Chase, Ray Cook, and Walter C. McMahon. The authorized capitalization is $3000.

Hazard, Ky.—The Well's & Day Coal Co. has been organized here by P. G. Wells, J. H. Wells and R. F. S. Day, with capital of $50,000, for the purpose of developing the rich Perry County field, around Hazard. This field is attracting considerable attention.

Fort Worth, Tex.—The Strawn Coal Co. has filed articles of incorporation, the capitalization being placed at $500,000. The incorporators and directors, each of whom subscribed to $100,000 of stock, are Paul Waples, L. H. McKee, W. Burton, J. L. Johnson and A. Deffenbach. The company will mine and market coal in Tarrant, Palo Pinto and other Texas counties, with headquarters at Fort Worth.

Whitesburg, Ky.—The Letcher County Coal & Development Co. has been organized here by James P. Lewis, Martin D. Lewis, James H. Frazier, Whitesburg, and George Hogg, Roxana, Ky., with a capital stock of $100,000, fully paid in. The company owns large areas of fine coal and timber properties in eastern Kentucky and proposes to spend thousands of dollars in the development during the spring and summer months. James P. Lewis is president, and James H. Frazier, secretary and treasurer.

CATALOGS RECEIVED

National Tube Co., Pittsburgh Penn. "The Proof is in There." Eight-page folder, 5x12 in., illustrating and describing modern soft-steel pipe vs. wrought-iron pipe.

National Tube Co., Pittsburgh, Penn. "N. T. C. Regrinding Valves." Fourteen pages, 2½x6 in., illustrating and describing the advantages of N. T. C. regrinding valves.

The J. C. Stine Co., Tyrone, Penn. The J. C. Stine Patented Disk Fans. Twenty-four pages, 8x6½ in., illus.

Chicago Pneumatic Tool Co., Chicago, Ill. "Chicago Coal Drills." Twelve pages, 6x9 in., illus.

Coal Trade Reviews

General Review

Cancellations the rule in anthracite and trade marking time pending opening prices. Possibility of a suspension in the soft-coal fields already discounted. Contracts renewed on the same basis as last year, but subject to a change in the wage scale.

In spite of the fact that mining in the hard-coal regions is under heavily curtailed production, the anthracite agencies are being swamped with cancellations of March orders. Consumers and dealers have sufficient of the domestic sizes on hand to carry them over until the spring discount goes into effect, Apr. 1, and the market is flat and devoid of any interest whatever. The trade is at a complete standstill, and simply marking time pending the opening prices. Individual operators are always offering coal at the April circular, but the large companies are contenting themselves with making preparations for the spring and summer business, which promises to be heavy. It is generally agreed on all sides that stocks on hand are at an abnormally low level, and a sharp rush for coal is expected Apr. 1, with a consistently active business thereafter.

The possibility of a suspension at the bituminous mines, lasting from four to six weeks, seems to have been already discounted. General conditions are obviously unfavorable, and only a vigorous curtailment can prevent a price recession; should the price-level break, there is little hopes of it being restored during the dull period the trade is now facing. Some little contracting is being negotiated on the same basis as last year, but subject to any change in the wage scale. The Pittsburgh district reports prices steady, with mine operations at close to full rated capacity, due probably to a general stocking against a possible suspension and also in part to a slightly greater consumption; neither an agreement nor continuation of mining pending a settlement of the wage-scale controversy is anticipated.

While the price-level in Ohio is being well maintained, there is an entire absence of snap, although this should be ordinarily a boom period in trade circles. The domestic business is particularly hard hit, dealers attempting to clean up stock rather than accumulate surplusses. Hampton Roads prices are steady at the full circular, while loading at the piers is somewhat heavier and a further improvement is anticipated next week.

There has been a profitable business in the Southern domestic coals, as a result of the colder weather, but a decided slump is anticipated when the spring opening occurs; the steam trade is already demoralized, and many mines have shut down until conditions improve. As a result of the milder weather in the middle-western market, the domestic demand has dropped off almost entirely, and retailers are showing little disposition to accumulate surplusses against a suspension in mining Apr. 1. This also applies to the steam trade with the single exception of the railroads which are stocking heavily.

EASTERN MARKET

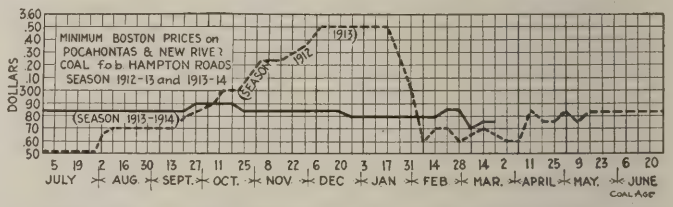
BOSTON

A dull period of 60 days or so still predicted. Less talk of concessions on contracts, while spot coal is practically at a standstill. Some demand for Pennsylvania grades but mostly for all-rail delivery. Water freights easy. Anthracite beginning to be loaded for April billing.

Bituminous—The general opinion of a fortnight ago that there would be little doing on contract business until after May 1 seems to be borne out by the state of trade so far this month. Aside from water freights being guaranteed at a minimum, there is little reason to suppose that any material concessions are being made from the $2.85 price f.o.b. Hampton Roads. If the price level should be reduced through over-anxiety on the part of any of the shippers it would be next to impossible to reëstablish the season basis in a year so dull as this promises to be. Spot coal is practically at a standstill, with no near prospect of improvement. New England buyers feel they can continue their waiting policy and perhaps make better purchases in May or June.

Only a relatively small volume of the Pennsylvania grade is coming forward in anticipation of a suspension in mining. Most of such supplies are coming all-rail; the tide-water market has shown rather less activity in that line. Shippers of the better known coals are sharing a fair amount of March business but the bulk of it is a hand-to-mouth matter.

Water freights are easy at 70@75c, Hampton Roads to Boston. The demand for tonnage is light, even some of the steamers being in the market for recharter. From New York for points on Long Island Sound rates are 45@50 cents.



Anthracite—Large dealers in the cities are running along on light stocks, hoping for early April deliveries. It is understood that the shipping companies have already begun to place barges for April billing. The volume of domestic sizes to be received here next month is expected to be heavy. The ice went out of the Sace River on Mar. 15, but the Penobscot and Kennebec will probably not open until Apr. 5 to 10.

There is some anxiety over the probable shortage in the supply of broken coal, and prices on that size are expected to be firm in all directions.

Current quotations on bituminous at wholesale are as follows:

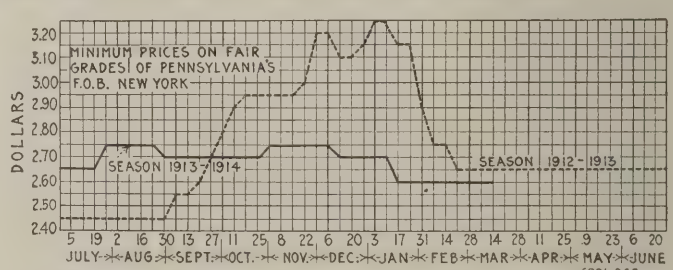
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.90	2.92@3.02	
New York*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.75@2.85
Boston†				3.78@3.83
Providence†				3.73@3.78

*F.o.b. †On cars.

NEW YORK

Bituminous trade fails to respond to the possibility of a suspension in mining. Spot market flat and little doing on new contracts. Nominal market on hard coal down to the April circular, and the trade marking time pending opening prices.

Bituminous—Contrary to what is normally the case, just before a possible suspension in mining, there is absolutely no snap whatever to the bituminous market. With the exception of some buying on the part of the Berwind Co., due probably to the delayed movement as a result of the inclement weather, there is practically no spot market whatever. This is rather remarkable in view of the fact that conservative interests look for a suspension of from four to six weeks, and it is evident that buyers are either skeptical of this or that such a condition has already been discounted.



Business on contracts is also coming in slowly, with prices usually on the same basis as last year, but subject to any increase in the wage scale. A large tonnage of Fairmount coal for lake shipping is reported to have been closed. Demurrage coal is well cleaned up locally, but the loading at South Amboy is still reported slow.

The market is not quotably changed, and we continue on the same basis as last week, as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; George's Creek, $3.15@3.25.

Anthracite—Hard-coal operations are heavily curtailed, while all agencies are being swamped with cancellations. The nominal market on the prepared grades is practically at the full April discount, rumors even being current to the effect that some of the larger companies are making such concessions; this is hardly possible, however, and more likely applies to orders being placed now for April delivery. There is plenty of individual coal, however, available at these figures.

As a rule, the steam grades are somewhat easier and more nearly normal, but the curtailment in mining is still resulting in reduced shipments, and there is an acute shortage in certain departments, notably pea and buckwheat, which are practically out of the market. The anthracite trade is now practically marking time, pending the spring opening, Apr. 1, at which time a heavy rush for coal is anticipated. In view of the reduced mining over the past few months, the feeling prevails generally that the stocks of hard coal are at an abnormally low point and an unusually active spring and summer business is anticipated. We quote the New York hard-coal market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00		$5.05	
Egg	5.25	$4.90@5.35	5.30	$4.75@5.30
Stove	5.25	4.90@5.35	5.30	4.90@5.30
Chestnut	5.50	5.35	5.55	5.25@5.55
Pea	3.50	3.50@3.75	3.50	3.50@3.75
Buckwheat	2.75	2.75@3.00	2.70@3.45	2.70@3.00
Rice	2.25	2.25@2.50	1.95@2.20	2.00@2.40
Barley	1.75	1.75@2.00	1.70	1.60@1.90

PHILADELPHIA

Anthracite business flat. Demand for steam sizes good, but domestic grades quiet. Mining curtailed. Bituminous improving; demand about the same as last week, but at slightly better prices.

Anthracite—The market for anthracite, outside of the steam sizes, has fallen flat. The winter weather of the past month has been followed by almost spring temperatures, and as the householders have laid in sufficient supplies to carry them over until the opening prices, very little can be expected in the movement of the domestic sizes. The demand for steam grades still continues good, and the stocks of these grades have been largely reduced during the past three weeks. Curtailed mining has in part been responsible for the apparent shortage in these sizes, and in some cases, premiums have been asked and received.

The latter half of the month of March has always proved a fertile field for the individual operators who desire to continue work at their mines, and a large quantity of coal will doubtless come to this market, billed at the April figures. The large companies, however, still insist upon March prices, and content themselves with filling up their order books, and preparing for the heavy rush which is bound to take place on Apr. 1. A canvass of the situation finds the dealers in splendid shape to handle coal. Their calculations are doubtless made to have present stocks almost depleted by the opening of April, in marked contrast with last year, when considerable high-priced coal was carried over. The present outlook is favorable for a good, early spring business.

Bituminous—Slight improvement marked the bituminous trade last week. The demand was on about a parity with the week previous, but slightly better prices prevailed. The restricted movement of cars has doubtless caused this, but the end of the week finds traffic in much better shape. Restricted production, however, still obtains at many operations, and the fear of demurrage finds little coal standing at tidewater without shipping orders.

BALTIMORE

Car shortage is being severely felt, much to the surprise of the trade. Spot sales at tide exceed the mine prices. Anthracite demand shading off, but both branches busy on contracts for the new year.

At a time when the car movement is generally the best of the year, a shortage is beginning to develop. During the past week a number of mines in West Virginia and in western Pennsylvania reported inability to get empties as desired or to get their loaded cars on the move to terminal points. Whether the general retrenchment policies of railroads is responsible, or some other cause, the fact remains that the movement on the Pennsylvania, Western Maryland and Baltimore & Ohio is below the high standard formerly set. As a result there have been days when there was a considerable shortage of fuel at the piers here, and some shippers have been forced to purchase coal above the market price. The situation as to prices at the mines remains unchanged and the general market is still flat and uninteresting.

The anthracite men are feeling the effects of the spring shading off in demand, particularly in the household trade. Both ends of the business, however, are now busy on new contracts. A fair number of consumers are already in the field for long-term contracts, and the figures quoted are reported the same as those of last April. This is considered a good omen for a prosperous summer in the trade.

While principally interested with the future, there is enough spot business for the operators to maintain existing prices. West Virginia gas coals are commanding from 75 to 85c. with the steam grades around 90 to 95c. but the better grades are easy at from $1.15 to $1.30.

Heavy foreign loadings continue. A number of charters for foreign account, principally for South and Central America, and the Mediterranean, were announced during the week.

BUFFALO

Fair anthracite trade for the season and supply now decidedly light. Bituminous moving a little more freely. Coke not active. Some uncertainty as to new agreement.

Bituminous—The demand for all grades of bituminous is a trifle more active, with slack more so than sizes, which has been the case for sometime and is likely to continue. Shippers hardly know why this is except that there does not appear to be any made yet in connection with the lake trade. Slack comes into the lake trade indirectly in the preparation of three-quarter, which is the favorite size in that business.

Some of the mines have increased their output considerably to meet a sort of spasmodic demand from customers who are afraid that they will need more coal if the miners go out for any considerable time. Shippers are very cautious in predicting either a strike or a suspension. In view of this uncertainty, sellers and buyers are protecting their interests as best they can. There has been some delay on account of snow in the mining districts. Usually there is some activity on account of preparing for the lake trade, but now it is thought that the upper-lake docks may show large amounts unsold when the lakes open. Quotations are fairly firm at $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.50 for mine-run and $2.25 for slack, with Allegheny Valley about 25c. lower.

Coke—There is no stir in the coke trade. Here and there some shipper will discover an indication of improvement, but it is usually found to be temporary. The Buffalo price is based on $4.50 for best Connellsville foundry. Furnace coke is very dull, but stock is scarcer.

Anthracite—The demand is good, considering that April is so near at hand. The shippers look for a steady dropping off from this time on, but they are not anxious, for the supply is light and has been for some time. The mines have not run at all actively for a month or so past, due in part to the deep snow and there is also no particular reason for activity just now. Dealers in independent anthracite have cleaned up their supplies at circular prices and now look for a season of quiet.

There is no activity yet in Buffalo harbor. One shipper has taken some tonnage, but the ice is still heavy. As a rule, the lake shippers have little or no coal yet and they do not look for any right away.

CENTRAL STATES

PITTSBURGH, PENN.

Operations much improved and prices notably stiffer as result of impending suspension. Neither settlement or continuation of operations expected. Prompt coke continues easy and contracts moderately good.

Bituminous—The hardening in prices noted a week ago has continued, until the market is fairly steady around the $1.30 basis for mine-run. Slack can be picked up at the old price of 90c. in some cases, but sales at $1 and even $1.05 are not uncommon. Domestic 1¼ in. is going at $1.55@1.65. The higher figure is understood to be the minimum of the leading interest, an advance to that price having been made last October. Mine operations have improved and some of the large interests are now running practically full, while the Pittsburgh district as a whole is probably operating at fully 75% of capacity. A small part of the increase in demand is attributed to increased consumption, but the major part is ascribed to stocking up against a possible or probable suspen-

sion of mining Apr. 1. The market is quotable as follows: Slack, 90c.@1.05; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55@1.65 per ton at mine, Pittsburgh district.

The Interstate Joint Conference has been called by President John White of the United Mine Workers to meet in the Hotel La Salle, Chicago, Tuesday, Mar. 17. Coal operators refuse to make any predictions as to the outcome, but as a matter of fact there is little reason for expecting either a settlement or an arrangement to continue mining pending a settlement. The convention at Philadelphia lasted three weeks, or much longer than was expected. The Chicago convention has only two weeks and a day to the expiration of the present scale and it will probably put in all this time, since an adjournment with a disagreement would not look well before all the possible time had been used up.

Connellsville Coke—The market shows somewhat more strength. It has lately developed that several sales of round tonnages for second-quarter were made by the Producers Coke Co., in February, at $2, a price which has been withdrawn at least nominally. It is claimed that this interest is now sold up to an average operation of fully 50% of the plants represented, and will not sell any more coke except at an advance over $2. Other sellers are talking $2.10 and have some negotiations on. Prompt coke is quiet and is easier again, the stringency caused by bad weather being over. The market stands quotable: Prompt furnace, $1.90@2; contract furnace, $2@2.10; prompt foundry, $2.40@2.60; contract foundry, $2.40@2.60, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Mar. 7, at 345,690 tons, an increase of 31,820 tons, and shipments at 383,842 tons, an increase of 42,058 tons. The shipments appear to have exceeded production by 38,152 tons, attributed to the movement of stock coke by the leading furnace interest.

TOLEDO

Market very quiet and demand for steam coal light. Circular prices holding well. Track coal strong among domestic dealers.

Although it was anticipated that purchasing agents for the large factories would by this time have been incited to provide reserve stocks in anticipation of a shutdown, conditions in the market are still unchanged. Reports state that in some instances reserves are being held that were bought several weeks ago when prices had slumped badly. This is, however, not general.

On the other hand, there is still an optimistic outlook regarding the situation. The weather is moderating each successive day and in consequence the immediate demand for domestics has weakened. The cold weather although of short duration, was still sufficient to enable the dealers to unload all of their yard stock. For the past week track coal has been in good demand to fill waiting orders. It must be an immediate sale or none at all and dealers do not seem inclined to await mine shipments.

COLUMBUS

Even with the wage agreement expiring there is no general stocking movement. Trade is quiet, although a considerable tonnage of steam grades is moving. Domestic trade has fallen off.

The coal trade in Ohio apparently has little snap at this time, although many contend that a suspension of from 30 to 60 days can hardly be avoided. Buying to guard against a suspension is not active and the market appears dull during a natural boom period. Prices are not being cut, however, to force trade and the general tone of the market is fair under the circumstances.

One of the worst features is the falling off in domestic demand. With the coming of higher temperatures the domestic producing section of the state is at a standstill. Dealers have been trying to clean up their stocks rather than to accumulate and this move has left them in good shape for the summer months.

The impression prevails that steam users, in case of a cessation of mining in Ohio will be able to get their fuel supply from West Virginia and there is a lack of buying for stocking purposes. Then, again, many of the steam consumers accumulated stocks during the past two months by permitting their usual requisitions to come forward, even when consumption was at a low ebb.

The railroad situation has improved to a certain extent, but the motive power on most of the roads is in bad shape and consequently the movement is not rapid. In the Hocking Valley district the output is estimated at about 75% of the average. In the Pomeroy Bend most of the mines worked full time and a normal production is recorded, but in eastern Ohio the output has been about 65%, and the same is true of the strictly domestic fields.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50 @ 1.40	.....	$1.50 @ 1.45	$1.50 @ 1.40
¾-inch	1.35 @ 1.30	$1.20 @ 1.15	1.35 @ 1.30	1.35 @ 1.30
Nut	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.85 @ 0.80	.....	0.90 @ 0.85	0.80 @ 0.75
Coarse slack	0.75 @ 0.70	1.00 @ 0.95	0.80 @ 0.75	0.70 @ 0.65

CLEVELAND

Market suffering from a surplus of coal and spring-like weather. Retail trade at a low ebb and the wholesale has no outlet. Prices are running below cost in many instances.

All last week coal was a drug on the market. Stocking has been carried about as far as the manufacturers intend to go. The jobbers and operators have more real coal on hand than they can move and concessions are the rule rather than the exception. Monday the situation was worse than last week because of the large receipts. Youghiogheny slack was being offered at $1.95 by a local operator, who had a number of cars on track and he would have sold 5c. under that price to have moved it last Saturday.

As there are few boats available, it is not likely much, if anything, will be loaded until after the navigation season officially opens, Apr. 15, and really not before May 1.The attempt to charter tonnage for the entire season at 25c. to the fast docks on Lake Superior seems to have failed, and it is understood 27½c. is being offered. The fact that the shipper is willing to meet the vessel owners half way means none of the boats can be had at the lower rate and the prospects of a 30c. rate are good.

Reports received from Duluth-Superior state that the coal shipments during the first half of March have been normal. The February business was good because the temperature averaged ten degrees below normal. It is estimated by the fuel agent of one of the largest railroad systems in the Northwest that the docks at Duluth-superior are holding between 3,000,000 and 4,000,000 tons of coal.

Sales on the spot market were made at the following prices last week and Monday:

	No. 8	Middle District	Pocahontas
Lump, 1¼ in.	$2.05*	$2.00*	$3.10@3.15
Lump, ¾ in.	2.00@2.05	1.95	
Egg	.....	....	3.10@3.13
Mine-run	1.90	1.90	2.60@2.75
Nut	2.00@2.05	1.95	
Slack	1.85	1.75	2.25@2.35

*None on track.

DETROIT

Colder weather cleaned up stocks while delayed movement has restricted supplies and there is a somewhat better tone to the market. No general stocking in anticipation of a strike.

Bituminous—There is somewhat of an improvement in the local market, although the price level remains practically unchanged, except on some of the best grades. Slack is commanding a fair price, while the domestic grades are naturally somewhat softer as a result of the milder weather. The extreme cold weather of a few weeks ago did much to clean up the surpluses, and there is a rather slow movement on the railroads, which is keeping the tonnages available at a low point. Embargoes on the Big Four and congestions on other lines are reported.

While consumers as a rule are ostensibly refusing to buy, in anticipation of a shutdown Apr. 1, it is noted that there are some making extensive preparations against such a contingency. Contracts for the new year are being renewed on the same basis as for the last period, but it is reported that little new business has developed. The new circular on Pocahontas and New River is as follows: Lump and egg, April, $1.60; May, $1.70; June, $1.90; July, $2; August, $1.25. Mine-run from April to August is quoted as $1.25, and $1.40 beyond August.

Anthracite—The milder weather has resulted in a reduced demand for hard coal, and it is reported that there is considerable on demurrage.

Coke—The coke trade is quite active. The Semet Solvay Co. is reported considerably behind on orders, and although prices have not improved as yet there is a strong undertone. Connellsville foundry is quoted at $2.40, Semet Solvay at $3.25, and gashouse at $2.90, all f.o.b. ovens.

HAMPTON ROADS

Demand for spot coal improving somewhat and fair shipments being made on contracts. Principal foreign shipments during the week to Naples and Genoa.

Dumpings during the week have not been extra but are somewhat larger and it is believed conditions will greatly improve during the coming week. Barge and steamer loading for the New England market has been fair with some large shipments moving to foreign ports.

Prices on all grades still remain at circular, foreign shipments selling about $2.80 to $2.90 for New River and Pocahontas and the demand for these grades showing up considerably better. There is, however, practically no movement of either high volatile or prepared grades. Export coal for the week has moved to La Plata, Rio de Janeiro, Canal Zone, St. Lucia, Genoa, Naples, Kingston, Para, Ceres and Manos.

A record loading was made by the Norfolk & Western Ry. at their new pier at Lamberts Point on Mar. 9, when they loaded 6000 tons of cargo and bunker coal into the S. S. "Fedora" between the hours of 8 a.m. and 3 p.m. and it is believed that when this pier is working properly that much better work will be accomplished.

LOUISVILLE, KY.

Continued cold weather, with snow, has held business up with the retailers, but the advance of the season has cut down the demand with operators, who find orders diminishing. Weather is moderating.

Ane entirely unexpected snowstorm early last week resulted in a continuation of active business with retail coal dealers in this section, although hand-to-mouth buying was general on the part of domestic consumers. The retailers, in their turn, have resorted to the same plan, many of them retiring from the market with small supplies, purchased within the past week or so. In consequence, there is at present only a light movement, and operators find themselves in much the same condition as before the February cold snap came to their rescue.

Strike talk is common, and the hope is freely expressed that there will at least be a suspension in order to strengthen the market. Prices have not reached any higher level than that of the past few weeks, $1.50 being about the top of the market for first-class block. The steam market is in fairly good shape, with the lessening supply of screenings, 80 and 85c. being the price for the better grades of nut and slack.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Demand for lump coal much larger but steam coal quiet. Both furnace and foundry coke dull. Pig iron sales not so large as last week. Car supply ample.

The continued cold weather throughout the South has materially aided the lump-coal business, as there was practically no stocks in the yards, and, as the demand was quite heavy on the retail dealers, the operators reaped a substantial benefit. However, as practically all the cold weather is over, it is expected that lump will now take a decided slump until the spring buying sets in at the lower prices.

Conditions on steam coal are far from satisfactory. The coast business is not what it should be, and the market in general is greatly demoralized. Many of the mines are running on short time, and some are even shut down entirely until conditions change for the better. However, the operators expect an improvement within the next 30 days. With all the adverse conditions, however, prices on steam coal are holding up remarkably well.

The market on both furnace and foundry coke is still quiet, all orders being for small tonnage only. Blacksmith coal is in a satisfactory condition, the price being firm at $2 to $2.25 per ton f.o.b. mines. The furnaces report that a very small tonnage of iron was booked during the last week as compared with the last few weeks but that the price was slightly over the $11 mark for 2 foundry f.o.b. Birmingham. On account of the exceedingly small shipments of coal and coke, the car supply is not a factor at this time.

NEW ORLEANS

Continued low temperatures help move the domestic grades but heavier demand fails to increase prices. New wharf to handle cargo business being considered.

Owing to the mildness of the winter it looked, the first day of February, as if large piles of coal would be carried over. Most of the cold weather of the winter, however, has come since that date and stocks have been greatly reduced. Supplies are still above normal and there has been no tendency to depart from the reduced prices that went into effect shortly after the first of the year. With the passing of present cold spell there is little hope of any further domestic demand this winter. From now until the discount season there will be little activity in the local market. Despite the large stocks some coal is coming down the river from Pittsburgh and Kentucky.

CHICAGO

Moderate weather and market quiet but supported by fairly good buying for storage purposes. Producers are awaiting for Apr. 1 to develop some change in the situation.

The comparatively warm weather and the fact that winter is about over has resulted in quiet conditions. The retailer is not stocking up now, preferring to take his chances at getting coal at the April discount. Apartment houses, the principal users of smokeless, have been permitting their stocks to run down low, but strength is added to the market by the cleaning up of demurrage coal, with companies getting $1.40 for mine-run and $2.25 for lump and egg, with some shading on both figures. If mine-run is up to demurrage it has been disposed of as low as $1.25, while the forcing of lump and egg brings the price for the latter below $2.

The demand for Hocking has been unusually quiet with the price maintained at $1.50. The splint situation is still unsettled as the result of shipping this coal in open cars by consignment to Chicago. A large bulk of this grade has sold at from $1.40 down to $1.10 and $1, but the circular price is $1.50. Franklin County coal is selling at $1.50 circular when it is shipped direct from the mine, while coal up to demurrage is less than $1.25. The Carterville situation is practically the same with quotations of from $1.40 to $1.50. There is an active steam demand in the Springfield market and Indiana dealers are reaping the benefit of a strike scare. The coke market is rather soft for domestic but strong for the hard coke.

Prevailing prices at Chicago are:

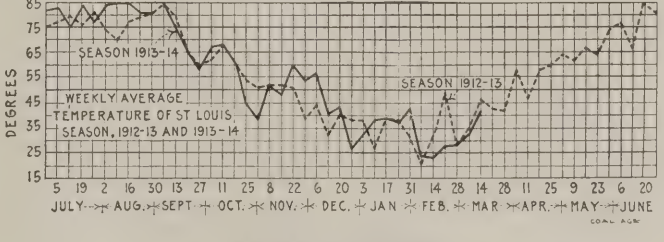
	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07@2.17	$2.55@2.65	$2.12@2.27	
Steam lump	1.97		1.97	
Egg		2.55@2.65		$4.30
Mine-run	1.87	2.20@2.25	1.87	3.45
Screenings	1.67@1.77	1.90@2.05	1.67@1.77	

ST. LOUIS

Railroads doing considerable stocking but the average steam consumers very little. No strike expected but a suspension of some duration anticipated.

The domestic demand has practically ceased, and few of the companies are laying in storage coal. During the past week, however, the railroads became open about their buying in both the Carterville and Standard fields, and a large tonnage is now moving for railroad storage. The crisis will come as a result of the conference in Chicago and it is impossible at this time to determine what action they will take. It is likely, however, that there will be no strike, but that there will be a suspension. This will cause a general advance in prices, on account of the certainty of having to place orders for storage coal.

The screenings market is in a healthy condition, Standard screenings selling at from 65 to 70c., and Carterville at from 85 to 90c., with indications that both grades may do from 5 to 10 or 15c. better almost any time. Otherwise there has been practically no change in prices and the washed market is still weak. The Nos. 3, 4 and 5 sizes are in good demand, with No. 5 at 75 to 80c., and Nos. 3 and 4 at $1.25 and $1.35. Nos. 1 and 2 are offered freely and hard to move at $1.25. With screenings at $1 this will open the way for outside coal from the Kentucky field, and the coming week may see considerable of this brought in.



KANSAS CITY, MO.

Arrival of spring weather has shut off buying. Mine operations reduced to 50% capacity.

The arrival of spring has tended to cut down demand from retailers. Dealers, while having light stocks on hand, are not inclined to order heavily in view of the warm weather, and operators of the Southwest must now rely on other than domestic consumption for business.

Operations at the mines have been reduced to about half time as the result of recent unfavorable developments. The prospects are for this average to be maintained for some time to come. No change has been made in quotations. Sales offices are still selling from track, but this method is likely to be eliminated in the immediate future.

OGDEN, UTAH

Market conditions weak. Spring weather prevailing from Omaha to Pacific Coast. Surplus of nut coal at mines. Quotations unchanged and unsteady.

The mines in Wyoming and Utah have reduced operations to summer basis on account of the weak market and the mine that is able to work half time is fortunate. The mild winter is being followed by an early spring and no doubt the market will continue weak for some time. At present there is a surplus of nut coal at the mines, but it is hoped the early spring will create a demand for this grade of coal as it makes a good warm weather fuel.

	California	Nebraska	General
Lump	$3.00	$2.75	$2.75
Nut	2.50	2.00	2.25
Mine-run	1.85	1.75	1.85
Slack	1.00	1.00	1.00

PORTLAND, ORE.

Winter's trade over and has been a poor year. But coal consumption on whole is increasing.

Winter is now practically over here. The weather has been unusually mild in the Pacific Northwest all winter and hence the demand for coal for domestic purposes has been light, although new uses for coal has probably resulted in an increase in the total consumption.

A regular line of steamers has been established between Portland and points in southeastern Alaska and it is expected that these steamers will call at the Vancouver Island collieries for return cargoes. This will probably affect the fuel situation to some extent here next winter. With freight rates more reasonable the demand for coal here will be increased, it is agreed by all dealers, for under existing conditions little fuel of quality is obtainable at less than $9.

PRODUCTION AND TRANSPORTATION STATISTICS

BITUMINOUS COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during December and the twelve months of 1913 in comparison with 1912, in short tons:

	December		12 Months ending December 31	
Anthracite	1912	1913	1912	1913
Baltimore & Ohio[1]	179,705	118,264	1,613,190	1,516,916
Chesapeake & Ohio[1]	1,541	681	23,450	16,545
Erie[3]	680,141	794,562	7,537,623	8,811,114
Pennsylvania[1 3]	1,036,717	1,012,125	10,312,348	10,711,335
Virginia[2 1]	103	86	283	1,045
Total 5 roads	1,898,207	1,925,718	19,486,894	21,056,955
Bituminous				
Baltimore & Ohio[1]	2,796,924	3,183,145	34,128,269	36,915,385
Buffalo, Roch. & P.[1 2]	719,733	816,981	8,289,296	9,723,992
Buffalo & Susq.[1 2]	138,944	141,895	1,530,441	1,787,551
Chesapeake & Ohio[1]	1,266,503	1,438,367	17,011,888	17,155,233
Erie[3]	8,107	10,389	266,150	350,590
Hunt. & Br'd T. Mt[1 2]	150,771	110,411	1,277,180	1,352,721
New York Central	826,281	806,572	8,308,260	9,220,689
Norfolk & Western[1 2]	1,697,488	1,835,823	22,643,169	23,892,469
Pennsylvania[1 3]	4,271,702	4,354,729	46,434,187	51,526,267
Pitts. & Lake Erie[1 2]	928,090	869,360	11,424,681	12,783,389
Pitts. Shaw. & North[1 2]	210,473	264,145	2,026,010	2,799,308
Virginia[1 2]	317,405	364,937	3,584,009	4,555,331
Western Maryland	198,102	175,311	2,767,980	2,953,601
Total 13 roads	13,530,523	14,472,065	159,691,520	175,016,526
Coke				
Baltimore & Ohio[1]	416,296	269,998	4,783,821	4,281,240
Buffalo, Roch. & P[1 2]	53,461	27,559	550,436	500,230
Buffalo & Susq.[1 2]	25,291	23,351	280,489	301,475
Chesapeake & Ohio[1]	23,544	33,079	260,847	361,535
New York Central	7,173	.....	87,758	36,207
Norfolk & Western[1 2]	134,763	117,305	1,469,618	1,530,384
Pennsylvania[1 3]	1,242,882	880,962	13,371,345	13,892,825
Pitts. & Lake Erie[1 2]	589,561	470,912	6,321,154	6,710,138
Pitts. Shaw & North[1 2]	2,004	.....	7,159	9,383
Western Maryland	5,927	4,801	70,351	73,346
Total 10 roads	2,500,902	1,827,967	27,202,978	27,696,763
Coal and Coke, 13 Roads				
January			16,421,839	18,936,646
February			17,787,331	17,546,496
March			19,483,025	17,631,346
April			13,429,367	16,850,695
May			15,635,568	18,986,790
June			16,702,153	18,580,366
July			16,635,448	18,704,713
August			18,396,247	19,718,850
September			17,432,358	19,046,247
October			18,712,657	20,611,176
November			17,815,767	18,931,169
December			17,929,632	18,225,750
Total, 12 months			206,381,392	223,770,244

[1] Includes coal from connecting lines.
[2] Includes company's coal.
[3] Does not include company's coal hauled free.

Note:—The Southern Railway hauled 373,994 short tons of bituminous coal during November, 1913, and 3,869,715 short tons during the 11 months ending November 30, 1913.

NORFOLK & WESTERN RY.

Following is a comparative statement of the N. & W. tonnage for February, 1913 and 14:

	Shipped		Tipple		Total	
Field	1914	1913	1914	1913	1914	1913
Pocahontas	869,596	793,880	16,691	17,158	886,287	811,038
Tug River	201,007	192,545	3,067	3,809	204,074	196,354
Thacker	191,755	252,527	6,473	8,955	198,228	261,482
Kenova	64,371	64,018	7,030	9,173	71,401	73,191
Totals	1,326,729	1,302,970	33,261	39,095	1,359,990	1,342,065

Shipments of coke, entirely from the Pocahontas field, were 64,610 tons in February of this year as compared with 121,058 last year.

THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Mar. 1, as follows:

	Surplus	Shortage	Net*
New England Lines	128	0	**128**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	12,243	0	**12,243**
Ohio; Indiana; Michigan; Western Pennsylvania	28,539	129	**28,310**
West Virginia, Virginia, North & South Carolina	5,372	900	**4,472**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	4,543	23	**4,520**
Iowa, Illinois, Wis., Minn.; North & South Dakota	4,019	42	**3,977**
Montana, Wyoming, Nebraska	1,517	0	**1,517**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	3,289	0	**3,289**
Texas, Louisiana, New Mexico	614	0	**614**
Oregon, Idaho, California, Arizona	4,558	200	**4,358**
Canadian Lines	0	0	0
Total	64,822	1,394	**63,428**

	Nov. 1	Nov. 15	Dec. 1	Dec. 15	Jan. 1	Jan. 15	Feb. 1	Feb. 15
Surplus	6,720	10,520	17,621	36,435	72,535	87,149	85,489	84,775
Shortage	12,595	8,477	5,095	2,295	57	789	102	239
Net*	5,875	**2.043**	**12,526**	**34,140**	**72,478**	**86,360**	**85,387**	**84,536**

***Bold face** type indicates a surplus.

FOREIGN MARKETS

GREAT BRITAIN

Mar. 6—Irregular conditions are again in evidence. Steamers are being much delayed by stormy weather, and stocks of coal are heavy. Buyers in a position to take immediate delivery, are able to secure easy terms for most qualities. Colliery owners regarding the difficulties as only temporary, are unwilling to modify prices for forward loading. Quotations are approximately as follows:

Best Welsh steam	$4.50	Best Monmouthshires	$4.14
Best seconds	4.38	Seconds	4.02
Seconds	4.14	Best Cardiff smalls	2.64
Best dry coals	4.38	Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

ITALIAN COAL CONTRACT

Contracts for supplying about 750,000 tons of coal for the Italian State Railways during 1914 have gone to Cardiff, Wales, and the price is to be $3.89 to $4.01 per long ton f.o.b. Cardiff. The coal is to be best Monmouthshire.—"Daily Consular Reports."

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follows; complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

Canada—It is reported that a bill was recently enacted by the Canadian Parliament to exclude French steam trawlers from ports in Canada where they now go to coal. If this law becomes effective, it is proposed to establish a coal depot for the trawlers, and it is possible that this depot will be supplied with coal from the United States. An American consul has already furnished some particulars in regard to American coal, but the administrator of the port desires to procure as soon as possible all available information regarding the price of coal f.o.b. Norfolk, under contracts calling for about 40,000 or 50,000 tons of coal per annum.—**No. 11,870.**

Europe—A member of a business firm in a European country informs an American consular officer that he desires to be placed in communication with American exporters of coal, with the object of representing them as agent. Correspondence may be in English. Prices, terms, discounts, etc., are desired. References can be furnished.—**No. 11,931.**

Index of Coal Literature

We will furnish a copy of any article (if in print) for the price quoted. Where no price is quoted, the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

BRIQUETTES

Fuel-Briquetting Investigations. C. L. Wright. Bureau of Mines, Bull. 58; 266 pp., illus.

The Briquet for Saving Fuel Waste. D. A. Willey. Coll. Engr., February, 1914; 2 pp., illus. 35c.

COAL DUST

British Coal-Dust Precautions. C. F. J. Galloway. Coll. Engr., March, 1914; 2½ pp. 35c.

French Coal Dust Precautions. P. Dunaime. Coll. Engr., February, 1914; 4⅓ pp., illus. 35c.

Wet-Peat Zones for Arresting Coal-Dust Explosions. R. Cremer. Iron Coal Tr. Rev., Feb. 20, 1914; ⅝ p., illus. 40c.

COKE

A Westphalian Byproduct Coking Plant which also Supplies Town Gas. (Abstract of Paper by L. D. Ford read before the North of England Inst. of Min. & Mech. Engrs.) Iron Coal Tr. Rev., Feb. 20, 1914; 1⅓ pp., illus. 40c.

A New Type of Coal Compressor. (Meguin's Magnetic Stamping Machine.) Gas Wld., Feb. 7, 1914; 1¾ pp., illus. 40c.

Coal- and Coke-Handling Machinery as Applied to Horizontal Retorts. (Discussion.) Gas Wld., Feb. 28, 1914; 2¼ pp. 40c.

Coke Oven Gas for Gas Engines. (Paper by Heinrich J. Freyn presented at the Feb. meeting of the A. I. M. E.) Iron Tr. Rev., Mar. 5, 1914; 2 pp. 25c.

Coke-Oven Gas for Power Purposes. Coll. Engr., February, 1914; 1½ pp., illus. 35c.

Byproducts vs. Beehive Coke Ovens. Henry S. Geismer. Coal Age, Feb. 28, 1914; 2 pp. 10c.

Metallurgical Coke. A. W. Belden. Bureau of Mines, Tech. Paper 50; 40 pp., illus.

The Automatic Control of Byproduct Coke-Oven Plants—III. A. Thau. Gas Wld., Feb. 7, 1914; 2 pp., illus. 40c.

DRAINAGE, PUMPING, ETC.

New Pumping Plant at Burley Colliery. (The new pumps are installed in duplicate in a roomy pump house about 90 yd. from the pit-bottom, taking the place of the steam driven pumps installed at the pit-bottom and delivered to a lodgment, the final lift being made by a Cornish pump installed on the surface.) Iron Coal Tr. Rev., Jan. 30, 1914; ⅝ p., illus. 40c.

Unwatering Old Workings at Middletown Colliery. (Paper by Cecil Hinchliffe read before the Yorkshire Branch of the Natl. Assn. of Coll. Mgrs.) Iron Coal Tr. Rev., Jan. 30, 1914; 3 pp., illus. 40c.

The Oneida Drainage Tunnel. A. H. Lewis. Employees' Mag., January, 1914; 3½ pp., illus.

ELECTRICITY

A Draw-Out Mining Switch Pillar. Coal Age, Feb. 14, 1914; 1¾ pp., illus. 10c.

Direct-Current Fields. (Discussion of some of the difficulties encountered in the operation of direct-current machines and some emergency cures.) Coal Age, Feb. 28, 1914; 1 p. 10c.

Electricity in Mines. (Paper read by Robt. Nelson before the No. Staffordshire Inst. of Min. & Mech. Engrs.) Coll. Guard., Feb. 6, 1914; 1 p. 40c.

Electricity in Mining. E. B. Wagner. Employees' Mag., January, 1914; 1½ pp., illus.

Explosion-Proof Mining Switch Gear. Coal Age, Feb. 28, 1914; 1 p., illus. 10c.

Hydro-Electric Power for West Virginia Collieries. C. A. Tupper, Coal Age, Feb. 7, 1914; 3 pp., illus. 10c.

Purchased Power and Bituminous Coal Mining. A. E. Rickards. Coal Age, Feb. 7, 1914; 5¼ pp., illus. 10c.

Speed Control of Electrical Motors. Coll. Guard, Feb. 13, 1914; 2 pp., illus. 40c.

The Action of Acid Mine Water on the Insulation of Electric Conductors. (A preliminary report.) H. H. Clark and L. C. Ilsley. Bureau of Mines, Tech. Paper 58; 19 pp., illus.

The Application of Electric Motors to Shovels. H. W. Rogers. Bull. A. I. M. E., February, 1914; 10½ pp., illus.

Use of Alternators in Parallel. C. A. Tupper. Iron Tr. Rev., Mar. 5, 1914; 8 pp., illus. 25c.

EXPLOSIONS

Auckland Park Colliery Explosion. Jas. Ashworth. Coll. Engr., February, 1914; 1⅝ pp. 35c.

Explosions in Mines. (Lecture by Prof. H. B. Dixon.) Coll. Guard., Feb. 13, 1914; ⅝ p. 40c.

Stone-Dusting at Bentley Colliery: Report to the Doncaster Coal Owners' (Gob Fires) Committee. (Paper read Feb. 21, 1914, by Robt. Clive before the Midland Inst. of Min., Civil & Mech. Engrs.) Iron Coal Tr. Rev., Feb. 27, 1914; 5 pp., 7 tables. 40c.

The Automatic Distribution of Stone Dust by the Air Current. (Abstract of paper by H. W. Halbaum read Feb. 14 before the North of England Inst. of Min. & Mech. Engrs., and Discussion.) Iron Coal Tr. Rev., Feb. 20 and 27, 1914; 2½ pp., illus. 80c.

The Explosion at Ravenwood, Colo. Samuel Dean. Coal Age, Mar. 7, 1914; 1½ pp., illus. 10c.

The Senghenydd Disaster. (Continuation of inquiry conducted by the Home Office.) Coll. Guard., Feb. 13 and 20, 1914; 3 pp. 80c.

FUEL TESTING

Coal and the Chemistry of its Carbonization. (Paper read by Dr. John Harger before the Liverpool section of the Soc. of Chem. Indus.) Gas Wld., Feb. 14, 1914; 1½ pp. 40c.

Miscellaneous Analyses of Coal Samples from Various Fields of the United States. U. S. Geol. Sur., Bull. 531, 1913; 4 pp.

The Microscopical Examination of Coal, Especially in Respect to Spontaneous Combustion. (Address by James Lomax before the Lancashire Branch of Natl. Assn. of Coll. Mgrs. and Discussion.) Iron Coal Tr. Rev., Feb. 27, 1914; 1⅝ pp. 40c.

GENERAL

Alaskan Coal Fields; Their Possibilities and Their Plight. J. Esdaile Florance. Eng. Mag., March, 1914; 10 pp., illus. 35c.

Coal at Horseshoe and Jerusaleum Valley, Boise County, Idaho. C. F. Bowen. U. S. Geol. Sur., Bull. 531, 1913; 6 pp., illus.

Coal Resources of Cowlitz River Valley, Cowlitz and Lewis Counties, Washington. A. J. Collier. U. S. Geol. Sur., Bull. 531, 1913; 7 pp., illus.

Coal in the Tertiary Lake Beds of Southwestern Montana. J. T. Pardee. U. S. Geol. Sur., Bull. 531, 1913; 15 pp., illus.

Mines and Mine Management: Past and Present. (Paper by John McLuckie read before the Scottish Branch of Natl. Assn. of Coll. Mgrs.) Iron Coal Tr. Rev., Feb. 20, 1914; 1¼ pp. 40c.

Prospects for Workmen's Compensation in Kentucky. G. D. Crain, Jr. Coal Age, Feb. 28, 1914; 1½ pp. 10c.

Status of the Coal Industry. (Address by Thos. L. Lewis at the banquet of the Coal Min. Inst. of Amer.) Coal Age, Feb. 21, 1914; 2 pp. 10c.

Surveying Methods of the Consolidation Coal Co. A. W. Hesse. Coal Age, Feb. 21, 1914; 3 pp., illus. 10c.

The Value of a Technical Training to Underground Workmen. (Paper read by Prof. W. H. McMillan before the Natl. Assn. of Coll. Mgrs.) Coll. Guard., Feb. 13, 1914; ¾ p. 40c.

Use and Abuse of Wood in Anthracite Mining. (Abstract of paper by E. E. Reuter read before the recent meeting of the Panther Valley Min. Inst.) Coal Age, Feb. 21, 1914; 3¾ pp., illus. 10c.

GEOLOGY

The Barber Coal Field, Johnson County, Wyoming. Carroll H. Wegemann. U. S. Geol. Sur., Bull. 531, 1913; 21 pp., illus.

The Cerrillos Coal Field, Santa Fé County, New Mexico. Willis T. Lee. U. S. Geol. Sur., Bull. 531, 1913; 27 pp., illus.

The Coaldale Coal Field, Esmeralda County, Nevada. J. H. Hance. U. S. Geol. Sur., Bull. 531, 1913; 9 pp., illus.

HOISTING AND HAULAGE

Methods of Haulage in Coal Mines. J. Shanks. Can. Min. Inst. Bull. No. 23; 14 pp., illus.

Types of Electric Winding Engines. L. F. Mitten. Coal Age, Mar. 7, 1914; 4¼ pp., illus. 10c.

The Carron Haulage Gears. (The two illustrations show an endless rope haulage gear, which can be separated into two haulages and worked independently if desired, and a belt-driven double endless rope haulage.) Coll. Guard., Feb. 13, 1914; ⅓ p., illus. 40c.

The Care of Wire Rope. Employees' Mag., January, 1914; 1¾ pp., illus.

LEGAL REFERENCES

Mining Royalties Dependent Upon Existence of Coal. A. L. H. Street. Coal Age, Mar. 7, 1914; 1 p. 10c.

Must a Contract to Sell Coal Be in Writing? A. L. H. Street. Coal Age, Feb. 7, 1914; 1 p. 10c.

Reasons for Opposing Anthracite Tax. Coal Age, Mar. 7, 1914; ¾ p. 10c.

LIGHTING

Design and Maintenance of Miners' Electric Lamps. (Paper by F. J. Turquand read before the London Branch of the A. M. E. E.) Iron Coal Tr. Rev., Feb. 20, 1914; 3 pp., illus. 40c.

The "Stach" Electric Safety Lamp. (A carrying-hoop is so attached to this lamp that it may be suspended in any position; an alternative construction allows it to swing some 45 deg. in either direction.) Iron Coal Tr. Rev., Feb. 27, 1914; ⅜ p., illus. 40c.

MINE FIRES

Notes on Gob Fires and Blackdamp. (Abstract of paper by John Morris read before the North of England Inst. of Min. & Mech. Engrs.) Iron Coal Tr. Rev., Feb. 20, 1914; 1⅜ pp., illus. 40c.

The Burning of Coal Beds in Place Alexander Bowie. Bull. A. I. M. E., February, 1914; 9½ pp.

Spontaneous Combustion of Coal in Mines. (First report of the Departmental Committee.) Coll. Guard., Jan. 30, 1914; 1⅓ pp. 40c.

MINE GASES, TESTING

Influence of Methane in Mine Air. (Translated from Zeit. f. d. B. H. Salinen.) Coal & Coke Op., Feb. 5, 1914; 1 p. 20c.

The Inflammable Gases in Mine Air. George A. Burrell and Frank M. Seibert. Bureau of Mines, Tech. Paper 39; 20 pp., illus.

PREPARATION

Adjusting Ohio Tipples to Conform to New Law. Black Diamond, Feb. 14, 1914; ¾ p., illus. 20c.

Automatic Chute Stop. Coll. Engr., March, 1914; ⅓ p., illus. 35c.

Black Diamond Concrete Tipple. (Description of an Ohio coal mine, methods of mining employed and a remarkable tipple.) W. G. Burroughs. Coll. Engr., March, 1914; 3⅓ pp., illus. 35c.

RESCUE, SAFETY APPARATUS

Kingston Coal Company's Hospital. Coll. Engr., March, 1914; 1 p., illus. 35c.

Safety Priming Device. Wm. W. Jones. Eng. & Min. Jour., Feb. 21, 1914; 1 p., illus. 25c.

Safety in West Virginia. Frank H. Kneeland. Coal Age, Feb. 7 and 21, 1914; 8¾ pp., illus. 20c.

The Use of Rescue Apparatus in Mines. (Inquiry conducted by Lord Mersey.) Iron Coal Tr. Rev., Feb. 27, 1914; 4½ pp. 40c.

The Present Status of Oxygen Breathing Apparatus. F. W. Gray. Can. Min. Jour., Mar. 1, 1914; 1¼ pp. 25c.

SANITATION, DISEASES

Change House with Novel Features. Eng. & Min. Jour., Mar. 7, 1914; 2¾ pp., illus. 25c.

The Hygienic Aspect of the Coal-Mining Industry. Far-reaching effects of trauma; prevalence of nervous diseases. (Lecture by Dr. Frank Shufflebotham before the Royal College of Physicians.) Coll. Guard, Feb. 27, 1914; ¾ p. 40c.

Welfare Work of the Kingston Coal Co., Coll. Engr., March, 1914; 2 pp., illus. 35c.

STEAM AND GAS ENGINES, BOILERS

Automatically Timed Firing. Power, Feb. 10, 1914; 1½ pp., illus. 15c.

Basis for Determining Coal Values. H. W. Weeks. Black Diamond, Feb. 28, 1914; 1⅜ pp. 20c.

Coöperative Central Station Possibilities. David R. Shearer. Coll. Engr., March, 1914; 1⅜ pp. 35c.

Choice and Care of Grate Bars. Coal Age, Feb. 28, 1914; 1 p., illus. 10c.

Economical Lubrication. (Paper prepared for Lake Superior Min. Inst.) W. W. Davis. Coll. Engr., March, 1914; 2⅜ pp. 35c.

How to Calculate the Losses in Gas Engines. Geo. W. Muench. Power, Feb. 17, 1914; 1¼ pp. 15c.

Improvements in Design in Gas-Engine Construction. (Paper by T. C. Wild read before the Midland Inst. of Min., Civil & Mech. Engrs.) Iron Coal Tr. Rev., Jan. 30, 1914; 1¼ pp. 40c.

Modern Gas-Engine Practice for Collieries. (Paper by A. T. Cocking read before the Midland Inst. of Min., Civil & Mech. Engrs.) Coll. Guard., Jan. 30, 1914; 1 p. 40c.

The Development of the Gas Engine in England and Its Adaptation to the Generation of Power at Collieries and Iron Works. T. C. Wild. Coll. Guard., 2⅜ pp., illus. 40c.

The Cause and Remedy for Clinkers. F. Webster. Power, Feb. 17, 1914; 2 pp. 15c.

The Deterioration of Engines and Boilers. Edward Ingham. Power, Feb. 17, 1914; 1 p. 15c.

The Increasing Use of Powdered Coal. (Editorial) Eng. News, Feb. 19, 1914; 1 p. 25c.

The Use of Pulverized Coal as Fuel. (Paper read by W. S. Quigley at the annual meeting of Amer. Foundrymen's Assn.) Eng. News, Feb. 19, 1914; 1 p. 25c.

Tests of Four-Pass Boiler with Illinois Coal, and Discussion. (Paper read by Bryant Bannister at the second informal dinner of the Chicago section of the A. S. M. E.) Power, Feb. 24, 1914; 2¾ pp., illus. 15c.

TRANSPORTATION

A Simple Coal Elevator and Conveyor Device. Coal Dealer, February, 1914; 2 pp., illus. 20c.

Typical Coal Trestles. Wm. Wallace. Eng. & Min. Jour., Feb. 21, 1914; 1 p., illus. 25c.

Getting Mechanical Handling in Small Plants. BIack Diamond, Feb. 28, 1914; ¾ p., illus. 20c.

Loading Conditions of Anthracite Coal at Buffalo. Black Diamond, Feb. 28, 1914; 1 p., illus. 20c.

TIMBERING, PACKING, ETC.

Hydraulic Mine Filling; Its Use in the Pennsylvania Anthracite Fields. (A preliminary report.) Charles Enzian. Bureau of Mines, Bull. 60; 67 pp., illus.

Methods of Driving Pillars in Pitching Seams. J. Somerville Quigley. Can. Min. Inst. Bull. No. 23; 8 pp., illus.

What Shall We Use for Roof Support? A. W. Hesse. Coal Age, Feb. 28, 1914; 1½ pp. 10c.

VENTILATION

Air-Crossings and Their Construction. Ernest Watts. Min. Eng., February, 1914; 2½ pp., illus. 40c.

Connecting Motors to Mine Fans. H. J. Booker. Coal Age, Feb. 7, 1914; 1 p., illus. 10c.

Reversing the Ventilation. (The Keith Mine Fan.) Coll. Guard., Feb. 6, 1914; 1 p., illus. 40c.

Some Experiences in Reversing the Main Air Currents in Coal Mines, and Discussion. (Paper by Wm. Clifford read before the Manchester Geol. & Min. Soc.) Coll. Guard., Feb. 13, 1914; ⅜ p. 40c.

Testing of Ventilating Fans. (Paper by A. J. Kennedy before the Kent Branch of Natl. Assn. of Coll. Mgrs.) Iron Coal Tr. Rev., Feb. 27, 1914; ½ p. 40c.

WORKING OF MINERALS

Mining Methods in the Bering River Coal Field, Alaska. W. R. Crane. Min. & Sci. Press, Feb. 21, 1914; 5 pp., illus. 20c.

The Stripping of Anthracite. E. G. Lewis. Coal Age, Feb. 14, 1914; 2 pp., illus. 10c.

The Disk Coal Cutter. Charles Frobisher. Min. Eng., February, 1914; 4 pp., illus. 40c.

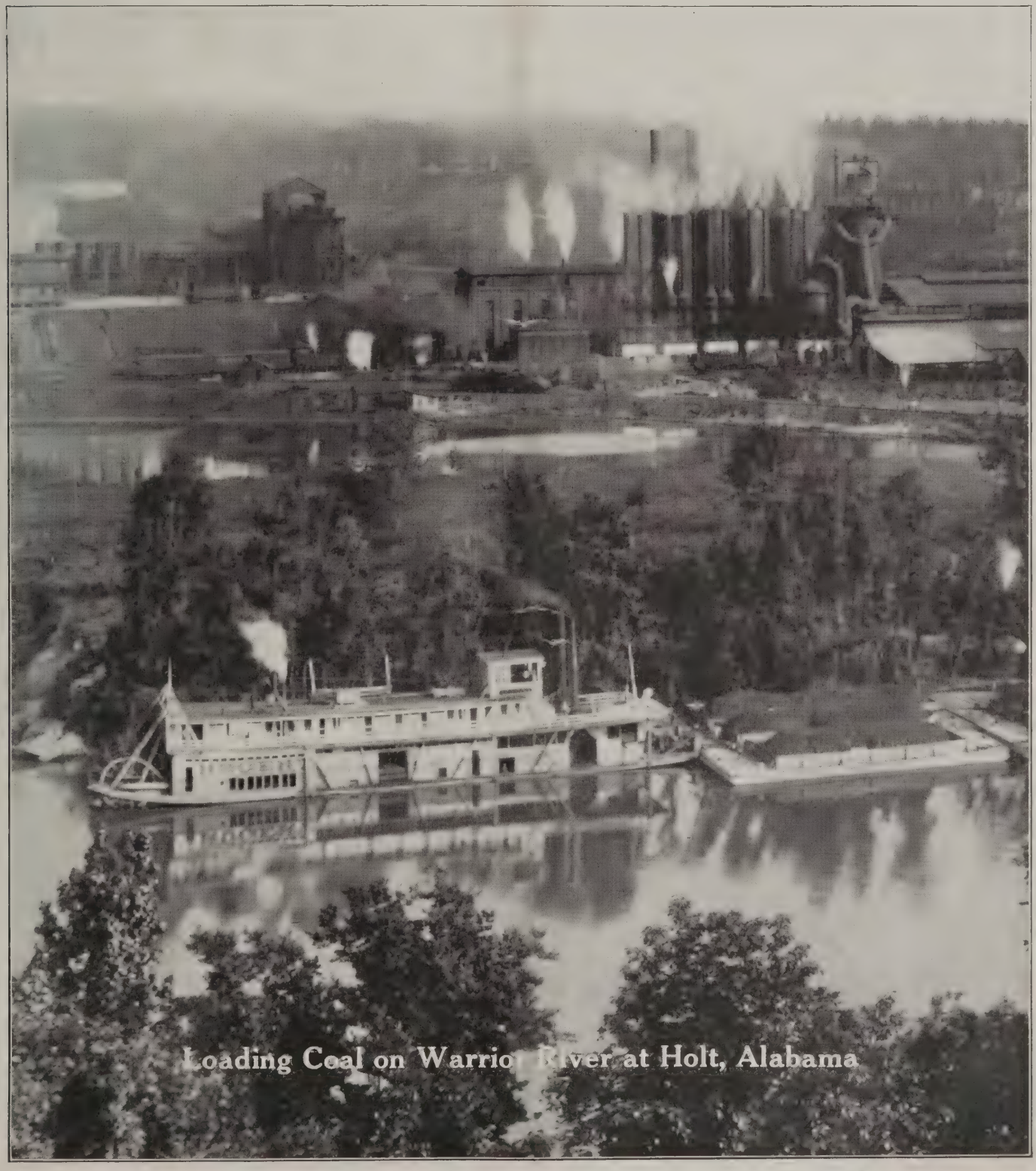
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

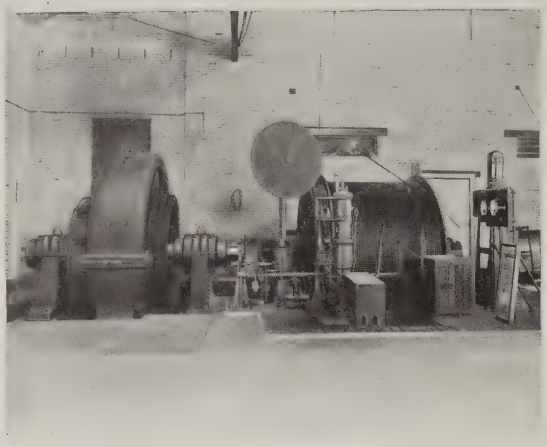
Volume 5, No. 13
Issued Every Saturday
Hill Publishing Company

NEW YORK, MARCH 28, 1914

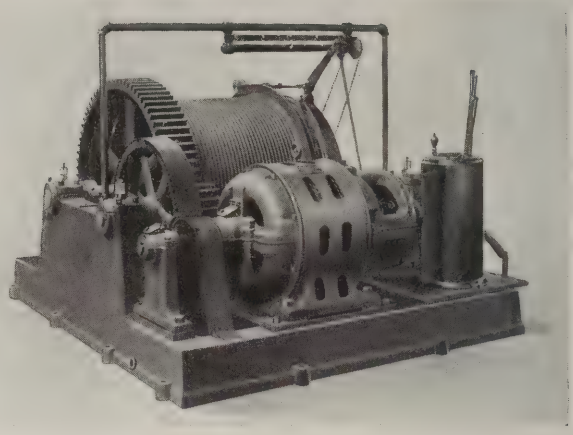
Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Loading Coal on Warrior River at Holt, Alabama



Large Hoist Installation



Small Hoist Installation

Westinghouse Hoist Installations
Both Large and Small

The motors and control of Westinghouse Electric hoist installations, designed especially for your service, have embodied in their design features that assure

Maximum Output Under All Conditions

Liberal design of motor makes it possible to hoist increased loads for a long period to make up for time lost in delivering coal, or ore, to the foot of the shaft.

Reliability

Reliability means continuity of service, assuring against loss due to reduced output caused by motor or control trouble.

Ruggedness

The first two points are dependent upon ruggedness of mechanical and electrical construction.

Efficiency

Power consumption per ton output is an important factor. Westinghouse high efficiency means low operating costs.

Safety

All Westinghouse hoisting installations are designed with control arranged to prevent accidents due to overwind, failure of power and errors in judgment of the operator.

Our specialists in mining equipment will be glad to assist you in selecting the proper equipment for your mines. Their services are at your disposal if you will write to the nearest office listed here.

Westinghouse Electric & Mfg. Company

East Pittsburgh, Pa.

DISTRICT OFFICES:

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W.Va.
Boston, Mass.
Buffalo, N.Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Calif.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N.Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N.Y.
St. Louis, Mo.
Salt Lake City, Utah.
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
Syracuse, N.Y.
Tacoma, Wash
Toledo, Ohio.
Washington, D.C.

*Westinghouse Electric & Mfg. Co. of Texas.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MARCH 28, 1914 NUMBER 13

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 513

The Rover. Poem by Berton Braley.

IDEAS AND SUGGESTIONS: *Pages* 514-515

Converting the Foreman to the "Safety-First" Idea. The author points out the tendency of the busy mine foreman to neglect the "Safety-First" idea, until converted to it by the occurrence, under his charge, of some preventable accident. Sim C. Reynolds. COAL AGE, Vol. 5.
*A Built-Up Gin Pole.

*A LARGE KOPPERS' REGENERATIVE COKE-OVEN PLANT IN GREAT BRITAIN: *Pages* 516-517

A description of one of the largest retort-oven installations in England, with notes on the advantages of the Koppers' process. It is claimed that 25 million tons of coal per annum are consumed by this method. COAL AGE, Vol. 5

*THE STONEGA PLANTS IN WESTERN VIRGINIA: *Pages* 517-518

The plants at Stonega are among the finest in the State of Virginia.

*AUTOMATIC LIGHT SWITCH SIGNAL: *Pages* 518-519

SAFE BOILER SUPPORT: *Page* 519

KING COAL: *Page* 520

Poem by Robt. H. Wilson.

INCREASE IN BALTIMORE HARBOR FACILITIES: *Page* 520

*DWELLING HOUSES AT THE L. C. & N. CO.'S NEW HAUTO PLANT: *Pages* 521,522

The gradual leaning toward better construction of workingmen's quarters is becoming more noticeable each year. It is generally conceded that comfortable houses do much to attract and hold a more desirable class of men. Edw. L. Kellogg. COAL AGE, Vol. 5.

*THE SCOTTISH COAL PORTS: *Pages* 522-523

AUTOMATIC STONE DUSTING: *Page* 523

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 540

COAL AND COKE NEWS: *Pages* 541-544

*MINE OF BIRMINGHAM FUEL CO. AT TOWNLEY, ALA: *Pages* 524-527

A description of the Townley mine: its position, equipment, working methods and output. COAL AGE, Vol. 5.

ANTHRACITE COAL AND THE PUBLIC: *Page* 528

*HALF-MILLION DOLLAR EXPERIMENT STATION FOR U. S. BUREAU OF MINES: *Page* 529

*A NEW TYPE OF AUTOMATIC DUMP CAR: *Page* 530

THE SITUATION IN LABOR CIRCLES: *Page* 530

EDITORIALS: *Pages* 531-532

Miners' Union Opposes National Guard—Religion and Coal Mining—Playing to the Grand Stand—The Union—The Chief Cause of Mine Accidents.

SOCIOLOGICAL DEPARTMENT: *Pages* 533-535

*Method of Rendering First Aid:
A discussion of the most effective methods of rendering first aid to the injured in the more frequent types of mine accidents—as the breaking of a limb or the back—and practical suggestions regarding the best procedure in event of such accidents. A. S. Snyder. COAL AGE, Vol. 5.
*A Sunday School at Palos, Ala.

LOYALTY TO CONTRACT OBLIGATIONS: *Page* 535

RECENT LEGAL DECISIONS: *Page* 535

DISCUSSION BY READERS: *Pages* 536-538

Widths of Opening and Pillar. Letter No. 1—Indications of Gas on the Carbide Lamp—Coal Mining in England, Past and Present.

STUDY COURSE IN COAL MINING: *Page* 538

INQUIRIES OF GENERAL INTEREST: *Page* 539

Overcasts and Stoppings—Fan Ventilation—Mensuration, Lateral Surface of Cone.

COAL TRADE REVIEWS: *Pages* 545-550

ADVERTISING INDEX: *Page* 32

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

The Modern Guarantee

The Weekly Ad-Talk Page

"When a man writes his name on his goods, he thereby endorses them," says one of the Curtis Publishing Company's Advertisements.

"Then by advertising he puts a heavy investment behind that endorsement. He promises to be responsible.

"He separates himself altogether from the manufacturers who will not put their names on their handiwork, but send it out into the world like an anonymous letter, for which no one can be held responsible.

"The manufacturer who, by advertising, has given the purchaser a bond dare not take liberties. He must fulfill every expectation that his advertising may have aroused or lose part of his investment. He must keep up the quality. He must make the goods make good."

There is a world of truth in these words. Unless the advertiser keeps up the quality, unless he makes his goods make good, he forfeits his bond, he will not survive; because no advertiser is any better than the goods he has to sell.

Are you taking up the proffered bond—the bond offered to protect you? Are you using these weekly messages the advertisers are putting out to the fullest advantage?

Are you getting their weekly helps and hints that suggest new and various ways to solve your problems? Are you taking advantage of the valuable literature some of these advertisers offer to put in your files, gratis? Are you buying equipment that has the *public* endorsement of the manufacturer?

Your answer, sir, determines whether or not you are getting *full* value out of your subscription to Coal Age.

Again, therefore, let us add: If you are not an ad follower, become one *now*; because it pays.

COAL AGE

Vol. 5 NEW YORK, MARCH 28, 1914 No. 13

The Rover

By Berton Braley

Written expressly for Coal Age.

I've mined in France an' I've mined in Wales
An' I've mined n Russia, too,
An' I've heard all kinds of miner's tales
From many a husky crew;
In mines that's shallow an' mines that's deep,
I've drilled in the good black coal,
But there ain't no job that I seem to keep,
For I've got a rovin' soul!

There's some men loves a wife an' home
An' children four or five,
But something makes *me* want to roam
As long as I'm alive,
So I gets a job an' I works away
For mebbe a month or so,
Then I goes to the office to draw my pay
An' off on the trail I go.

There's a lot of places I've never seen,
That I kinda want to see,
So I hits the grit with an ardor keen
An' a heart that's light an' free,
I just can't stay in the same old place
A-seein' the same old things,
So I moves along at my own sweet pace
An' takes what my fortune brings.

Wherever there's coal that men must dig
I'm sure to get a job,
So I moves around in the world so big
As long as my heart can throb;
I swears that' I ll quit it now an then,
But I gets the same old call,
For the earth is full of mines an' men,
An' I want to see them all!

Ideas and Suggestions

Converting the Foreman to the "Safety-First" Idea

By Sim C. Reynolds*

SYNOPSIS—The author points out the tendency of the busy mine-foreman to neglect the "Safety First" idea, until converted to it by the occurrence, under his charge, of some preventable accident. He further indicates the necessity of putting the foreman, as, likewise, the miners, on guard before, not after, such an occurrence; and suggests, as a preventative, the practice of photographing the conditions surrounding an accident and distributing copies among all persons likely to be affected by a similar accident.

A foreman of one of the northwestern ore mines was showing the writer—whose business happened to be the looking up of dangerous conditions—through his concentrating plant. In that part of the establishment there were a number of belt-driven machines in operation washing ore. The larger-sized belts were guarded, but those of four or five inches or less were not. Having this matter brought to his attention the foreman in question said that it was his opinion that placing guards about such belts was an entirely superfluous precaution, and no arguments to the contrary that the writer could think of changed that opinion, although in other essential features concerning safety he was perfectly reasonable. He seemed to look at the subject from the same point of view that it is seen by many others; that the larger possibilities of creating accidents should be closely looked to, but that the smaller things are too trifling to demand much care.

Belated Conversion

In less than ten days from that time this foreman was thoroughly converted to the entire program of "Safety First," but in a way that is altogether too common. The poor fellow who accomplished the missionary work in this case did so by having an arm torn off at the shoulder —a tragic conversion, but decidedly efficient, as later events proved. As many another has done, this foreman has swung to the other extreme, and insists on the utmost measures of safety being taken by all under his charge. But who shall say but the price paid for that conversion was not too high, particularly when it might have been discounted by a little foresight and care regarding the so called little things.

This incident recalls another which, still more tragically, made a convert of a mine foreman to the "Safety First" idea. It happened at a mine not fifty miles from Pittsburgh. In order to conserve the lives of the employees, the Department of Mines had issued an order that all electric currents should be kept off the wires running into the mine, while men were being hauled to their work by mules over the electric haulage road. This was obviously a very necessary precaution, since the same state wrongly allows each workman to take with him into his working place as much as 25 lb. of powder—sufficient to last a week.

The particular morning when this accident happened, cutting was behind, and three or four machines were kept running right through from the night shift, which, of course, necessitated the current being left on the feed line in violation of the state rule. A switch, situated at the mine entrance, made the connection between trolley and feed lines, and on this occasion somebody had closed the switch for the purpose mentioned. One of the miners, sitting with others in a pit car waiting to be pulled into the mine, had a full keg of powder under him. Another came along with an 8-ft. drill, and in putting it into the car made a connection between the wire and the keg by means of the draw-bar, with the result that four men were instantly killed and a dozen others maimed for life. The very thing which the state department had anticipated had happened. The mine foreman at that pit now insists on carrying the "Safety First" idea to the limit of precaution insofar as concerns this particular matter. Not only does he not allow current to be on the wires while men are being hauled in, but also has the generator shut down until all danger is over from that source. But again may we not ask if the cost of converting him was also too high, particularly since it, too, could have been averted by a little more care regarding details.

Greater Responsibility with the Foreman

Statistics compiled by the Federal Bureau of Mines attribute the larger portion of all accidents in industry connected with mining to the carelessness of the miners themselves, and the figures are no doubt correct as a whole. Yet, to cut down this spirit of recklessness, which is universal wherever public work is carried on, and not only in coal mining as some may think, we have got to turn the man in direct touch with the workmen into a "Safety First" enthusiast, particularly when that man is the foreman of a mining plant, because he is, more so than any other in the industry, the individual on whose shoulders the chief responsibility rests for accidents that occur at his mine; and secondly, because the men at the great majority of pits get their orders direct from him, or from the fireboss through him. His attitude with regard to the "Safety First" idea will inevitably be reflected in the attitude and actions of his workmen, and they will be more or less earnest and serious in this respect in proportion as they see him earnest and serious in carrying out this idea in all things. It is thus that the foreman or superintendent who is deeply imbued with this chiefest of industrial ethical ideas, which, from a present-day intermittent thing, will, we believe, in time become an industrial institution, unconsciously communicates his care and caution to all with whom he comes in touch. Hence the importance of his being converted first.

*Inspector, Aetna Life Insurance Co., Hartford, Conn.

Accidents Rarely Repeat Themselves

From an unusually extensive experience along the line of dangerous work in mines, the writer is convinced that, as a rule, accidents do not repeat themselves. I mean by that, that if a foreman has a driver crushed between a car and rib because of insufficient space for clearance he does not usually have that kind of accident happen again, at least not soon nor in the same place. His attention, because of that accident, is centered on the *cause* of it, and precautions are immediately taken to prevent the like occurring elsewhere. It follows that if the interest of the foreman can be obtained beforehand in a like regard, much good will result.

Many methods have been put into practice with more or less success in efforts to accomplish this. One large corporation in the bituminous field has illustrated talks given frequently in its various mining camps. Moving pictures showing the right and the wrong way of doing things, the conditions which lead up to accidents, are pictured and explained not only to officials but to all the workmen. It is the author's belief that attendance at such classes should be made compulsory, particularly with regard to the more ignorant workmen. Other companies issue illustrated pamphlets on safe management to its mine officials, and again others have appointed "Safety Directors" and "Company Inspectors" whose duty is solely to ferret out dangerous conditions and spots. This is as it should be at all plants, for the very obvious reason, which every mine foreman will readily agree with, that in most mines the foreman's attention is expected and demanded to the limit of his time and ability in the getting out of the largest possible tonnage, and, regardless of his attitude toward the idea of safety, he has not much time to devote to it. The larger companies are in many instances going fully into this, but no company is too small to not admit of some work along this line. In fact it is just as essential to the welfare of the industry as a whole that the small companies carry out the "Safety First" idea according to their means as it is for the larger companies to do so. The lives and health of the fifty or one hundred men employed in the little mine, should be, and are, equally as valuable as the same number multiplied several times over in the big plant. The reduction of mortality and liability for accidents will be in direct proportion to the interest taken in safety inspection at any mine, whether it be large or small.

Photographed Accidents Good Educators

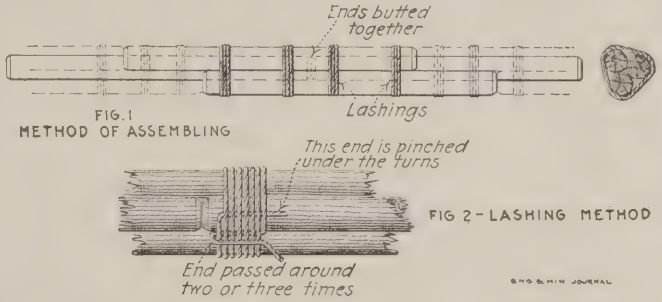
It occurs to the writer that an excellent plan to follow, in keeping before the mine officials the necessity for safety measures, would be in event of an accident—especially a fatal accident—to have photographs made of the conditions leading up to the accident, and of the place where it occurred, and copies sent to all interested parties at the company's various mines. A good series of photographs will vividly show and silently yet eloquently explain to even the foreign miner who cannot speak a word of English, what caused a man to be killed at that place, no matter whether the accident occurred between a car and rib, under draw-slate, by a fall of coal, or at any other of the numerous death spots that are in every mine. In the case of the more common form—death by fall of roof—a picture showing where the post should have been set which would have prevented the fatality, would help much to keep the matter pertinently before the minds of the men who can in a great measure increase or reduce these accidents. If the death or accident happen through an electric wire being too low, a picture taken before it was raised or guarded, would, in some instances, tell the story better than words. The pictures could be accompanied by text, when deemed essential to the purpose, explaining what should have been done to obviate such accident. They would certainly be of great value in bringing before the other fellow the possibility of the same thing occurring at his mine, even though he may have been so fortunate as to not suffer any accidents of a similar nature for some time.

A Built-up Gin Pole

By A. Livingstone Oke*

It frequently happens, where timber is scarce, that a gin pole or other long timber is required larger than any single stick on hand. A method of building one from short lengths of either round or square timber is exhibited herewith.

The poles are laid up in threes, the ends overlapping, as shown in Fig. 1, with a lashing on both sides of each



Three Round Timbers Lashed together for a Gin Pole

joint; the number of turns of rope used depends on whether the pole has to sustain merely a thrust, as in a gin pole, or is to be employed for work in which it will be subjected to bending stresses. In the latter case, both the strength of the ropes, the number of turns and the tightness with which they are put on, must all be increased. If the poles available are all of the same length, but of different diameters, some care must be used in matching the sizes at different points in the length of the built-up pole, keeping the stouter ones together and gradually tapering to the smaller end. Poles may also be built with more than three members, but this number is the more satisfactory, when possible, as it makes a three-point support inside and prevents transverse movement.

Fig. 2 shows the proper method of lashing; several turns of small rope are to be preferred to fewer turns of a larger rope. One end of the rope is pinched under the turns and finally the free end taken around these by passing through several times, as shown, and the whole drawn up tight. To tighten the lashing further, short lengths of smaller rope may be passed around the turns on the other two sides as well and drawn as taut as possible.—*Engineering and Mining Journal.*

*Mining engineer, Penzance, Cornwall, Eng.

A Large Koppers' Regenerative Coke-Oven Plant in Great Britain

SYNOPSIS—A description of one of the largest retort-oven installations in England, with notes on the advantages of the Koppers' process. It is claimed that 25 million tons of coal per annum are consumed by this method.

One of the largest British coke-oven plants is at the Middlesbrough Works, of the Cargo Fleet Iron Co. The Koppers' Coke Oven & Byproduct Co., of Sheffield, are just completing for this firm a third battery of 50 regenerative coke ovens and in addition to these, the whole of the byproduct plant has been remodeled. The old plant is to be abolished, and a complete new one installed,

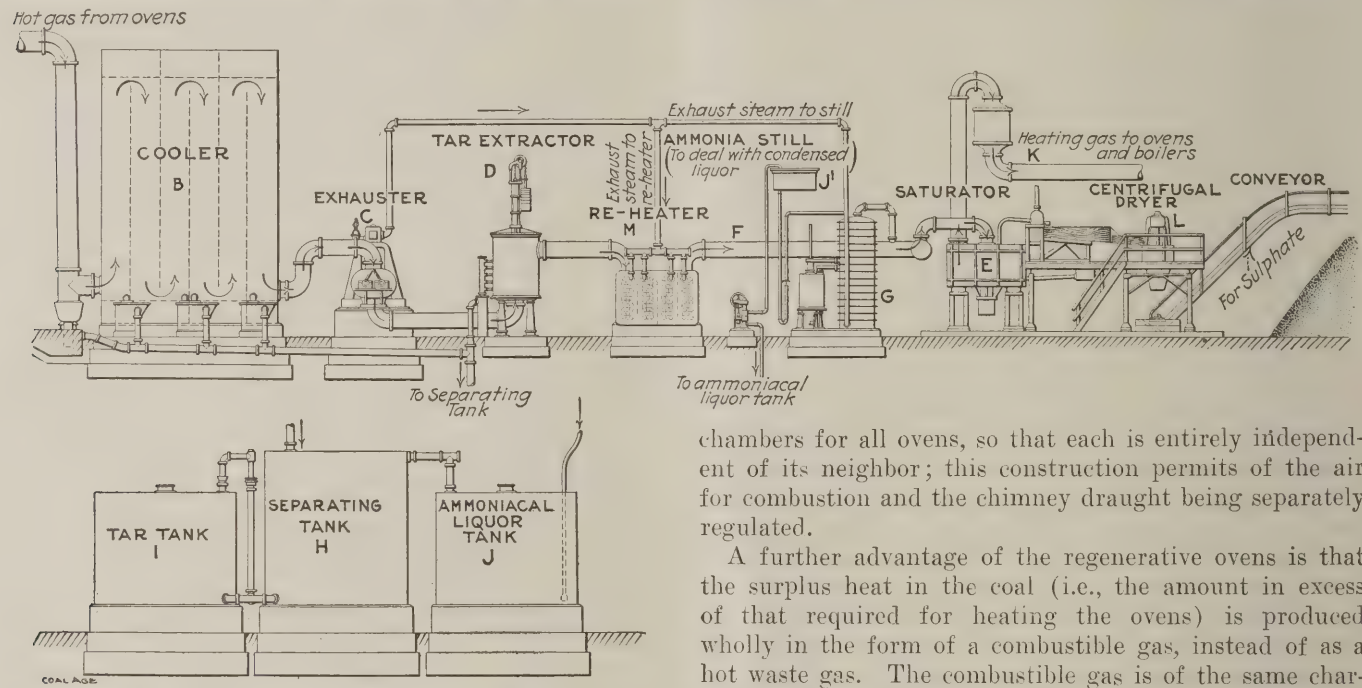


DIAGRAM ILLUSTRATING THE KOPPERS' DIRECT-RECOVERY SYSTEM FOR AMMONIA

working on the Koppers' patent direct-recovery principle for the recovery of tar and sulphate of ammonia. Up to the present time, benzol has not been saved but a plant is now being erected for its recovery from all the 150 ovens.

SOME ADVANTAGES OF THE KOPPERS' PROCESS

The Koppers' oven is of the vertical-flue type and possesses special features not to be found in other ovens, more particularly as regards the arrangement of the heating flues and regenerators and the facilities for inspection. The gas and air for combustion are separately distributed on each side and along the whole length of the oven and combustion takes place in each vertical flue. Each oven wall is formed of about 30 vertical flues, there being a gas jet in each flue: all ovens are heated at about 60 points.

At the top of the ovens and over all the vertical flues, openings are provided for giving access for inspection and regulation. Simple means are also provided for the regulation of combustion in each flue, which is such that it is easily possible for the walls to be uniformly heated from end to end. It is this ease of regulation which distinguishes the Koppers' oven from all other types. Uniformity in the heating of the ovens, not only results in the production of a homogeneous coke but enables the coal to be burnt off more quickly, besides which it effects great economy in the consumption of gas. It is owing to this latter economy that the surplus gas from the Koppers' oven is probably greater than that obtained from any other system.

WASTE-HEAT SAVING

Another distinctive feature of the Koppers' regenerative oven lies in the employment of separate regenerative chambers for all ovens, so that each is entirely independent of its neighbor; this construction permits of the air for combustion and the chimney draught being separately regulated.

A further advantage of the regenerative ovens is that the surplus heat in the coal (i.e., the amount in excess of that required for heating the ovens) is produced wholly in the form of a combustible gas, instead of as a hot waste gas. The combustible gas is of the same character as that produced at gas works, and can be employed for illuminating purposes, and more particularly for consumption in gas engines; in this latter case from two and one-half to three times the power can be generated than when the gas is used in steam boilers. Where power is required in the form of steam, it is generally thought that waste-heat ovens should be adopted, but with that type it is necessary for a special range of boilers to be erected in close proximity to the ovens, while on the other hand, the surplus gas can easily be conveyed almost any distance without loss. It is claimed that the surplus gas from Koppers' regenerative ovens will yield as much steam as the hot waste gas from waste-heat ovens. The coal is conveyed from the hopper to the stamping station and is charged into the oven in the form of a compressed cake.

POPULARITY OF THE KOPPERS' METHOD

The byproduct plant is designed on the Koppers' direct-recovery principle, whereby the ammonia is recovered directly in the form of sulphate, thus dispensing with the usual scrubbing apparatus. Since its introduction about seven years ago, the Koppers' process has met with remarkable success, and there are now installations consuming 25,000,000 tons of coal per annum.

The illustration shown herewith is a diagrammatic representation of the Koppers' direct-recovery system for ammonia. The hot gas from the ovens enters the series of water-coolers of the multi-tubular type, where it is cooled to a normal temperature, thus bringing about the condensation of tar and aqueous vapor. The gas is then drawn by an exhauster and driven forward to a tar extractor, in which the last remaining traces of tar are effectually removed—an operation which cannot be successfully performed without cooling the gases.

After leaving the tar extractor the gas passes through a reheater, and then is delivered direct into the saturator without condensation taking place. The ammonia is extracted from the gas by direct absorption in sulphuric acid, and is recovered in the form of sulphate. The salt is automatically removed from the saturator by means of an ejector working either with steam or compressed air. The sulphate is delivered onto a collecting table and then into a centrifugal dryer, where it is completely freed from mother-liquor.

Saving the Byproducts

The products of condensation extracted in the cooling and tar-eliminating operations are drawn off from the condensers, tar extractors, etc., and conveyed into a separating tank, where the tar and ammoniacal liquor separate, owing to their different densities. The tar flows into one storage tank, and the liquor into another. The liquor is pumped to an ammonia still, where the ammonia is driven off by steam and lime, in the usual way. The vapors of distillation are delivered into the main where they mix with the heated gas, and the whole then passes into the saturator.

No live steam is necessary in the Koppers' process, either for reheating the gas after cooling and tar extracting, or for distilling the ammoniacal liquor. For both these purposes the exhaust steam from the engine driving the exhausters is more than sufficient. No tar is deposited in the saturators, and the salt produced is of the first quality, and is snow white. The gas passes out of the saturator through the main, and is conducted to final coolers, where it is cooled to the required degree for the efficient extraction of the benzol vapor. The benzol is washed out of the gas in the scrubbing apparatus by means of creosote oil in the usual way. After the extraction of the benzol, a portion of the gas is returned to the ovens for heating purposes.

The scrubbing oil containing the benzol in solution, after it has been enriched to the required degree, is delivered to a distilling plant, where the benzol is extracted. The rich oil passes first into a superheater and then into the still proper, where the whole of the benzol contained in the oil is vaporized by means of live steam. The benzol vapor and steam pass through a cooler and condense, the benzol and water formed running into a separator, from which the benzol is run off in the form of a crude spirit.

The debenzolized oil leaves the still at the bottom, and passing through a series of coolers, is cooled down to its original temperature, and again employed for scrubbing the gas. The crude benzol is then washed and redistilled for the production of refined spirit. The whole installation is complete with all the necessary tanks for storing the various products, and with a water-cooling frame, to enable the water employed for cooling purposes to be used over and over again.

The Stonega Plant in Western Virginia

SYNOPSIS—The plant at Stonega is one of the finest in the State of Virginia.

The Stonega colliery of the Stonega Coal & Coke Co. is located about five miles north of Appalachia, in Wise County, Virginia, just across the Cumberland Mountain from Letcher County, Kentucky. The coal mined is the famous Imboden seam, which averages 6 ft. 3 in. in thickness. It makes the best foundry coke on the market and is also a good domestic coal. There are four mines at Stonega which are all self-draining and free of gas. In three of the mines the coal is mined by hand, machines being used in the other. The coal is hauled by electric motors, and ventilation is provided by two Capell fans

There are 666 beehive coke ovens, 200 of which are equipped with a Covington coke-drawing and loading machine. A modern coke-crushing plant prepares the coke for domestic use.

Two of the three large tipples at Stonega supply the coke ovens, and are equipped with Stedman disintegra-



Arched Opening to No. 3 Mine. The Arch Is only 12 In. Thick



Inside of Machine Shop of Stonega Coal and Coke Co. and Interstate R.R.

tors. The third tipple ships coal, and coals engines for the Interstate R.R. The plant of the latter tipple has a large brick power house with stone foundation and trimmings which contain three 500-volt direct-current generators, which furnish power for the mines and one machine also supplying direct current, which furnishes energy for use in lighting the streets, dwellings and office buildings.



PLANT NO. 1 OF THE STONEGA COAL & COKE CO., STONEGA, VA. COKE CRUSHER ON LEFT, POWER HOUSE IN MIDDLE FOREGROUND AND TIPPLE ON RIGHT

To supply steam for these units is a boiler house containing a battery of ten Brownlow boilers.

ALL KINDS OF REPAIRS ARE MADE IN THE REPAIR SHOP

A large machine shop equipped with lathes, shapers, planers, wheel-press, radial drill, bolt-and-pipe machine, shears, punch and steam hammer makes all repairs around the plant and also does all the work of that character needed by the Interstate R.R., which terminates at Stonega. At another repair shop all electrical repairs are made, armatures being wound and commutators built by the force engaged. At a large foundry castings up to 2000 lb. are made at this plant.

At Stonega, there are Presbyterian, Methodist-Baptist Union and a Catholic Church, and for colored people only, Methodist and Baptist Churches. A four-room graded school for white children and a two-room school for colored children supply the educational needs. For amusement a picture theater and lodge hall is provided. Pictures are run nightly, admission to the entertainment being obtained for 5 and 10c. There is a good library and a pool room, which was donated and is maintained by the company.

The corporation also has for the population of about 2000, a fine hospital in charge of Dr. C. B. Boyer, the company's physician, who is aided by two trained nurses.

The Stonega plant is in charge of C. G. Duffy, superintendent, and his assistant, H. B. Price, Jr. It is one of six plants located within a radius of seven miles. The headquarters of the Stonega Coal & Coke Co. is located at Big Stone Gap, Va.



THE STONEGA BASE BALL TEAM OF 1912

Automatic Light Switch Signal

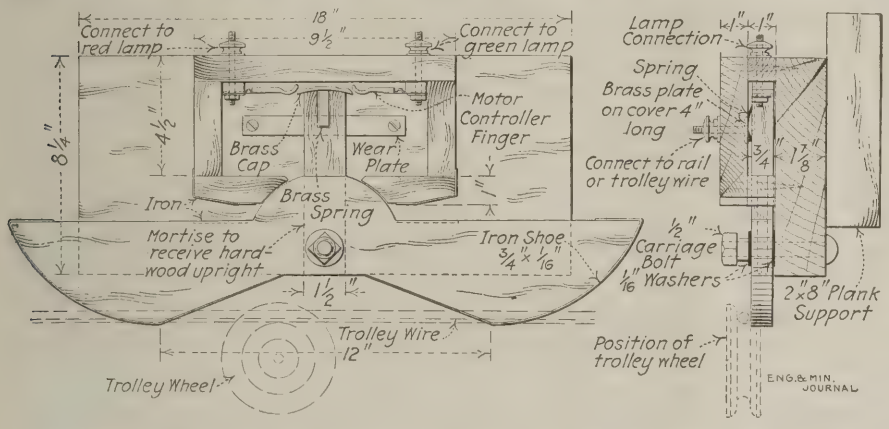
BY L. O. KELLOGG

It frequently happens in underground electric-haulage systems that the main drift branches a short distance from the shaft and that loaded trains are brought in over both branches. It then becomes necessary to signal to any incoming trains whether the track between the junction and the shaft is open or whether a train from the other branch drift is dumping at the pocket. This signaling is done automatically by colored lights in an exceedingly neat way at the Oliver mines near Ely, Minn. A switch is set in the back of the drift so as to be tripped by the trolley wheel of the incoming train and to flash a red light. The trolley wheel of the outgoing train usually flashes a green light. A train approaching on the other branch drift will stop if the motorman sees a red light and will proceed if he sees a green.

It is not entirely necessary to use the green light, but somewhat safer; for if two lights are used, the absence of

either a green or a red light indicates that something is wrong with the system, and the motorman will not proceed as he would if the mere absence of a red light was used to indicate a clear track. Only one switch is necessary, set where it will be operated by trains from both drifts. One or two sets of lights may be used, only one set being required, if a point can be had visible from a sufficient distance in both drifts.

The construction of the switch is shown in the drawing. It consists of a wooden box inclosing the contacts. A vertical pivoted finger is connected through the bottom of the box with two horizontal wings which the trolley wheels strike; the finger, thrown laterally by the movement of the wings, completes a circuit through the lamp of the proper color. The wings of wood are shod with iron where struck by the wheel and where they



Automatic Switch to Indicate Position of Underground Motor

strike the bottom of the box, in order to resist wear. The top of the wingpiece is shaped as an arc to fit the opening in the box, which is thus kept closed. The box itself consists of a wooden back and a wooden front piece screwed together through filling blocks which form the box sides. The finger, by means of the brass spring shown, maintains a constant contact with a brass plate on the inside of the box front piece, which is connected to one side of both lamp circuits. The spring connects with a brass cap on the finger, and this makes contact with one of two fingers taken from a motor controller. One of these connects with the other side of the red-light circuit, the other with the other side of the green light. In the case shown, the trolley current is used for the lights; if a separate lighting circuit were in service, connections could be as easily made to this. The device is mounted on a board parallel with the tracks.—*Eng. & Min. Jl.*

Safe Boiler Support

The importance of safe boiler support is not generally recognized, says an editorial in *Power* for Mar. 3, 1914, and the boiler laws that have been enacted in the various states and municipalities, do not seem to have taken into account its influence as affecting the safe operation of boilers. Anyone familiar with boiler explosions will be sure to feel that if a boiler should fall down while under steam, an explosion would be almost certain to follow; yet it is rare to hear this cause advanced as the explanation of boiler explosions where other causes are not in evidence. It seems more than probable that a good number of mysterious boiler explosions, occurring with sound boilers and where there has been conclusive evidence that no overpressure existed, may have been due to the falling down of the boilers or their changing position to such an extent as to result in the breaking of the pipe connections, thus producing the explosion.

Investigation into the conditions surrounding the explosion of two sound boilers recently, seemed to indicate that the falling down of one of the boilers was the only reasonable explanation for the accident. These two boilers exploded simultaneously, the explosion of one having undoubtedly been the cause of the explosion of its mate. The tears through the shells of both boilers were similar, occurring through the top manhole reinforcement, which was of the outside pattern, and weak. The girth rivets at each end of the course that contains the manhole opening were sheared. All parts of the shell that were fractured were without evidences of defects, the tears being through the solid plate. Calculation showed that the structure should have stood about five times the load due to the steam pressure that was on the boilers at the time of the accident, and that there was not an excess pressure at this time was clearly indicated by the condition of the pop safety valves that were attached to the boilers. One boiler showed distinct marks on the manhole course of having been dented by a blow delivered to it by the manhole frame of the adjoining boiler when it exploded. From the nature of the breaks on these boilers, it is probable that the main steam connection on one boiler was broken by the falling down or settling of the boiler. The sudden opening and the resulting outrush of steam, caused a wave action of the water in the boiler, which resulted in its rupture girthwise and the manhole course lengthwise through the manhole reinforcement. This explosion probably would have been prevented if the boilers had been properly hung.

The Massachusetts and Ohio rules prescribe that boilers above 78 in. diameter be hung, and that the support be independent of the setting walls. This provision was evidently made for fear that such large boilers could not be safely supported on the setting walls, which is doubtless correct. It would also seem to be reasonable precaution to have all sizes of horizontal tubular boilers hung. The smaller size boilers are usually installed in the smaller plants where the condition of the setting is not as apt to be so closely watched as in the larger plants and small boilers for this reason are probably more likely to be exposed to the danger of explosion from improper support.

The American Boiler Manufacturers' Association, at its twenty-fifth convention, proposed that the Massachusetts Rules be modified in regard to the requirements for hanging boilers and that the boiler manufacturers be allowed to follow the present practice, which had been proved safe. Such a move would seem to be a step backward, and if any change is made it should be to require that the smaller sizes of boilers also be hung. It requires more than the mere statement of the boiler manufacturers to show that lug-supported boilers are safe, for there have been many instances to show that this means of support has often been the initial cause of boiler explosions.

King Coal

By Robert H. Wilson*

A coal fire burns on my hearth tonight,
Outside is the frost and snow,
The stars are a-shiver with cold and fright
As they hear the north wind blow.

Jack Frost peers in at the casement frame
With a leering, bold grimace;
The fire cries out, "You're not in the game,"
And it flouts him to his face.

The Frost King mutters, and in his voice
Is a tone of gruff regret,
The coal laughs back, "You have no choice,
For I am the master yet!"

"If thou art King," said I to the coal,
"Tell me thy warrant, pray,
That aught to thy power should yield control,
Or bend to thy scepter's sway."

"And thou wouldst know," said the coal to me,
"My secret, then listen well,
For it is a tale of mystery,
And wonder I have to tell.

"I was conceived of the virgin Earth
When time had only begun,
Forests and jungles my place of birth,
'Neath the shine of a tropic sun.

"My cradle was down in a swampy fen,
Where the ichthyosaurus fed,
The diplodoccus came from his den,
And guarded my trundle bed.

"Surges and billows, and roll on roll
Of shimmering light and heat
Wrapped me and filled me, body and soul,
Till my pulses wildly beat.

"I breathed the heat, and I drank the light
Till the glacial torrent's spume
Flooded and buried me out of sight,
Again in my mother's womb.

"Reincarnation! Wonderful theme!
But the marvel came to me
Of birth anew, like the mystic dream
Of the Brahminic devotee.

"Ho! for the craft of the sons of men,
Ho! for their cunning and skill,
Delving for treasures beyond their ken,
And molding them to their will.

"They searched me out from my dark, damp caves,
Braving my poisonous breath,
They brought me from 'neath the salt sea waves,
At risk of the fangs of Death.

"They gave me a kingdom, a crown, a throne,
And millions before me fall,
Trade and traffic my empire own,
And industry is my thrall.

"My hand directs the billowy course
Of the ocean-greyhound fleet,
My blood is life to the iron horse,
And strength for his flying feet.

"At touch of my magic—commerce feels
The spur of a thousand thrills,
I drive the shuttles, and turn the wheels
In thousands of shops and mills.

"I yield my life—though I reckon it not—
To defeat the demon Cold,
I quicken the fires in the smelting pot,
To purge the silver and gold.

"I warm the home of the millionaire,
And the hut of the Esquimaux;
Eyes dreamy with youth find pictures rare
In the depth of my ruddy glow."

* * *

"King Coal is a Suzerain Lord," I cried,
"With power on land and sea,
I yield him due homage, whatever betide,
For he warmeth my hearth and me."

*Saltsburg, Penn.

Increase in Baltimore Harbor Facilities

The rivers and harbors appropriation bill, pending in Congress, is of wide significance to the coal trade of Baltimore. The bill contains a provision for the expending of $112,000 by the government in deepening the Baltimore harbor to 35 ft., making it possible for the largest merchant vessels and colliers of the United States Navy to load coal at the Maryland port.

In discussing the proposed legislation with Congressmen Linthicum and Talbott, of the Maryland delegation, President Daniel Willard stated that the Baltimore & Ohio will build an additional steel pier at Curtis Bay, which will double the capacity of the present facilities there. The time of construction, the cost of which will be more than $1,000,000, will be dependent upon the financial condition of the road. It is known, however, that the pier will be erected as soon as practicable.

Eastern coal operators, and particularly those doing business through this port, predict a rapid growth of the trade when the proposed extension shall have been put in operation. Baltimore is a logical point for handling a large volume of coal. It is also located near the coal fields of West Virginia, southwestern Pennsylvania and Maryland; and now that a low-grade route has been established, which makes it possible to handle the longest trains expeditiously and economically, a large increase in tonnage is anticipated.

Last year more than 3,000,000 tons of coal were dumped over the Curtis Bay pier, and the world's record for loading a vessel was established on Nov. 18, 1912, when the collier "Newton" was loaded with 7473 tons of coal in 3 hr. and 45 minutes.

Dwelling Houses at the L. C. & N. Co.'s New Hauto Plant

By Edward L. Kellogg*

SYNOPSIS—The gradual leaning toward better construction of workingmen's quarters is becoming more noticeable each year. It is generally conceded that comfortable houses do much to attract and hold a more desirable class of men. This article describes the introduction of hollow-tile at the L. C. & N. Co.'s Hauto plant and is probably the first application of this method in a mining community.

It is so short a time since the building of modern model villages in America for workingmen has been gaining ground, that the broad principles which underlie such expenditure on the part of a corporation for such a purpose need stating and reiteration. The increasing difficulty of obtaining satisfactory help for industrial



Front View of the Two-Story House

plants is compelling managers to analyze among other things the living conditions of their men, and they find that high-grade workmen of today are not content with wooden shacks in the middle of bare ground covered with refuse, cans and ashes; and will not stay in towns where housing conditions are poor.

There is, as is well known, a large floating class of workmen who only stay a short time in each place, leaving under the slightest pretense. The scarcity of labor has made reliable men more particular and most of these prefer to work for lower wages in towns where they can get better and more attractive homes.

Some Advantages of Improved Dwellings

It has long been noted that under average conditions the loss of time from sickness has been 10 per cent., but in model villages is almost nothing, while the death rate is one-quarter to one-half what it is under ordinary conditions. It is easy, therefore, to realize that the better physical, mental and moral conditions of the men make them more efficient workmen.

From the increased efficiency, additional profits come to the employer sometimes in so large amount that the management feels justified in maintaining a model village at considerable actual expense. Others place rentals at a markedly lower figure than would be justified, if an ordinary real-estate investment proposition. The accompanying table, prepared as a rough guide, has been so frequently called for by managers of large corporations, that it will no doubt be welcomed by others. The cost of land mentioned pertains specially to country districts where land is cheap.

SCHEDULE OF COST AND RENTALS OF HOUSES FOR WORKINGMEN

Cost of House	No. of Rooms	Interest at 5%	Annual Total Expense	Rent per Month	Rent per Year	Annual Surplus % Income
			Sink and Toilet			
$750	3	$37.50	$65.10	$6.00	$72.00	10
860	3	43.00	74.80	7.00	84.00	11
975	3	48.75	84.80	8.00	96.00	12
1100	4	55.00	95.40	9.00	108.00	12
1200	4	60.00	104.50	10.00	120.00	13
1300	4	65.00	112.80	10.50	126.00	10
1400	4	70.00	121.10	11.00	132.00	9
			Bath, Sink and Toilet			
1500	5	75.00	130.40	12.00	144.00	9
1600	5	80.00	139.30	13.00	156.00	10
1725	5	86.25	149.10	13.50	162.00	8
1825	5	91.25	157.40	14.00	168.00	6
1925	5	96.25	167.50	15.00	180.00	7
2025	5	101.25	174.80	15.50	186.00	6
2150	6	106.25	183.35	16.00	192.00	4
2250	6	111.25	191.75	16.50	198.00	3
2350	6	116.25	199.95	17.00	204.00	2
2475	6	123.75	211.30	18.00	216.00	3
2575	6	128.75	220.90	19.00	228.00	3

Taxes are figured at the usual 1 per cent of cost of house and land. Repairs are figured at cost of one month's rent, standard practice for even less durable construction than hollow tile.

Collection expenses at 5 per cent. of rent collected.

Sinking fund at 1½ per cent. of cost of house only. At 5 per cent. compound interest a 1½ per cent. sinking fund will repay cost of house in thirty years.

In many of the coal-mining towns, the housing of miners is poor and commonplace, due to several reasons:

(1) The lack of interest of the actual operators of the mines, and the absenteeism of the responsible heads and owners of the companies, and

(2) The feeling on the part of the managers that the perhaps early exhaustion of the coal seams will bring an end to the value of real property.

A leading executive recently said to me: "Our company has over one hundred houses in this town that should not be occupied by human beings. I am constantly asking for new houses, as they pay a fair interest on the investment, but my directors will not authorize the expenditure."

Reasons for Adopting Permanent Construction at Hauto

Vice-President Ludlow, of the Lehigh Coal & Navigation Co., with headquarters at Lansford, Penn., takes great interest in his company's employees. His company's experience with wooden houses and the heavy repairs necessary on them, has led him to investigate other more durable methods of construction. The thick veins of coal belonging to this company promise work for scores of years, so that more durable construction than wood was economically important.

The building of the great electric plant at Hauto, near Lansford, to use up the long accumulating millions of

*Standard Buildings, Inc., 70 East 45th St., New York.

tons of waste coal in generating electricity on an enormous scale for surrounding towns and cities, gave Mr. Ludlow an opportunity to carry out his idea of a model village for the employees of the plant.

Standard Buildings (Inc.), of New York, an association of experts on the laying out, designing and erecting of model villages for workingmen, was asked to do the work. This company makes a specialty of building with hollow tile, and in the effort to reduce the cost so as to compete with good wood construction, had devised in coöperation with the National Fireproofing Co., a new hollow tile with a pleasing exterior surface, warm red in color, something like tapestry brick, at one-third the cost, thus doing away with the expensive exterior stucco. The unit of tile, 6x12-in. face by 6 in. thick, with double air spaces, will, where properly laid with portland cement, make an impervious masonry wall, warm in winter and cool in summer.

A number of houses illustrated herewith have just been finished. The appropriation available called for the strictest economy; all architectual features had to be omitted, but the result is nevertheless most interesting. The delightful warm, red brick color of the roughened wall surface, and the size of the units with the wide grey mortar joints, make a pleasing exterior. The roofs are of heavy durable prepared roofing, matching the walls in color, and put on with heavy battens painted the same color. The exposed woodwork is stained a warm brown and the window sashes painted cream white.



Rear View of the Two-Story House on the Left and the Bungalow Type on the Right

Types of Buildings Used

Three types of houses have been erected, as illustrated:

(1) *Bungalows* containing a large living room, two double bedrooms, of over 800 cu.ft. of air capacity each, and a kitchen. There is a center chimney, a water closet, a soapstone washtub and sink. The cooking range will heat the house from the living room in winter and in summer can be moved into the kitchen. There is a large front porch and a smaller one in the rear. The hollow tile in these bungalows is smooth on the interior and is white-washed, doing away with the use of plaster and presenting a most durable surface practically proof against wear and tear.

(2) *Five-Room, Two-Story Houses.* The rooms in the second story are full height. There is a living room, dining room, kitchen, two bedrooms and bath. Also a cemented cellar and excellent hot-air furnace.

(3) *Six-Room Houses*, similar to those with four rooms, but with a larger living room and three bedrooms. Good closets are provided in all these houses. The five- and six-room houses are plastered in the usual way with white, hard finish for painting or tinting.

The illustrations taken in mid-winter, with the streets dug up for water pipes, give little of the real beauty that will be apparent later when a year or so has passed, and nature has again taken hold, the grass grown and the leaves out, and human interest apparent and active. But this experiment has already shown that given an interesting and durable material, and skilled design limited, to proportions alone, will together make a beautiful whole. The credit for part of the idea of the new wall material for low-cost houses, should be given to that eminent business man and philanthropist, J. G. Schmidlap, of Cincinnati, who has invested half a million dollars in two housing companies in his own city. His remark to the president of Standard Buildings, Inc., a year ago: "You will not be able to lower the cost of workingmen's houses until you find some cheaper structural material," led to the experiments that finally produced the new hollow tile, whose first use is illustrated herewith.

The Scottish Coal Ports

The North British Railway Co. has been interested in the export of coal from the rich Fifeshire fields, almost since the beginning of coal mining. From a charter dated March, 1291, it appears that coal has been worked in that county for more than six centuries. Many of the Fifeshire seams extend for considerable distances under the Firth of Forth, and it is estimated that the quantity of coal still to be worked is 3,742,336,644 tons, according to a Royal Commission, which sat in 1903-5. The total output of the county in 1907 was 8,530,043 tons, as compared with only 5,944,631 two decades ago.

Soon after the acquisition of the original dock at Methil by the North British Railway, in 1889, the traffic of the port increased to such an extent that it was found necessary to extend the facilities for handling coal. The construction of the outer dock, which has an area of 6½ acres, was completed in January, 1900. The dock has a depth of water at high tide of 27 ft., and 22 ft. at low; its cost was about $1,500,000.

The coaling facilities consist of three Armstrong Whitworth coal hoists of the most approved types with high-level runways for the empty wagons. There is also a 25-ton hydraulic coaling crane, which can lift the loaded

wagon bodily and empty it direct into vessels, and also work alongside one of the coal hoists so that a vessel can be loaded by both methods simultaneously.

There are 12 miles of storage sidings round the docks and the whole are lighted by electricity to facilitate work at night. With all the hoists working there is no difficulty in handling 70,000 tons a week and a record shipment for one week was accomplished on July 8, 1911, when 75,595 tons were shipped; the record monthly shipment was made in September, 1911, when 311,883 tons were handled.

The total tonnage shipped from the Methill Docks during 1909, was 2,691,109 and in 1910 it was 2,926,210 tons. The traffic at Methil has again outgrown the facilities and a third dock is nearing completion, which has a water area of 16¼ acres and will be equipped with six additional miles of sidings. The hydraulic hoists will be capable of lifting a weight of 35 tons to a height of 45 ft., above the quay level and tipping into vessels. When this dock is completed the loading capacity of the port will be increased to 160,000 tons per week.



General View of the Burntisland Dock in Scotland

Other Large Docks

The other important outlet of the Fifeshire coal field is Burntisland, where the docks are also the property of the North British Ry. Co. In 1889 the coal tonnage shipped from this port was only 739,307, while in 1908 it was 2,164,293 tons, and in 1910 it was 1,128,218 tons.

There are two docks, the old and the new, the former having a depth of 28¼ ft., and the latter 22½ ft. Both docks are fully equipped with the latest coaling appliances and there are no fewer than ten hydraulic hoists, which are said to be the first of their kind erected in Scotland, while experiments have been made with antibreakage appliances with satisfactory results. The record shipment of coal for a week was that for Aug. 7., 1909, when 68,100 tons were shipped, and the record month was October, 1908, when 256,000 tons were put into vessels.

Automatic Stone Dusting

H. W. G. Halbaum, in a paper before the North of England Institute of Mining Engineers, offers some interesting notes on stone dusting. Instead of employing a number of men to clean up the coal dust and distribute the stone dust every night, he suggests that the inert dust be stored at the surface in such a way that it will be subjected to the suction of the downcast shaft (as coal dust now is from the screens). Secondly that another supply of inert dust should be taken nightly to the haulage landing of each district.

During working hours the cager is provided with a number of shallow trays made of galvanized sheet iron, and fitting the tops of the full cars. In each of these trays he places a few handfuls of the inert dust. The tray would prevent the coal dust from escaping from the cars, while the inert dust reposing in the tray would be shaken up as it traveled, and carried away and deposited by the air current. This would obviate the cleaning-up of the haulageways each night, since the deposition of coal dust would be prevented, and the roads would be efficiently stone-dusted.

This seems to Mr. Halbaum the logical conclusion to the study of the distribution of dust, whether it be formed from coal or stone. Such a method would have the twofold effect of practically preventing the deposition of coal dust on the main haulageway and covering instead its whole rubbing surface with fine inert dust. If the buoyancy of the inert dust be sufficiently marked, it should penetrate into obscure parts of the mine, which have hitherto been accessible only to coal dust.

Mine of Birmingham Fuel Co. at Townley, Ala.

EDITORIAL CORRESPONDENCE

SYNOPSIS—A description of the Townley Mine; its location, equipment, working methods and output.

The mine of the Birmingham Fuel Co. is located geographically at Townley, Walker County, Ala., on the St. Louis and San Francisco R.R., 52 miles northwest of Birmingham, and geologically in the northwest corner of the Warrior coal field. The mine is under the general supervision of John R. Pill, president and general manager, and under the direct supervision of John B. Monfroy, superintendent. The writer is indebted to the two gentlemen mentioned for their coöperation in preparation of this article.



FIG. 1. GENERAL VIEW OF PLANT

A, dwellings; B, office; C, commissary; D, washer; E, bath house

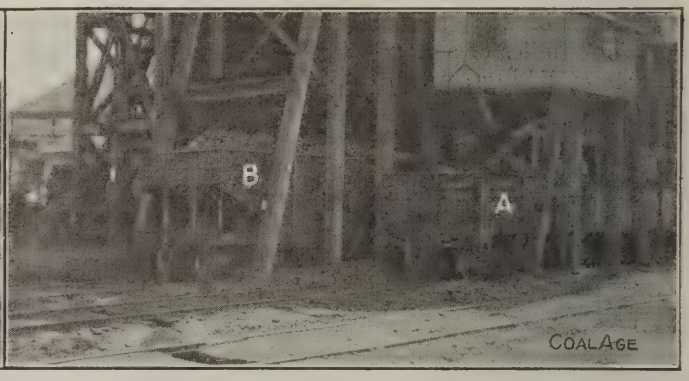


FIG. 2. METHOD OF LOADING

A, domestic lump over 6-in. screen; B, steam through 6-in. screen.

The Jagger Seam, which is worked in this mine, is one of the lowest seams of the Warrior field and is of workable thickness only in the northwest corner of the field. The coal occurs in irregularly shaped basins, the limits of which can only be ascertained by drilling. Normally, the coal lies flat with local variations and, as a rule, it is of normal thickness, except near the boundary of a basin, where it thins rapidly and turns up to the surface. It is impossible to ascertain the limit of a basin by cutting the outcrop, as the seam on "turning up" usually plays out. The approximate boundary of a basin is shown usually by the appearance of the bed rock on the surface.

The roof of the seam consists of shale of average strength and the floor of firmer shale. At some points of the field a stratum of bone coal, 6 in. to 8 in. in thickness, occurs in the bottom.

The coal is an excellent domestic and steam coal and finds a ready market. The steam sizes bring from $1.20 to $1.50 per ton, and the lump from $1.75 to $2.25 per ton, f.o.b. mine, the prices varying with the seasons. Fig. 2 shows two grades being loaded, lump and steam, while Fig. 6 is a photograph of a car of fancy lump over 6-in. shaking screen.

Figs. 1, 3 and 4, which are photographs of the plant from different points of vantage, show the general arrangement of the buildings. The reader's attention is particularly directed for a moment to the general neatness evidenced by the photographs. It might be mentioned in this connection that "good order" is characteristic of the plant both on the surface and inside of the mine.

The boiler plant consists of four 165-hp. Atlas return-tubular boilers. The boilers are equipped with four 16-in. turbo-blowers. The water is fed from a 500-hp. Star



FIG. 3. VIEW OF PLANT FROM RAILROAD SIDE

A, headframe; B, hoist-engine room; C, compressor room; D, drinking fountain; E, bath house; F, carpenter shop; G, machine shop; H, blacksmith shop.

vacuum heater which is on the exhaust from the air compressors. An important economy is effected in the boiler plant in that only the washed slack which passes through a ⅜-in. screen is used in firing, except when this supply is insufficient, at which times quantities of the larger sizes are used. This method utilizes principally the fine product, which is of the lowest market value. All boiler coal is delivered to the boilers from the washers by flume *g*, shown in Fig. 4. Flume *h* disposes of the extreme fines from the boiler coal.

The power plant consists of three Norwalk compressors, each having a capacity of 900 cu.ft. per min., which supply compressed air for the coal punchers and pumps; and a Janney direct-current generator, which furnishes lights for the principal buildings and the shaft bottom.

The headframe is arranged for self-dumping cages, which dump directly into the shaking-screen bin. The cages are operated in balance by a first-motion Crawford & McCrimmon hoisting engine.

The fan, shown at *d* in Fig. 4, is a 16-ft. Crawford & McCrimmon fan. The fan house is of the Kahn system of reinforced-concrete construction, and is arranged so that the direction of ventilating current can be reversed. It is also equipped with explosion doors.

The washer, a two-jig Montgomery type, washes everything from 3 in. down. The raw coal is separated before being washed, and all coal passing through a 1½-in. revolving screen is washed in one jig and larger sizes in the other jig. Chutes and conveyors are so arranged that the entire washed product, or the sizes above 1½ in., can be put in with the nut coal or loaded separately to suit the demand. All coal that is not washed is hand picked. (See Fig. 2.)

The washer refuse is very economically disposed of at this plant. It is hauled from washer to dump over the track shown at *l*, Fig. 4, by means of a tail-rope which winds on a drum equipped with friction on the driving shaft of the jigs. The rope can be seen in the photograph. The refuse car automatically dumps at the proper place.

There are two features of the surface plant that are not in the strict sense of the word necessities for a coal mine, but are the ear-marks of an operator that has the best interest of the mines at heart, they are: The drinking fountain, shown at *d*, and the bath house, shown at *e* in Fig. 3. The fountain is fed, by means of a compressed-air line, from a stream that was struck in the main shaft. The fountain is of concrete construction. The bath house is not yet in use, but is nearing completion. It is also of concrete construction, and when completed will be equipped with sufficient showers and steel lockers to accommodate the workmen. In keeping with modern practice, the name of each building is plainly painted thereon.

The main, or hoist, shaft is 10x20 ft., 126 ft. deep, with three compartments, two for hoisting and one for



FIG. 4. VIEW OF PLANT FROM MUCK DUMP

A, washer; B, headframe; C, boilers; D, fan; E, machine shop; F, carpenters' shop; G, flume for boiler coal; H, flume for wasting extreme fines from boiler coal; I, track for washer-refuse car.

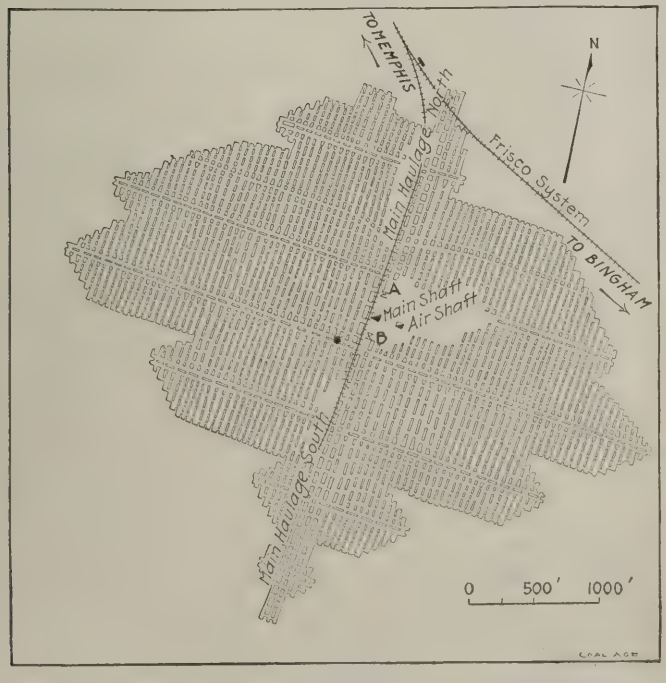


FIG. 5. UNDERGROUND PLAN OF BIRMINGHAM FUEL CO.'S TOWNLEY MINE



FIG. 6. CAR LOADED WITH FANCY LUMP PASSED OVER A 6-IN. SHAKING SCREEN

pipes, etc. The timbering is of pine. The air, or fan, shaft is 100 ft. east of the hoist shaft. It is 10x14 ft., with two compartments, separated by a reinforced-concrete wall. One compartment is connected with the fan and the other used for a manway. The manway compartment is provided with a steel ladder built in short flights. It is used in emergencies only, as the men are let into and out of the mine by means of the cage.

For the protection of life and limb, and for the sake of general neatness, all timbers and ribs of main headings adjacent to the main shaft, as well as those of passages to the manway, are kept well whitewashed.

For the protection of the shaft and surface plant, a 60-ft. pillar was left between the main haulageway and air courses on both sides of the shaft to the first headings. Sufficient pillar was also left around the airshaft for its protection. The reader will note, upon reference to Fig. 5 that main haulageways are driven north and south from the shaft. These haulageways divide the basin, as nearly as possible, into equal parts. They are driven 18 ft. wide with a 15-ft. air course on both sides, and a 20-ft. air-course pillar.

From these main entries, at intervals of 400 ft., double entries are turned at right angles. The double entries are driven 13 ft. wide with a 20-ft. pillar between. These double entries, as well as the main entries, are driven on sights. Rooms are turned from the double entries on 35-ft. centers, and the coal mined by the room-and-pillar-advancing method, with 25-ft. rooms and 10-ft. pillars. The rooms are necked off 8 ft. wide at the heading and substantial stumps are left alongside the heading. Such pillars as it is possible to rob are robbed on the retreat.

In mining, the coal is undercut with Ingersoll-Sergeant coal punchers and shot down with black powder. In



CAMERON COLLIERY OF MINERAL RAILROAD

shooting, the holes are drilled up through the shale parting near the top, and the powder bedded in and above the parting. Charges strong enough to break the coal down, but not to scatter it, are used. In this way it is possible in loading the coal to uncover the parting and throw a large part of it into the gob, without it becoming mixed with the main body of loose coal, and, at the same time, correct shooting yields a larger percentage of lump coal. In this mine the average yield per keg of powder is 90 tons, which represents an actual shooting charge closely approximating 2c. per ton.

The ventilation is a combination of the split and continuous systems. The mine is divided into four quarters by the ventilation scheme, and each quarter, or corner, is ventilated by a separate split of air, which passes, without further splitting, through the workings. This system gives each section of the mine a sufficient supply of fresh air and necessitates only two overcasts. These overcasts will be noted on Fig. 5, on the main haulageways on either side of the hoist shaft at points *A* and *B*. In order to prevent the main shaft from freezing, the fan is used as a blower during the severe winter months.

The mine does not make any considerable amount of water; therefore the pumping problem is comparatively simple. Three pumps are maintained which have a combined capacity far in excess of the demands. They are all Camerons—one No. 10A, one No. 8 and one No. 3.

The mine has an average daily output of 1200 tons, which is undercut with 16 punchers and hauled by 26 mules. The high yield per mule is made possible by the excellent condition of the tracks. The mules are stabled outside and are taken into the mine on the cages.

The mine employs a total of 315 men, 24 of whom are used outside and 291 inside.



AND MINING COMPANY, SHAMOKIN, PENN.

Anthracite Coal and the Public

The *Philadelphia Public Ledger* of Mar. 20 prints the following editorial under the title, "An Invisible Hand Takes Heavy Toll on Anthracite:"

Nothing but a long and tedious lawsuit can decide whether the Lehigh Valley maintains a coal trust. But no trial is necessary to convince all consumers of anthracite that they pay too much for it.

The United States census figures of 1910 showed that the average value of a ton of anthracite loaded on cars at the mines was $1.86. That the price included the royalty paid by the operators to the owners of the coal.

To bring a ton of anthracite from the mines to Philadelphia costs from $1.70 to $2 a ton. It is true that the census figures for the value of a ton of mined coal did not include interest on the enormous sums invested in the properties.

After allowing for a substantial rate of interest and after establishing a sinking fund for the exhaustion of the mines, the difference between that and the more than $7 which the consumer pays is entirely too much.

Somewhere an invisible hand appears to reach out and collect a heavy toll on every ton of anthracite between the time it leaves the mine and the hour it is put into your cellar. Whose hand is it? To whom does that toll go?

This we do know, that of all the railroads in America the anthracite companies as a group are much the most prosperous. Lackawanna's 20 per cent. dividend, Jersey Central's 12, Lehigh Valley's 10, Delaware & Hudson's 10, and Reading's 8, show that these carriers thrive no matter how hard other roads struggle to make both ends meet.

Perhaps those invisible hands which collect the heavy tolls on anthracite belong to the coal sales companies, for they also thrive mightily and pay big dividends on a capital stock distributed free to the shareholders of at least two coal railroads.

In answer to the above statements, Eli Conner, of Philadelphia, makes the following reply:

Mar. 20, 1914.

Editor "Philadelphia Ledger,"
Philadelphia, Penn.:

Dear Sir—Noting your editorial in this morning's "Ledger" entitled "An Invisible Hand Takes Heavy Toll on Anthracite," I desire to call your attention to the unfairness of some of your statements.

I hold no brief from any of the anthracite corporations, but 20 years' experience in a managerial capacity, besides frequent professional engagements in that region, gives me intimate knowledge of the conditions governing the industry. I believe the "Ledger" is fair enough to justly present the situation to its readers.

The cost of producing anthracite coal and the prices realized by the mining companies therefor, was exhaustively set forth in House of Representatives Document No. 1442, 62d Congress, entitled, "Increase in Prices of Anthracite Coal Following the Wage Agreement of May 20, 1912." A statement is given in this document showing "operating cost per ton of 2240 lb. at collieries, not including royalties, taxes, sinking fund, interest on investments, or general office expenses," of seven of the largest producing corporations, whose aggregate output in 1911 was 35,382,545 tons, or about 52 per cent. of the total output of the whole anthracite region. The average cost of producing this large amount of coal on the above basis was, in 1911, $1.897 per ton. The wage increase of 1912 was computed at an average for the whole region of about 9c. per ton, which, added to the 1911 average, brings the cost up to $1.987.

The items excluded from the statement above quoted, namely royalties, taxes and sinking fund, but omitting interest on investments, would throughout the region average at least 25c. per gross ton, bringing the cost up to $2.337 per ton at the mines, or 0.477c. per ton more than the cost figure quoted in your editorial, $1.86.

The tendency in the production of anthracite coal is toward constantly increased costs, due to the general increasing "cost of living"; to the greater amount of coal that must be won from thin beds, which in order to be mined at all necessitate the removal of large quantities of rock to make working height; to the greater depths and longer distances the raw product must be transported underground; and to the fact that to properly conserve the mineral, it is necessary to mine as they are encountered in downward development, thin and lean beds at an actual loss, or else leave them in such a state that by reason of extracting beds beneath them they cannot hereafter be recovered; in other words, destroy them for all time.

Therefore, it is probable that the general average cost of producing anthracite coal at the present time is above the figure quoted, $2.337. There are, to be sure, companies whose mines are exceptionally favored by natural conditions, resulting in lower costs than this, but a general average is a fair one.

Now as to the other statement contained in your editorial, the price charged the consumer, over $7 per ton. You do not qualify this statement, merely comparing it with the quoted cost of $1.86. This is quite misleading. While it is true that the sizes of coal known as domestic sizes, namely, broken, egg, stove and chestnut, are retailed at the quoted figure above, these sizes constitute but about 60 per cent. of the output. In other words, to produce an average ton of anthracite, 40 per cent. is in the so called steam sizes, known in the trade as pea, buckwheat No. 1, No. 2 and No. 3, mustard seed and screenings, which sizes are all, with the possible exception of pea, byproducts of the industry, and must be sold in competition with bituminous coal.

The price realized by the anthracite-mining companies is, therefore, the average of all the sizes sold. On the basis of 60 per cent. domestic sizes and 40 per cent. steam sizes, and at the market prices prevailing in 1913, after deducting selling expenses, the average price realized by the producers of the whole anthracite region "at the mines" would not exceed $2.85 per gross ton.

The question of the freight rate for transporting anthracite coal to market is another matter that will doubless be solved in due time, but the fact should not be lost sight of that there are many mines now being operated at an actual loss, which loss is partly recouped from the freight profit. If this latter is greatly reduced, the unprofitable mines must necessarily be abandoned. The remaining mines will then be unable to supply the demand for anthracite coal, and as a natural consequence the price will go still higher, and the last state of the consumer will then be worse than the former.

ELI T. CONNER,
Mining Engineer.

Stephen-Girard Building, Philadelphia, Penn.

Explosives in Coal Mines Order

Secretary of State R. McKenna recently issued an amending Explosives in Coal Mines Order, under date of Feb. 10, 1914, in pursuance of the power conferred by Sec. 61, of the Coal Mines Act, 1911. By this order, the explosive "Bellite No. 4," of the order of Sept. 1, 1913, is withdrawn from the schedule, another "Bellite No. 4" being substituted therefor. Also, the explosive "Sheppey powder" of the Order of Nov. 25, 1913, is withdrawn from the schedule.

The Order of Feb. 10, 1914, adds six new explosives to the permitted list of the previous schedules. The added explosives, which have passed the new Rotherham test, for Canada, are as follows:

Bellite No. 4—Composition (parts by weight): Nitrate of ammonium, 68-64; di-nitrobenzol, 15-13; chloride of sodium, 21-19; moisture, 1. Permitted weight of charge, 18 ounces.

Faversham Powder No. 2—Composition (parts by weight): Nitrate of ammonium, 48.5-45.5; nitrate of potassium, 25-23; tri-nitrotoluol, 11-9; chloride of ammonium, 19.5-17.5; moisture, 1. Permitted weight of charge, 24 ounces.

Kent Powder—Composition (parts by weight): Nitroglycerin, 25-23; nitrate of potassium, 33.5-30.5; woodmeal (dried at 100 deg. C.), 31-28; oxalate of ammonium, 11-9; moisture, 6-3. Permitted weight of charge, 32 ounces.

Monarkite—Composition (parts by weight): Nitroglycerin, 13-11; nitrocotton, 0.5; nitrate of ammonium, 51-48; nitrate of sodium, 8.5-6.5; chloride of sodium, 26-23; starch, 5-3; mineral jelly, 2.5-1.5; moisture, 2. Permitted weight of charge, 26 ounces.

Monobel, No. 1—Composition (parts by weight): Nitroglycerin, 9.5-7.5; nitrate of ammonium, 70-66; wood-meal (dried at 100 deg. C.), 9-7; chloride of sodium, 16-14; moisture, 2. Permitted weight of charge, 10 ounces.

Swale Powder—Composition (parts by weight): Nitroglycerin, 20-18; nitrocotton, 1.5-0.5; tri-nitrotoluol, 5-3; perchlorate of potassium, 38.5-36.5; wood-meal (dried at 100 deg. C.), 10-8; oxalate of ammonium, 29-27; moisture, 2. Permitted weight of charge, 20 ounces.

The full list of permitted explosives will be given next week.

Half-Million Dollar Experiment Station Proposed for the Bureau of Mines at Pittsburgh

Plans for the proposed $500,000 experiment station of the U. S. Bureau of Mines, to be located in Pittsburgh, Penn., have been approved by the commission appointed by Congress for that purpose. The Federal Government now owns the property upon which will be erected a group of buildings, especially designed and adapted for the carrying on of the mine-safety work and other investigations in which the Bureau of Mines is interested.

Congress, a year ago, in the Public Buildings bill, authorized a new home for the Bureau of Mines, to cost $500,000. It is now expected that Congress, in its present session, will make a specific appropriation so that construction work may begin. It is hoped that contracts may be let by July 1.

The commission that approved the plans consists of J. A. Holmes, D. C. Kingman, chief of engineers of the U. S. Army and O. Wenderoth, supervising architect of the treasury. The State of Pennsylvania has appropriated $25,000 for coöperation in establishing this experiment station, and has appointed a state commission, consisting of James E. Roderick, chief mine inspector, Dean W. R. Crane, of the mining department, Pennsylvania State college, and W. H. Caverly. This latter commission has tentatively approved the plans.

The proposed site consists of nearly 12 acres of land, part of it on the higher level of the city streets and part of it on the level of the B. & O. R.R., which will furnish adequate facilities for passengers and freight traffic.

The group consists of three main buildings. The central building of the group, the mining building, will be three stories in height, flanked by two other buildings, one the mechanical, and the other the chemical building. In the rear of these, and inclosing a court, will be the service building. Beyond the service building, and spanning what is known as Panther Hollow, thereby connecting the Bureau of Mines buildings with the Carnegie schools, will be two buildings, over the roofs of which will pass the roadway from Forbes St. to the Carnegie schools and Schenley Park.

Between the main group and the power and fuel group, will be the entrance to a series of mine shafts. One of these will be used as an elevator to carry heavy material and passengers from the lower level to the upper; another will be for tests of hoisting ropes and similar mining appliances; another will be an entrance to tunnels extending under the buildings and in which mining experiments, such as fighting mine fires, will be conducted.

The portion of Panther Hollow above the power buildings will be arranged as a miners' field, the slopes of the ravine being utilized as an amphitheater, which will accommodate 20,000 spectators, who may assemble there to witness demonstrations in mine rescue and first-aid.

The main, or mining, building will contain the administrative offices, and those of the mining force.. In it will be an assembly and lecture hall, a library, smoking room and other rooms for demonstrations and training in mine rescue and first-aid. The mechanical building will be for experiments and tests of mining machinery and appliances; and the chemical building for investigation and analyses of fuels, explosives and mineral substances.

The buildings now used by the Bureau of Mines as an experiment station, at Pittsburgh, were loaned by the War Department, as an emergency measure, when the Bureau was created. The War Department has suggested that it now needs its own buildings and it is felt the Bureau cannot retain possession much longer. The buildings are very old and are entirely unsuited to the needs of the work. It is said that the investigations have been seriously handicapped by the inadequacy of the structures now in use.



PROPOSED NEW BUILDINGS OF U. S. BUREAU OF MINES

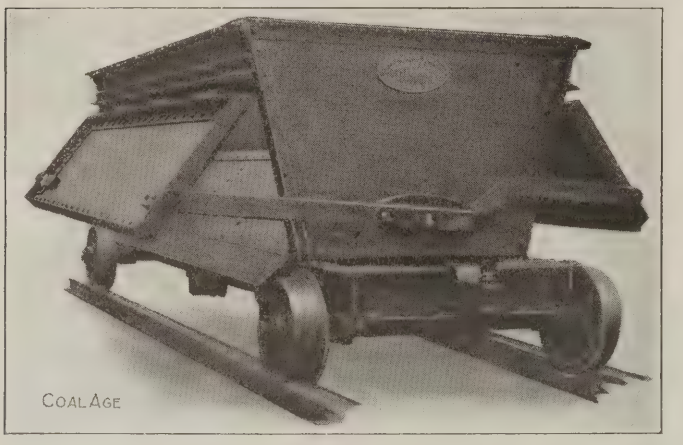
Illinois Miners and Mechanics Institute

Recognizing the importance of the coal industry in Illinois, the legislature of that state has authorized the establishment of an institute designed "to prevent accidents in mines and other industrial plants, and to conserve the resources of the state." The administration of the institute is vested in the trustees of the State University. The trustees have appointed a director and have placed the institute under the general supervision of the Department of Mining Engineering of the University of Illinois. The chief purpose of this institute is to serve the employees of coal companies who wish to attend a short course on coal mining. The institute will, therefore, offer such a course beginning Apr. 6, and continuing until May 16, 1914. There is also a two-year course of systematic instruction, which is so arranged that a man will be able to continue full time at his work while engaged in acquiring technical knowledge. Bulletins can be obtained by addressing R. Y. Williams, Director, Illinois Miners and Mechanics Institute, Urbana, Ill.

A New Type of Automatic Dump Car

The Montgomery Coal Washing & Mfg. Co., of Birmingham, Ala., have placed on the market an automatic dump car, which seems to be an improvement on many types now in use.

The Montgomery company originally designed this car for removing the refuse matter produced in the operation of their coal-washing plants, but it has gradually found its way into use in many places where a monitor car is necessary, such as handling coal, stone, or ore down an incline, removing mine refuse, stocking coal, coke, etc., and removing boiler refuse.



NEW STYLE DUMP CAR FOR COAL MINES

While commonly employed on an incline where it returns by gravity, this car may be used equally well in connection with a tail rope or may be provided with a motor for self propulsion.

The car is provided with a friction wheel beneath the body which comes in contact with an ordinary 2-in. plank, spiked to the ties, thereby automatically opening and closing the doors; the doors being opened on its passage over the plank and closed and locked on its return.

By changing the position of the friction wheel and providing additional planks, two or more cars may be operated on same track and dumped at different places.

The Situation in Labor Circles

The current week has witnessed the adjournment of the Chicago conference, which involves the western Pennsylvania, Ohio, Indiana and Illinois districts, and the reconvening of the central Pennsylvania conference at Philadelphia.

The disagreement in the Western situation was the result of a deadlock regarding the elimination of Clause Three of the Cleveland agreement. The miners proposed that this agreement be used in its entirety, with the exception of this Clause Three, which they desire omitted. The operators would not accept this condition. This clause provides that no change in the agreement reached at the joint conference, which will in any way affect the cost of production shall be made by district organizations. The removal of this condition from the agreement would make it possible for local unions to demand an increase in wages at any time they desired.

District President Patrick Gilday, of District No. 2, United Mine Workers of America, with nine delegates, represents the union contingent at the new Philadelphia conference. They are still demanding a 10 per cent. increase for all day labor, the check-off, the mine-run basis, and that the operators pay the expense of pushing the mine cars. Up to the present writing, the deadlock has been as complete as at the two previous conferences, and there are no present indications that an agreement will be reached.

A Big Consolidation of By-product Companies

Otto Coking Co., Inc., has been formed to operate in the United States, and, on Mar. 1, 1914, took over the organization, assets and good will of the Schniewind Coke Oven Co., the United Coke and Gas Co., the German American Coke Co. and the American Coke and Gas Construction Company.

The Otto Coking Co. is controlled by the interests in Dr. C. Otto & Co., of Dahlhausen a. d. Ruhr, Germany, and the Otto Byproduct Coke Co., of Leeds, England. The object is to introduce into the United States the Otto Regenerative Oven, with direct recovery of ammonia, tar and benzol.

The new company starts out with a contract for the immediate erection of a plant for the Buffalo Byproduct Coke Corporation, at Lackawanna, N. Y., near Buffalo, with several other negotiations now going on for additional plants.

The permanent officers of the new corporation will be Dr. M. G. Christie, Leeds, England, President, who will spend about half his time in this country; Dr. C. Otto, Assistant to the President, who will shortly take up his permanent residence in this country—Dr. Otto being the son of the inventor of the original Otto oven. The Vice-President and General Manager will be Mr. Louis Wilputte, one of the best known coke-oven engineers in America. The Secretary and Treasurer will be George F. McKay. The temporary offices of the corporation will be at No. 6 Church St., New York City, where they occupy the entire seventh floor.

Itinerary of Federal Rescue Car

EVANSVILLE CAR No. 3

Arrive	Leave	Address
1914		
March 23	March 28	Boone, Iowa
March 30	April 4	Colfax, Iowa
April 6	April 11	Melcher, Iowa
April 13	April 18	Knoxville, Iowa
April 20	April 25	Ottumwa, Iowa
April 27	May 2	Albia, Iowa
May 4	May 9	Chariton, Iowa
May 11	May 16	Dallas Center, Iowa
May 18	May 23	Mystic, Iowa
May 25	May 30	Rathburn, Iowa

Erratum

In our issue of Mar. 14, p. 437, referring to the capacity of air to absorb moisture, the following statement is made: "It practically doubles with every 250 deg. F." This should be: "with every 20 deg. F."

COLLIERY NOTES

In Illinois, there are 79,411 men working in and about the coal mines. Only two other states have a larger production of coal, and in no other state is there as much unmined bituminous coal as there is in Illinois.

A good light at the pit bottom and along main haulage roads is very necessary. Where the lighting is done from power circuits, bulkhead and well-glass fittings, hermetically sealed and protected by wire guards, and connected five in series on 500 volts, make a satisfactory arrangement

European experience in colliery operations is tending to prove that it is advisable to have two winding drums instead of one to each shaft; when this plan is followed, the two cages in the shaft can be raised and lowered independently of one another. German experience along this line has shown conclusively that in working thick seams of coal, a much larger output can be obtained by the employment of two drums.

Editorials

Miners' Union Opposes National Guard

The Illinois division of the United Mine Workers of America assembled in convention at Peoria on Feb. 27, and by a vote almost unanimous adopted a resolution condemning the National Guard as maintained in the various states, and urging all labor unions to do everything in their power to discourage their members from allying themselves in any way with the state soldiery.

It was pointed out in justification of this resolution that in all industrial struggles the National Guard had opposed and often frustrated the designs and practices of union labor.

So far as we are aware, the National Guard of Illinois has never been called into service, except for the protection of life or property. No law-abiding citizen, or group of citizens, has aught to fear from this most powerful and efficacious weapon of the commonwealth—the last resort of the chief executive. This antipathy to our military organizations now displayed by the United Mine Workers causes us to doubt the sincerity of their desire to act within the bounds of the law.

Religion and Coal Mining

We readily grant that in admitting the Sunday schools of Palos, Ala., to our columns, we depart somewhat from the rules which regulate the technical press and we do not expect to do this frequently.

It is needless to say that the difficulties in many towns arise largely from a disregard of that essential element in human progress—religion. If the reader doubts the importance of this factor, we would refer him to Benjamin Kidd's "Social Evolution," to prove the effect of the religio-ethical element in the progress of civilization.

As he points out, the resistance of the classes which possessed formerly the sole right to vote, to an education and to political preferment, have been broken down by the surrender of the more liberal members of that class to the nonrational or religious arguments presented. The poorer people have always been largely and most successfully led in their opposition to the richer not so much by the members of their own class as by the more ethical elements in the very class whose privileges were thus threatened. It is true today that the more arrant forms of capitalism are most menaced by protagonists found among the capitalists.

The appeal is always to rights and not to force and the world moves steadily along. If the nonrational appeal is of no value, why do the labor unions so continually use it? They rarely say we can do thus and thus, but rather that public opinion demands this or that. Each side from the beginning appeals to public opinion, a motive power not rational, but moral.

But what is the virtue of the church and religious school? Men meet in political assemblies to reform *others* by force of law; they assemble in labor unions to restrain and compel capitalism by strikes, sabotage, demonstrations and blacklists. The operators meet and weary each other with condemnations of the workmen. These assemblages are all conventions of protest. They aim to regenerate the other fellow.

Your religious meeting is different. It is almost always for self-regenerative purposes and consequently marks real progress. We can conceive that as a result of increasing religious opportunities, our sociological campaign will move more rapidly, but certainly with less friction and clamor. When both parties, employer and employed, have their minds centered on their own particular shortcomings, those evils which threaten to convulse the state will have no place to hide.

Therefore, we hope that churches and Sunday schools will grow and flourish in our mining towns and incidentally smooth the paths of industry and advance the coming age of mutual help.

Playing to the Grandstand

The juggling of words, the distortion of fact, the placing of a subject in false perspective in order to win the plaudits of the multitude, are rhetorical tricks perhaps as ancient as the transmission of ideas by articulate utterance. The demagogue and agitator stoop to any means however perverting in order to "be in with the crowd." So long as such people can "play to the grandstand," they stop at nothing.

A Pittsburgh newspaper, under date of Feb. 13, prints the following editorial:

> Just as soon as these mining troubles are looked at by other than local eyes, carefully adjusted to viewing conditions through them and no others, a new picture is given to the public. It was so in West Virginia, it is so in Michigan, and it will be shown to be so in Colorado when the Federal investigators have completed their work.
>
> The Federal commission on industrial affairs has just reported that the troubles in the copper-mining regions of Michigan are due solely to the mine owners. That is what the senatorial committee reported in the case of the West Virginia coal miners. It is what the congressional committee now at work in Colorado will report.
>
> The Federal commission in its report gives the Western Federation of Miners an excellent bill of health. The report confirms what was said by the striking miners in Michigan—that the trouble was because the mine owners refused to treat with the miners' organization, or recognize any of its officers. Therefore, the long battle, and bloodshed, and wanton slaughter of 72 women and children at Calumet, was only for the legal rights that every man has.
>
> Of course, bound up in that is the right to defend themselves economically, but that is exactly what the mine owners have done. The main difference is that the miners organize to defend their lives, while the mine owners are compactly bound to exploit miners and public. But the question of right to organize is the one issue in the copper strike.
>
> That is what was found in West Virginia, and what will be reported by the congressional committee in Colorado. The miners simply want to exercise their right to defend themselves. If the Western Federation of Miners, or the United Mine Workers is unlawful, or unlawfully conducted, that is a matter for the legal authorities to deal with, not the mine owners' organization. Organizing for self-protection is not a crime, and the mine owners cannot make it one.

But—it is a **crime to shoot and deport, and "bull pen"** men, women and children, to trample them to death in a panic in a crowded hall, and starve them for trying to defend themselves. There is the crime.

We call particular attention to the statement in the third paragraph: "The trouble was because the mine owners refused to treat with the miners' organization or recognize any of its officers. Therefore, the long battle and bloodshed and wanton slaughter of 72 women and children at Calumet was only for the legal rights that every man has."

O tempora! O mores! Is it the inherent right of citizenship, is it the privilege or duty of the wage-earner to make of himself a veritable "dog in the manger?" to say to his fellow workmen and the world at large, "I will not work except under such and such conditions and you shall not accept that which I refuse?" Is there any law, statute or custom which requires any employer to treat with—much less recognize as "it"—any "officer" or organization of or among his employees?

"The miners organize to defend their lives"—human life cannot be jeopardized unless there be a source of danger. We note that the periodical quoted is silent as to the nature of this peril to the workingman's existence. Was it the musket or the lash, or was it a purely fanciful grievance, the offspring of some organizer's lurid imagination?

No sane, logical, thinking individual will question the right of any class of men to band themselves together for mutual enjoyment or advantage. When, however, the activities of such an organization run counter to the laws of our nation, when its members—whether right or wrong in their contention—resort to riot and intimidation, they must not blame the mine owner if the consequences of their indiscretion are both copious and bitter.

It is just as foolish and narrow to believe that the mine operators are always right in their contentions as as it is to believe that every miner is a saint with a through ticket for heaven. There isn't any higher percentage of virtue among coal men, high and low, than there is among the people engaged in other industries. Every move on the part of each class—employer and employee—must be considered fairly and without bias, if commerce and industry in America are to be advanced on lines of justice and truth. The greatest harm is sure to come from always approving or condemning without question the action of either party in a labor conflict.

At the present time unionism has become so widespread that regardless of fact, regardless of all principles of recitude or equity, regardless of property right, regardless of the time-honored laws of *meum* and *tuum*, the crowd must be catered to. Our Pittsburgh contemporary has "played to the grandstand."

The Union

In most of the coal states the "Miners' Union" has come to stay. The operator does not face the question whether he wants unionized or ununionized conditions, but what sort of men are going to lead the organization and what demands these men are going to make. Nor let anyone doubt that the men of the Union are going to make demands and not assent readily to the operator's wishes in mine regulation.

These are facts and to them the operator should not oppose mere bluster. Unkindly remarks about the Union only make the hard-working intelligent miner realize that the operator dislikes the Union from its president to the more humble pit committeeman. The more intelligent miner, therefore, is not disposed to incur the ill-will of his employer, and as a consequence, he keeps out of union activity, permitting the radical irreconcilables to entirely rule all labor councils.

We confess that a better spirit on the part of the operator might induce many men of fair mind and honest purpose to seek for union preferment. We do not suggest that the operator, quietly or otherwise, urge men of extremely conservative mold to run for office. Such men are too reactionary to lead. But men who know what is right, and who will stubbornly resist an unjust course on the part of either operator or miner, should be encouraged to seek the best places in the Union.

It is time for the public good that we should have men in the operating positions and in the Union, who will make development in mining more rapid by making it more profitable to both owner and miner. If the differentials be small, or if they be refused when machines of larger capacity are introduced, when coal conveyors are installed, when longwall systems are put in force and other changes are made, no progress will be possible.

If merchants and manufacturers acted like many union officials now act, we should still live as our fathers did. Advantages must be split between the buyer and seller, otherwise the buyer will not purchase or the seller deliver.

An opportunity for real statesmanship exists in the Union—a measure of good judgment, which will make money and easier conditions for both parties. Greediness, such as usually distinguishes the mine owners and the Unions alike, after a bitter struggle, never makes for efficiency. A new union, unlike a new broom, does not sweep clean. The "foxiness" exhibited on both sides generates suspicion, and improvements in mining methods are impossible, while men of real ability and sterling character are by reason of the many disagreements prevented from engaging themselves steadily in the executive service of either operator or miner.

The Chief Cause of Mine Accidents

In a letter to Doctor Holmes, President Moorshead, of the Illinois Coal Operators' Association, says:

I think you will agree with me that it is not so much for the want of laws that we suffer, as it is for want of respect for them. I do not mean that we should not have better appliances and more modern equipment generally, but I do contend that back of all our more serious accidents is the disrespect for law and authority.

We cannot hope for a better state of affairs until convictions in the courts for violation of the laws are more general, and this will not be until greater powers are given to inspectors and superintendents so that they may be able to arrest men who openly violate instructions.

Mr. Moorshead has here put his finger on the sore spot of the coal industry. Lack of discipline will destroy the most magnificent organization, and there cannot be discipline where there is not both fear and respect for the law. Let everyone insist on the enforcement of all our present mining regulations. The result will be that ill-advised legislation will be corrected, and in the end fewer fatalities will be recorded. There is no more certain way to cause the repeal or amendment of an unfair and unjust law than to insist on its strict observance.

Sociological Department

Method of Rendering First-Aid

By A. S. Snyder*

SYNOPSIS—A discussion of the most effective methods of rendering first-aid-to-the-injured in the more frequent types of mine accidents—as the breaking of a limb or the back—and practical suggestions regarding the best procedure in event of such accidents.

The first thing to learn in first-aid methods is to tie the reef, or square, knot. It is well to learn to tie a reef knot and thereafterward use that method for tieing all knots in whatever you do. They are as easily tied as the granny knot, look better, are more secure and more easily opened.

Neatness is another factor in first-aid practice which requires considerable attention. Even the most simple bandage for an injury of the finger should be applied with neatness, as it will impress the injured with confidence in the person attending the injury. Furthermore, if bandages are applied neatly, they naturally fit the parts to which they are applied better than if put on in a slouchy manner, and the result is that this precaution adds to the comfort of the injured person.

In rendering first-aid-to-the-injured, always keep this thought well impressed on your mind, "Whatever you do is to make the injured person as comfortable as possible and to prevent the injury from becoming more serious, until medical aid can be secured."

Fractured Limbs

Before moving an injured person, be sure to treat the injury in such a manner as to prevent further injury. In fractures of bones of the limbs, secure them with well padded splints, being careful not to have undue pressure at the point of fracture, as that would cause unnecessary pain. Pad on each side of fracture, and place one bandage on each side of fracture around splints.

In fractures of the lower leg, have the splints long enough to reach above the knee and secure them there with a bandage, to prevent any movement at the knee.

In fractures of the thigh, the outside splint should be long enough to reach from the armpit to the foot, and the inside splint, from the crotch to the foot. Place one bandage around the splints on each side of the fracture, one below the knee, one around the hip and outside the splint, and one around chest. Use one bandage to tie the feet together and one around both legs at the knees. In all, seven bandages are required.

In fractures of the middle, or upper third, of the upper arm, always apply the splints so as *not* to interfere with the elbow—one splint to the inner and the other to the outer side of arm, permitting them to extend down to the end of the elbow. If of the lower third of upper arm, it is best to use a triangular splint and secure the upper part of the upper arm rigid with the forearm.

In fracture of the forearm, have the splints reach from the end of the elbow to the tips of the fingers, and apply one bandage above the fracture and one below, starting the lower bandage in palm of hand, making a figure of 8 on back of hand and securing the ends above wrist.

When applying splints or bandages to any part of the hand or arm it is best to hold the arm in the position in which it is to be carried—it being understood that the arm should always be placed in a sling.

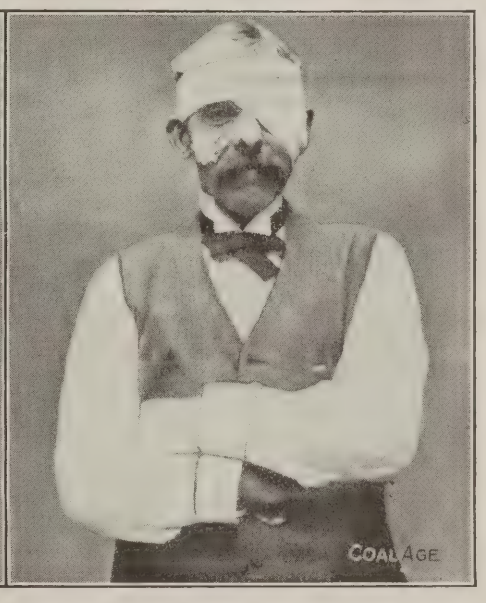
For fracture of the wrist or bones of the hand, secure with splint in palm of hand, letting it extend back some



Showing Proper Bandage for Injury to Hand



Bandage for Fracture of Right Collar Bone



Method of Treating an Injury to the Left Eye

*Berwind-White Coal Mining Co., Windber, Penn.

distance along the arm, so as to keep the hand rigid.

For fracture of the bones of the fingers, apply a small splint on the inside of the injured finger, or a piece of cardboard on each side.

Broken Back

A broken back is one of the most serious injuries with which a first-aid man comes in contact. The condition of the injured person is not always the same; their position after the accident is not the same; the degree of the injury is not the same. But in all cases the injured persons have to be handled with great care so as not to cause any further injury to the spinal cord. It is first necessary to place the injured persons on their back, after which the following described method of treatment has been approved by first-aid men and physicians everywhere.

Use two boards, 5 or 6 in. wide, placing them under the injured person, one on each side, being careful to pad the boards well beforehand. The best method of placing these boards under the patient, in order to prevent unnecessary movement, is for three persons to raise one side of the body high enough to slide one board under that side, parallel to the spine and about 1½ in. from center of spine; then raise the other side in the same manner and slide the other board under that side. The boards should be placed in such a position that they are about 3 in. apart, one on each side of the spine. The boards should be a little longer than the patient, if the ambulance or conveyance will permit. Cross pieces should then be placed under the two boards and securely tied to them at each end. The cross pieces should extend out far enough to serve as hand-holds in carrying the patient.

The injured person should then be securely tied to the splints by placing bandages around both the body and the splints; one about the chest and one around the hips. Each leg should also be tied to the splint on which it is lying. Special care is required to pad the boards or splints properly beforehand, so as to make the injured person as comfortable as possible.

I have seen a number of methods demonstrated and have heard descriptions of others I have not seen, but the above method seems to be the most satisfactory in every way. In case of a broken back it is required that persons treating the injury must use such judgment as is always required in emergency cases. When possible the treatment and moving of the injured person should be under the personal direction of a physician, and a physician should always be sent for at once.

Compound Fractures

The first thing to note in cases of compound fractures, as in other wounds, is, whether the hemorrhage is severe or moderate. If severe, it must be checked at once. Great care must be exercised to prevent infection. Clothing must be removed and a surgically clean dressing or gauze applied to the wound. This dressing must thoroughly cover the wound. If the end of the bones protrude through the skin, no attempt to replace them should be made, but the dressing and splints and bandage applied just as they are. The rest should be left for the physician, who should be notified immediately.

The clothing should always be removed from an injury in examining it, as no injury can be intelligently treated until its nature is known. In removing the clothing, it is best to cut it along a seam.

Varieties of Wounds

Any injury in which the skin is pierced or broken is called a wound. There are four general varieties of wounds, as follows:

1. An incised, or cut, wound, is a clean cut made by some sharp instrument, such as a knife, razor or piece of glass.
2. A lacerated, or torn, wound, is where the tissues are torn rather than cleanly divided, as in the case of an incised wound.
3. A punctured wound is generally small but deep, and may be caused by such instruments as a needle, nail, stiletto or pick. Bullet wounds are also classed as punctured wounds.
4. A contused wound is a bruise generally caused by a fall or by a blow from some blunt instrument.

A Sunday School at Palos, Ala.

When the Palos Union Sunday school was organized, August, 1912, its leaders realized that to make it a success, it must be an interdenominational body, as there were not enough members of any one creed for separate schools. When it was first organized, there were about 25 pupils present, but from the first the school has continued to grow, until now the enrollment reaches 200, with an average attendance of 100 pupils.

A special effort has been made to increase the adult Bible class, since September, 1913, and this endeavor has been most successful. There are on the roll 80 members, with an average attendance of 45, the largest number



The Palos Sunday School with the Superintendent in the Center of Foreground

present at any one time was 64, only 4 of whom were visitors, the rest being regular scholars.

The class name is Good Fellowship, and the emblem is the regular button with white center, around which is a red border; the class has membership, social and devotional committees. The membership committee look after new members and the absent ones, when they stay away more than two Sundays in succession; the aim being to help those that are in need of help—morally, spiritually or otherwise.

W. W. Kicker, mine superintendent, is in charge of the Sunday school. The method of organization of the adult Bible class and the name by which it is known do away with the idea that is a one-man class. Everyone feels that the class is his and not the teacher's private



THE GOOD-FELLOWSHIP CLASS AT PALOS
(Superintendent on left of second row from front.)

institution, in which he is introduced merely as a listener. The school is composed largely of miners and their families, but a number of farmers and business men in other walks of life are members.

It is an inspiration to any one to visit the school, and see the large number of men, women and young people in attendance. The school contains 106 members, and the Good Fellowship class has 46, as will be seen in the photographs.

Our little town of Palos is a well conducted village. The company which is the Republic Iron & Steel Co., does not permit the sale of whiskey and will not retain a man who gets drunk in its employ, nor will it permit drunkenness in any of its houses. Last Christmas not a drunken man was to be seen anywhere on the premises. The company employs about 200 men and they are of the best class.

Loyalty to Contract Obligations

By GEORGE N. LANTZ*

Patrick Gilday, president of District No. 12, United Mine Workers of America, is to be complimented on his boldness in advocating a penalty for breach of contract between miners and operators.

It requires a certain amount of courage to suggest the imposing of a fine for the misconduct of those who elect one to office. Especially is this true in the case to which I refer, inasmuch as the miners' union has always been known to be opposed to such a course. However, the action of President Gilday, in this matter, serves to emphasize the need of something of the kind. While not being troubled with the "button strikes" that have so frequently occurred in Pennsylvania, the miners in Ohio often go on strikes to settle matters that might easily be adjusted otherwise by the exercise of a little patience and good judgment.

The agreement between operators and miners provides that workmen shall not stop the mines, except for the breaking down of the scales or the refusal by the company to pay the miners on pay day. It is mutually agreed that either of these causes furnishes a sufficient excuse for the miners not going to work. A strike occurring from any other cause, whether otherwise justifiable or not, is clearly a breach of contract on the part of the miners. The fault may or may not rest wholly upon the miners, but may be the natural result of some injustice or unexplained action on the part of the operators. The terms of the contract, however, give no choice or option in the matter. The miners must continue to work if they would be *loyal to their contract. That the abrogation of a contract by one party thereto is a crime that should not be lightly regarded, all must allow.*

The inauguration of a system of fines for breach of contract would generally require the appointment or election of a board to interpret the meaning of the contract in different cases. If that board is well chosen and its duties clearly defined and it is understood and agreed that their findings shall be final, it will do much to eliminate friction between the parties to the controversy. The same board or a similar one might, also, decide a number of other matters that are local and cannot be specified in an agreement affecting whole states or districts. Among these may be mentioned: The eligibility of bosses for membership in the union; payment for "dead work"; removal of impurities from coal loaded in the mines; overtime and Sunday labor; payment for fractions of hours, and a number of other like matters that are often in dispute. The work of such a board, if properly systematized, might render disputes less frequent, as many questions would be governed by precedents previously established. The tendency would be greater coöperation between employees and employers, which is greatly needed.

*New Straitsville, Ohio.

Recent Legal Decisions

Injury Caused by Breaking Cable—A coal miner, who was injured through breaking of a cable used in drawing cars up an incline, was not necessarily guilty of contributory negligence in attempting to cross the track before the cars had passed. (Texas Court of Civil Appeals, Burnett Fuel Co. vs. Ellis, 162 Southwestern Reporter 911.)

Warning Miners against Existing Dangers—A mining company was not relieved from liability for injury to a miner, caused by the falling of part of a mine roof, because he was warned of the danger, if it was not his duty to prop the roof. (Kentucky Court of Appeals, W. G. Duncan Coal Co. vs. Thompson's Administrator, 162 Southwestern Reporter 1131.)

Injury Caused in Blasting—Scope of Miner's Employment—A coal-mining company cannot escape liability for injury to a miner, caused by fall of part of a mine roof due to shooting of nearby coal pillars, by showing that he was given no assurance that no shots would be fired. But that is a circumstance bearing on the question whether or not he assumed the risk of the accident. A miner engaged in replacing a canvas curtain which was used to divert fresh air into his working place, and which had fallen, was not acting outside the scope of his employment, as affecting his employer's liability for injury received while he was so engaged. (United States Circuit Court of Appeals, Eighth Circuit; Victor-American Fuel Co. vs. Peccarish; 209 Federal Reporter 568.)

Discussion By Readers

Widths of Opening and Pillar

Letter No. 1—Referring to the inquiry of Thomas C. Miller, COAL AGE, Feb. 28, p. 379, I desire to submit the following for consideration, believing that the further discussion of this question may be of special interest, not only to Mr. Miller, but to COAL AGE readers in general.

The answer given to this question in COAL AGE, at the time of its publication, is correct, as far as it goes; but in my opinion, certain important considerations have been overlooked. 1. The action of the dynamic forces that are set up when the sandstone and other overlying strata break to the surface as a result of robbing is not considered. 2. The extra loading due to the cantilever action of the roof on the pillars is overlooked.

The pillars must always be large enough, not only to support the superincumbent strata, but to provide against the conditions just mentioned. For economical mining, experience dictates that frequent resort must be made to "slabbing" or splitting of the pillars, in "robbing." This practice avoids the expense of cleaning up heavy falls of roof at that time.

Mr. Miller expresses the opinion that no falls of a serious nature will occur; but, at Rhodda, on Preacher Creek, and in other mines of the Stonega Coal & Coke Co. reported to be working the same seam of coal in the same locality, frequent areas of bad roof have been encountered; and it seems probable that the same conditions may later be found to exist at Benham, in which case it may be expected that the pillar work will be congested by falls of slate.

In the practice of robbing pillars, there is always a portion of the pillars that must be extracted before the roof breaks through to the surface. At times, this area of unsupported roof will cover an acre, and of necessity an excessive load is thrown on the pillars along the robbing line. The additional width of pillar required, under these conditions, is determined by assuming that the overhanging roof forms a uniformly loaded cantilever, extending from the robbing line to the last break in the gob. As the pillars are drawn back, the length of this cantilever increases until another break occurs over the pillar. A severe dynamic load is thus thrown on the pillars at intervals. Experience seems to dictate that the dynamic forces thus set up and the cantilever load acting on the pillars are as great as the dead load due to the superincumbent strata. If this be true, instead of 20-ft. rooms on 40-ft. centers, there should be driven 20-ft. rooms on 60-ft. centers.

Assuming, however, as Mr. Miller states, the pillars in the lower seam will stand for years, provision should be made for splitting the pillars, in robbing. These splits are seldom driven less than 16 ft. wide, and the original pillar should be, therefore, increased at least this width, making it necessary to drive 20-ft. rooms on 80-ft. centers. The dimensions given above are in common use in the Pocahontas field.

Again, it must be remembered that if the pillars are not mined clean, eccentric loading will occur, regardless of dimensions, in which case a squeeze is almost the inevitable result. For this reason, all mining should be conducted on the panel system, or some modification of the same that will provide large barrier pillars, at frequent intervals in the mine, and prevent the spread of a destructive squeeze throughout the entire workings. With proper supervision, over 95 per cent. of the coal in seams may be extracted at a reasonable mining cost.

As was stated in COAL AGE, in answer to this inquiry, "There are many factors that influence and modify the width of pillars and openings; and, while much value attaches to a theoretical analysis of the question, careful consideration must be had for such features as tend to lessen the strength of the pillars by softening the coal or the underlying stratum, or by producing a grinding action that would crush and weaken the pillars. The existence of gas in the coal or the strata adjacent thereto, or the presence of water, will tend to weaken the pillars and must be considered in studying this problem, as also any considerable inclination of the seam."

It should be the aim of every coal operator to conduct his operations in such a manner, that not only he, but the miner also, may reap the maximum return, for the minimum of energy expended. A recent study of room widths, for the purpose of trying to determine the most economical width of opening to adopt, would indicate that a 20-ft. room in a seam 5 ft. 6 in. thick, under conditions existing at Benham, is wasteful of the miner's energy and requires more than the minimum amount of explosive per ton of coal produced.

Indications of Gas on the Carbide Lamp

Some time since, mention was made in COAL AGE, Vol. 4, p. 27, of the behavior of the flame of an acetylene lamp in the presence of carbon dioxide. Warning has frequently been given of the increased danger to miners using carbide lamps, by reason of a greater depletion of the oxygen of the air being necessary to extinguish this lamp. The argument is advanced that the carbide lamp continues to burn in at atmosphere in which other lamps are extinguished.

In investigating this question for myself, I made careful observations in an abandoned entry from which the ventilating current had been excluded. My experiments led to the discovery of a phenomenon that I have never heard described or mentioned, and it occurs to me that the results might be of interest to the readers of COAL AGE. I believe it is the duty of any man who stumbles blindly onto facts that may be of value to his fellow workers or add to their common safety, to make these known and, with this purpose in view, I submit the following:

It may not be generally known that a much smaller percentage of marsh gas (CH_4) can be detected with an

ordinary carbide miner's lamp than by many of the safety lamps used for that purpose. I would first suggest that, in testing for gas with a carbide lamp, it is necessary to hold the lamp in such a position that the reflector will shield the eyes from the glare of the flame and care should also be taken to avoid the reflection of light from any surfaces in front of the lamp, as such reflection blinds the eyes so that the flame cap cannot be seen on the lamp. The best results are obtained with a large flame. In the presence of gas a luminous tail or cap extends outward and upward from the flame; which, in pure air, has a reddish tinge. I have found that a very small percentage of marsh gas, less than can be detected by the best safety lamp in use, causes this tail to elongate and take on a bluish tinge. When sufficient gas is present to give a cap varying from ¼ to ½ in. on the safety lamp, the cap on the carbide lamp will appear alarmingly large and wicked.

Having observed this fact by accident, I adjusted a carbide burner within the combustion chamber of a safety lamp, at the same time providing a shield to protect the eyes and permit the better observation of the cap. I found, however, that whether using a Davy lamp or one of the Clanny type, the reflection from the gauze or glass so blinded the eye that the cap could not be satisfactorily observed, and I concluded to abandon that attempt. Of course, the open carbide lamp cannot be used for ordinary testing purposes. But, when a test with a safety lamp fails to indicate the presence of gas, some surprising results may be observed on the open carbide flame, the tail of which is greatly elongated as the percentage of gas increases.

Interesting results were obtained in experiments with the carbide lamp in blackdamp. Entering a stagnant mixture, it was observed that there was enough marsh gas present in the upper stratum of air close to the roof to produce a faint cap ¾ of an inch long on a Wolf lamp. On lowering the lamp to within about 18 in. from the floor, the flame dwindled and it was necessary to raise the wick to avoid the extinction of the lamp. The lamp was then set on the floor and the flame was extinguished by the gas, which fact I consider indicated the presence of carbon dioxide and not simply an atmosphere deficient in oxygen.

The carbide lamp was now brought into use and developed a long cap that was much easier to observe than the ¾-in. cap on the Wolf lamp. On lowering the carbide lamp into the blackdamp at the floor, the flame was contracted and took on a reddish tinge. Its extreme brightness vanished and, instead of extending almost horizontally from the burner tip, as ordinarily, the end of the flame turned upward. Placed on the floor, where the safety lamp was extinguished, the flame of the carbide lamp continued to burn, though with less volume and brightness; and the outer third of its length was turned upward almost vertically. The carbide lamp was now advanced into a stronger mixture of blackdamp where it was necessary to increase the supply of water to maintain the flame. In this position, however, the flame went out suddenly, instead of gradually growing less and being finally extinguished, as is the case with an oil lamp.

In reporting these observations that seem to be of value, I would suggest that, although an experienced observer will learn to detect readily a lower percentage of blackdamp on a carbide flame than what would be fatal to life except by long exposure to its influence, the wisest plan is to use an oil lamp where blackdamp is suspected, because of the greater sensitiveness of the oil flame to extinction in this gas. I have offered the information, believing it to be valuable to a person who ordinarily uses a carbide lamp and who may unexpectedly encounter blackdamp, which would escape his notice but for this knowledge.

William Kellum, Supt.,
Southern Coal & Coke Co.
Glen Carbon, Ala.

Coal Mining in England, Past and Present

I have been greatly interested in the recent references, in Coal Age, to the efforts now being made to increase the safety in mines by suitable and much needed mine legislation and the certification of mine officials. It brings to mind some observations that I made on a three months' vacation trip in old England last summer, after an absence of ten years in this country.

Mining conditions there have greatly changed. Doncaster, in South Yorkshire, ten years ago was a sleepy farming town of little importance, except for its far-famed butterscotch and the annual horse-racing events. Today, it is a busy thriving mining center and contains some of the best equipped mines in England. Among these may be mentioned the Dinnington Main Colliery, the first English mine to be equipped with a wireless system of signaling underground—a German invention installed by a German firm. Here, also, is the Bullcroft Colliery, another finely equipped mine, the headgear being supported above the shaft on massive concrete arches. This mine is equipped with 3000 Ceag electric lamps. No open lights are allowed in the mine, which is the case, also, in a number of other mines in this locality. By the use of the electric lamp, the operators hope to reduce the prevalence of the miners' nystagmus, with which a large number of miners are afflicted in safety-lamp mines. Under the English law, miners suffering from this disease receive a certain compensation during incapacity, as provided by the Employers' Liability Bill.

At the Micklefield Colliery, in Yorkshire, a great transformation has taken place. New shafts have been sunk and new seams developed. But the most striking feature of all is the clean appearance of the surface plant, these mines being operated solely by electricity. No boilers, smoke, or escaping steam are in evidence. The buildings are of artistic design and the grounds surrounding them are laid out with shrubs and flowers. The coal, as hoisted, is transported to a distant point, where it is loaded on the railway cars. The entire plant is one of the most modern in England. The electric hoists employed are considered far superior to the old steam hoists.

The credit for these changes is to be attributed largely to the new Mines Act and the new mining rules and regulations put in force at the mines. The "Safety First" idea has been made a fundamental feature of the new law, which fact has greatly reduced accidents at mines where these laws are strictly obeyed.

Aside from these improvements and in strong contrast thereto, I regret to say the actual mining conditions underground have made little, if any, advance. My observations lead me to attribute this fact to the supplant-

ing of the practical mine managers of 15 years ago, with young men—a class known in England as the "Articled Pupil." These young men are generally the sons of the middle classes. By the payment of a certain sum, they are permitted to take a five years' course of study and apprenticeship, under the direction of the company's officials. They learn a little about surveying and accompany the officials in their daily rounds of inspection, asking questions and picking up such information as they are able to understand. At the end of the allotted time, they are given an examination which is more technical than practical. Having passed this examination, they remain with the company until a vacancy occurs.

Under this prevailing condition, I am sorry to say that the man who has worked hard in various capacities in the mine and, by constant effort and study, has fitted himself both practically and theoretically for the work, has scarcely any chance at all. He is only permitted to act as an instructor, to educate the "articled pupil" in practical mine work and help him out when later he becomes manager. As a consequence, it is not surprising that these older and more practical men simply perform their duties, as required by law, but, beyond this, manifest little interest in the welfare of the company. They are not allowed to develop any scheme of their own and their suggestions generally meet with a cold reception, the credit for the same, if the suggestion is used at all, going to the man higher up.

There is every evidence, in the mines, of wasteful expenditure and loss of useful material, owing to the lack of practical management underground. Timbers are left in the goaves; pack walls are poorly built; airways are choked by heavy falls, and the air current obstructed by sharp turns and long winding routes. While there are some good main haulage roads, the tracks in the cross gates and on stallroads are crooked and badly laid. To make coal mining in England pay better, no prophetic vision is needed to see that there must be more practical and less theoretical ability underground. The present existing conditions in the mines are detrimental to the best interests of all parties concerned.

EDWIN HUSBAND, Supt.,
Wadsworth Red Ash Coal Co.

Helena, Ala.

[Correspondents should never omit to give name and address when writing. If desired, the name will not be published. We regret that we have been unable to remit for some excellent contributions, because the writers have omitted to give either name or address, and but for their excellence, such unsigned matter would be discarded.—ED.]

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

General Potential of a Mine—An important application of the potential method, in mine ventilation, is the calculation of the potential value for the entire mine when the airways and shafts are of various dimensions.

Example—Calculate the general mine power potential in the following mine, shafts 1250 ft. deep:

			Area	Rub. Sur.
Shafts, upcast and downcast	8x10 ft.,	2500 ft.	80	90,000
Main airway ("A" seam),	6x10 ft.,	3750 ft.	60	120,000
Cross-headings ("A" seam),	6x 8 ft.,	2500 ft.	48	70,000
Tunnel to "B" seam,	5x 8 ft.,	500 ft.	40	13,000
Return air course ("B" seam),	5x14 ft.,	5500 ft.	70	209,000

Solution—The total power on the air, in any circulation, is clearly equal to the sum of the powers absorbed in the several sections of the mine, as expressed by the following general formula:

$$H = \frac{kQ^3}{K\,33{,}000}\left(\frac{1}{X_1^3} + \frac{1}{X_2^3} + \frac{1}{X_3^3} + etc.\right)$$

It will be readily observed that this general formula, for a mine of various sections (K being the coefficient of efficiency of the ventilator), is derived from the power formula

$$H = \frac{1}{33{,}000}\left(\frac{Q}{X_u}\right)^3 = \frac{Q^3}{33{,}000}\,\frac{1}{X_u^3}$$

But, since $1/X_u^3 = k\ s/a^3$ and k being constant, it is much simpler in using the above general formula, to factor and write k outside of the parenthesis, which makes each of the potential values within the parenthesis what may be called a "part potential" whose value is, omitting k,

Part potential $X_u = \frac{a}{\sqrt[3]{s}}$; and $\frac{1}{X_u^3} = \frac{s}{a^3}$

Now, calculating the value of $1/X_u^3 = s/a^3$, for each separate section of air passage in the mine given above,

Shafts, $\frac{1}{X_1^3} = \frac{90{,}000}{80 \times 80 \times 80} = 0.1758$

Main airway ("A" seam), $\frac{1}{X_2^3} = \frac{120{,}000}{60 \times 60 \times 60} = 0.5555$

Cross-headings ("A" seam), $\frac{1}{X_3^3} = \frac{70{,}000}{48 \times 48 \times 48} = 0.6380$

Tunnel to "B" seam, $\frac{1}{X_4^3} = \frac{13{,}000}{40 \times 40 \times 40} = 0.2031$

Return air course ("B" seam), $\frac{1}{X_5^3} = \frac{209{,}000}{70 \times 70 \times 70} = 0.6093$

Value for entire mine $\left(\frac{1}{X_0^3}\right)$ 2.1767

The part power potential for this mine is therefore

$$X_0 = \frac{1}{\sqrt[3]{2.1767}} = 0.7716$$

The Coal Age Pocket Book

Example—(a) From the part power potential calculated for the mine, on the preceding page, find the horsepower that will be required to circulate 30,000 cu.ft. of air per minute in a single current, assuming the ventilating fan to have a mechanical efficiency K = 60 per cent. (b) What water gage will be produced by the resistance in the mine, for this circulation?

Solution—(a) The required horsepower of the ventilator is

$$H = \frac{kQ^3}{K\,33{,}000}\,\frac{1}{X^3} = \frac{0.00000002 \times 30{,}000^3}{0.60 \times 33{,}000} \times \frac{1}{0.7716^3} = say\ 60\ hp.$$

(b) The mine water gage due to this circulation is

$$w.g. = \frac{kQ^2}{5.2\,X_u^3} = \frac{0.00000002 \times 30{,}000^2}{5.2 \times 0.7716^3} = 7.5\ in.$$

General Mine Potential, Equal Splits—It is possible to calculate the general mine potential when the air is equally divided one or more times, by simply multiplying the sectional area of the airway by the number of splits, as shown by the following example:

Example—A drift mine is opened on the triple-entry system. It is proposed to drive the main entries 7×10 ft. in section, a distance of 3000 ft. to the boundary. The cross-entries are to be driven double, 5x12 ft. in section and 1500 ft. to the side lines on each side of the main road, making in all 6000 ft. of cross-entries, including the returns. The main-return airways, on each side of the main intake are each 7x12 ft. in section and 3000 ft. long. Calculate (a) the horsepower on the air; and (b) the water gage produced.

Solution—The first step is to calculate the value $1/X_u^3 = s/a^3$ for each sectional division; thus

Main intake, 7x10 ft., 3000 ft. long: a = 70 sq.ft.; s = 102,000 sq.ft.
Two splits, 5x12 ft., 6000 ft. long: a = 120 sq.ft.; s = 204,000 sq.ft.
Main returns, 7x12 ft., 3000 ft. long: a = 168 sq.ft.; s = 114,000 sq.ft.

Substituting these values in the formula for finding the part potential value for each section,

Main intake, $\frac{1}{X_1^3} = \frac{102{,}000}{70 \times 70 \times 70} = 0.2974$

Two splits, $\frac{1}{X_2^3} = \frac{204{,}000}{120 \times 120 \times 120} = 0.1181$

Main return, $\frac{1}{X_3^3} = \frac{114{,}000}{168 \times 168 \times 168} = 0.0240$

Value for entire mine $1/X_0^3$ 0.4395

For the horsepower and water gage, we have

$$H = \frac{kQ^3}{33{,}000}\,\frac{1}{X_0^3} = \frac{0.00000002 \times 50{,}000^3}{33{,}000} \times 0.4395 = say\ 35\ hp.$$

$$w.g. = \frac{kQ^2}{5.2}\,\frac{1}{X_0^3} = \frac{0.00000002 \times 50{,}000^2}{5.2} \times 0.4395 = 4.2\ in.$$

FIREBOSS.

Meadow Lands, Penn.

The first question has recently been thoroughly discussed in COAL AGE, under the title Collapsible Stoppings. We shall be glad to receive the views of our readers in reference to the stonedust suggestion, in connection with the building of stoppings in mine entries.

Fan Ventilation

In a recent issue of COAL AGE, Jan. 24, p. 180, I noticed an interesting question in reference to operating two fans for the ventilation of the same mine in two separate sections, the return air from each section passing through the same return airway. I have a similar question that concerns our conditions here. It is as follows:

We are operating a mine that is extensively developed and in which the ventilation is becoming poor. The fan is producing, at the present time, 78,000 cu.ft. of air per min. against a 3.4-in. water gage. It has been proposed to install another fan, which will be a disk fan, 6 ft. in diameter, and which will ventilate a portion of the mine. Both fans, however, will be obliged to use the same return-air course for a distance of one mile, and both fans are to be operated as force fans or blowers.

The question is, Will both fans work successfully on this plan? I may state that the resistance of the main return-air course, at present, is equal to a 1.25-in. water gage. My own opinion is that the fan that is now in use will force air back through the portion of the mine intended to be ventilated by the small fan.

SUBSCRIBER.

Dayton, Penn.

In order to give an intelligent answer to this question, it would be necessary to know the length and size of the airways forming the two sections of this mine and the size of the main return airway. A plan should be given showing the present circulation and the proposed change. It is supposed that the present fan is a centrifugal fan capable of giving 78,000 cu.ft. per min. against a 3.4-in. water gage.

Though unable to offer an opinion of value, based on the data submitted, we may say that if a disk fan were to be installed in this mine, in order that it may assume its share of the work it would have to be capable of balancing the present installation. Under the ordinary conditions of mining, a 6-ft. disk fan would give, ay, 50,000 cu.ft. of air per min., against a water gage arying from 2 to 2.5 in. This fan would hardly balnce the action of the centrifugal fan now in use; and, s a result, we would naturally expect, as our correpondent has stated, that the present fan would still ontinue to force air into that portion of the mine inended to be ventilated by the disk fan. This is the est answer we can give with the information at hand.

Mensuration, Lateral Surface of Cone

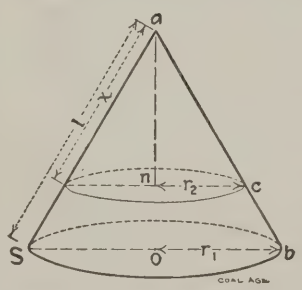
Please answer the following problem in the columns of COAL AGE:

The slant height of a right circular cone is 2 ft. At what distance from the vertex of the cone must the slant height be cut by a plane parallel to the base, in order that the lateral surface of the cone will be divided into two equal parts.

FRANK DEWEY, Asst. Foreman,
Bast Colliery.

Ashland, Penn.

Referring to the accompanying figure, let $a\,b\,s$ be a right cone whose slant height $a\,b$ is indicated by l. It is required to find the slant height $a\,c$ indicated by x and determined by a plane parallel to the base of the cone and dividing its lateral surface into two equal parts. The lateral surface of a right cone is equal to the product of the circumference of its base into one-half its slant height. Denoting the respective radii $o\,b$ and $n\,c$ of the bases of these two cones, by r_1 and r_2, we have, from the terms of the question,



$$(2\ \pi\ r_2)\ x/2 = \tfrac{1}{2}\ (2\ \pi\ r_1)\ l/2$$

$$x = \frac{r_1\ l}{\quad}$$

Miscellaneous Questions

(Answered by Request)

Ques.—What power will be required for hoisting an output of 800 tons of coal from the inside parting to the bottom of the shaft, 5/8 of a mile, up an incline having a grade of 2 in. to the yard, allowing time for the return of the empties. The empty cars weigh one-half as much as the load they carry. The resistance of the cars is estimated as $^1/_{60}$ of the gross load and as much power is required to move the rope as to move the cars. The speed of the rope is 3 miles per hour; the working day, 8 hr.; and the cars are moving four-fifths of the time?

Ans.—The length of the incline, or distance of haul, is $5/8 \times 5280 = 3300$ ft. The speed of winding, or velocity with which the cars mave is $3 \times 5280 \div 60 = 264$ ft. per min. The time required for one round trip is $2 \times 3300 \div 264 = 25$ min.

Since the cars are running four-fifths of the time, and the working day is 8 hr., the total time of hoisting is $^4/_5$ $(8 \times 60) = 384$ min. Allowing 25 min. for each round trip, the number of trips per working day is $384 \div 25 = 15+$ trips. This would leave $384 - (15 \times 25) = 9$ min. of extra time to allow for unavoidable delays. For an output of 800 tons hoisted in 15 trips, the weight of coal hoisted per trip is $800 \times 2000 \div 15 = 106{,}667$ lb. Since the cars weigh one-half as much as the load they carry, the weight of cars is 53,333 lb. per trip. The total load hoisted is, therefore, 160,000 lb. per trip.

For a grade of 2 in. per yd., or 1 in 18, the gravity pull, or pull on the rope due to the grade is $160{,}000 \div 18 = 8889$ lb. In like manner, the pull on the rope due to the resistance of the cars is $160{,}000 \div 60 = 2667$ lb. This makes the total pull on the rope, 11,556 lb. The power required to move the rope being equal to that required to move the cars, the total load in the engine is $2 \times 11{,}556 =$ say 23,000 lb. For a speed of winding of 264 ft. per min., the power consumed in hoisting this load is

$$H = 23{,}000 \times \frac{264}{33{,}000} = 184 \; hp.$$

Ques.—A mine is opened on the triple-entry system, the three main entries being driven parallel to each other. The two outside entries are free from accumulations of gas, and are driven 90 ft. ahead of the middle entry, which is found to contain explosive gas at the face. Explain how this condition could occur.

Ans.—The gas, in this case, is evidently not uniformly distributed in the seam or the underlying or overlying strata. Its appearance in the middle entry, which has progressed only to a point 90 ft. back of the two side entries, would indicate that the gas comes from a feeder or fault-line encountered by the middle entry. It frequently happens that gas will follow a slip or fault-line.

Ques.—The manometric efficiency of a mine is 70 per cent. and the mine resistance gives a water gage of 3 in. (a) If the area of the port of discharge of the fan is 0.6 of the area of the port of entry, what is the "blowing-in pressure?" (b) For the same conditions, what is the "blowing-out pressure?"

Ans.—This question is a relic of the past. In actual practice, it is impossible to measure with any degree of accuracy either the "blowing-in" or the "blowing-out" pressure of a centrifugal fan. It was formally the custom to estimate these pressures in accordance with the principle that the pressure producing circulation varies as the square of the velocity of the current, or inversely as the square of the area of the opening; in which case the pressure ratio would be equal to the square of the inverse area ratio. Denoting the blowing-in and blowing-out pressures by p_i and p_o, respectively, the corresponding relative areas being 10 and 6, in accordance with the statement of the question,

$$\frac{p_i}{p_o} = \left(\frac{6}{10}\right)^2 = \left(\frac{3}{5}\right)^2 = \frac{9}{25}$$

The mine pressure being $3 \times 5.2 = 10.4$ lb. per sq.ft. and the manometric efficiency 70 per cent., the total pressure or sum of all the pressures is $10.4 \div 0.70 = 14.857$ lb. per sq.ft. Subtracting from this the mine pressure, gives for the remaining sum of the blowing-in and blowing-out pressures $14.857 - 10.4 = 4.457$ lb. per sq.ft. But, the ratio of these two pressures being 9 : 25, the blowing-in pressure is

$$p_i = \frac{9}{9+25} \times 4.457 = \frac{9 \times 4.457}{34} = 1.18 \; lb. \; per \; sq.ft.$$

The blowing-out pressure is

$$4.457 - 1.18 = 3.277 \; lb. \; per \; sq.ft.$$

Inquiries of General Interest

Examination Questions

Coal and Coke News

Washington, D. C.

Attorney General McReynolds has filed his long-expected suit against the Lehigh Valley R.R. Co. on the ground that it is the principal factor in the combination alleged to control the anthracite output of the Pennsylvania mines. More than a dozen corporations and individuals are included as defendants and as being parties to a conspiracy to monopolize trade. The charges are the same as are already familiar in connection with the litigation in the past. It is pointed out in the bill that, through the alleged monopoly of the sale of coal produced along its line, the Lehigh Valley dominates the market at all points not reached by any other railroad, and has the power to fix without the check of competition the prices at which anthracite coal is sold. It is claimed that of 11,000,000 tons of anthracite annually carried by the Lehigh more than 82% is shipped for the account of the Lehigh Coal Co., which is described as a mere adjunct or instrumentality of the railroad itself. The litigation of 1910-11 is reviewed, and subsequent developments in conection with the sales company are described. The contract between the railroad company and the sales company, it is claimed, gave the latter unreasonably low rates for mined coal, fixed prices for coal to be mined and made other concessions of the same sort. It is alleged that the sales company's profits have been enormous, regular dividends of 2½% being paid, with an extra cash dividend of 25% after twenty one months' business and an additional extra dividend paid in stock, while a large surplus over and above dividends was retained by the company.

It is further alleged that the Lehigh R.R. Co. granted rebates and undue preferences to the coal company thereby violating not only the Sherman act but the railroad legislation of the United States.

It is understood to be the intention of the government to press the suit against the Lehigh Valley as vigorously as possible with a view to getting a thorough test of the general situation as affecting combinations of this kind, so that, if necessary at an early session of Congress, it may be attempted to revise the existing Interstate Commerce Act, insofar as such action may be found to be expedient, in consequence of the position taken by the Courts in this case.

* * * * * *

Senator Walsh has introduced a bill to promote the mining of coal and other minerals on the public domain, in which he deals separately with the several items whose production it is sought to regulate. With reference to coal, the essential points in the measure are as follows:

SEC. 2. That deposits of coal or lignites belonging to the United States, exclusive of those in Alaska, may, at the election of applicants qualified to enter coal lands under existing laws and to lease mineral deposits under the provisions of this bill, be acquired from and after the passage of this Act, in accordance with the provisions of sections twenty-three hundred and forty-seven to twenty-three hundred and fifty-two, inclusive, of the United States Revised Statutes, and acts amendatory thereof or supplemental thereto, or may be leased, as hereinafter provided.

SEC. 3. That the Secretary of the Interior is authorized to lease any deposits of coal or lignite owned by the United States, outside of the Territory of Alaska, through advertisement, competitive bidding, or such other methods as he may by general regulations adopt, in blocks or tracts of forty acres each, or multiples thereof, and in such form as in the opinion of the Secretary of the Interior will permit of the most economical mining of the coal in such blocks or tracts, but in no case exceeding two thousand five hundred and sixty acres in any one block or tract, said lands to be in compact form, as nearly as may be, no tract to exceed in length two and one-half times its width.

SEC. 6 That for the privilege of mining, extracting, and disposing of the coal in the lands covered by his lease, lessee shall pay to the United States such royalties as may be specified in the lease, which shall not be less than 2 cents per ton, due and payable at the end of each month succeeding that of the shipment of the coal from the mine, and the annual rental payable at the beginning of each year, on the lands covered by such lease, at the rate of 25 cents per acre for the first year thereafter, 50 cents per acre for the second and third years, and $1 per acre for each and every year thereafter during the continuance of the lease, except that such rental paid for any one year shall be credited against the royalties as they accrue for that year. Leases shall be for indeterminate periods upon condition of continued operation of the mine or mines, except when operation shall be interrupted by strikes, the elements, or casualties not attributable to the lessee, and upon the further condition that at the end of each twenty-year period succeeding the date of the lease such readjustment of terms and conditions may be made by the Secretary of the Interior as may be authorized by law at the time of expiration of such periods.

Harrisburg, Penn.

Testimony that the Central R.R. of N. J., which for more than a decade has been controlled by the Reading system, is not, and could not be, competitive with the Philadelphia & Reading Ry., was given on Mar. 17, by John F. Auch, vice-president, in charge of traffic of the Reading, speaking for the denfense in the new "anthracite-coal trust" suit of the government. The case involves nine anthracite-coal-carrying railroads and mining companies.

The hearing was held in the directors' room of the Reading Terminal, before Charles H. Guilbert, appointed master in the case by the United States District Court.

Mr. Auch submitted elaborate statistical data to prove that the interchange traffic of the Reading Ry. and the Central R.R. of N. J. could not be in any material degree competitive. The various interchange points in New Jersey and Pennsylvania, he showed, are merely railroad crossings and not sizable communities for the traffic of which railroads might compete. Practically all the interchange freight, Mr. Auch said, originated on the Reading lines destined for some point on or beyond the Jersey Central lines, or vice versa. Mr. Auch further declared that the Reading and Central R.R. of N. J. could in no sense be regarded as competitors for traffic between Bethlehem, Penn., and New York.

Reciting the causes that led to the purchase of a majority of the Central R.R. of N. J. stock by the Reading Co., Mr. Auch said this step was taken to procure for the Reading Ry. an entrance into New York, and to prevent a chaotic condition in the railroad situation that would have resulted had the Jersey Central fallen into other hands. The result, he said, would have been to shut the Reading out of New York completely. Mr. Auch maintained that the Jersey Central and Reading lines are mutually supplementary systems, and the very opposite of competitive.

Mr. Auch under cross-examination on Mar. 20, conducted by Mr. Coudert, counsel for the government, asserted that freight rates did not control anthracite prices. Mr. Coudert referred to a letter written by George F. Baer, president of the Reading, to T. P. Fowler, president of the Ontario & Western, under date of Oct. 1, 1906, in which Mr. Baer made the statement that if freight rates were reduced the coal companies would be compelled to lower their prices.

Testimony that any attempt to introduce new railroad competition in the Schuylkill region, where the Reading is in almost complete control, would be a costly failure, was given by Theodore Voorhees, vice-president of the Reading. Mr. Voorhees asserted that, owing to the narrowness of the mountain ravines in the Schulykill region, a competing road, taking second choice of route, would cost several times as much to construct as the Reading lines, and would have much heavier operating costs and greater fixed charges.

Mr. Coudert, counsel for the government, asked Mr. Voorhees why the Reading interests once spent $2,000,000 in what he termed "an illegal conspiracy" to prevent the building of a competing line. Mr. Coudert referred to the Temple Iron matter. Counsel for the Central R.R. of N. J. pointed out the projected line was intended to tap the Wyoming field and not the Schuylkill region.

It was brought out at the hearing, through A. T. Dice, general manager of the Reading, that the railway company never made any distinction between the Reading Coal & Iron Co. and the so-called independent coal companies in handling their product.

The Reading's control of the Wilmington & Northern R.R. came in for considerable questioning on the part of counsel for the government. The government contends that the Wilmington & Northern is a competing line between Reading and Wilmington, Del., but the Reading people assert that there were physical conditions why a large tonnage could not be sent over this line and to do so would require the building of almost an entirely new line. The Reading people also assert that the grades are steep on some parts of the road and that the cost of shipping coal over the Wilmington & Northern from the anthracite-coal regions to Wilmington would be very much greater than it is by going over the Reading lines, via Philadelphia to Wilmington.

The hearing was adjourned until Mar. 31.

PENNSYLVANIA

Anthracite

Luzerne—John M. Mack, president of District 1, of the U. M. W. of A., has issued an order proclaiming Apr. 1 as a holiday in commemoration of procuring of the eight-hour day, and ordering all members to celebrate the day by remaining from work.

Scranton—Examinations for mine foremen and assistant mine foremen in the anthracite districts will be given April 15 and 16 in the various towns in the 21 districts running from Forest City to Williamstown. It is stated that more attention will be paid to the character, conduct, and education of the applicant than heretofore. All persons taking the examination will be required to show a miner's certificate.

Lykens—Mine Inspector C. Price, of the 20th Anthracite District, included in which is the large East Brookside Colliery, near Tower City, where 20 lives were lost in August by an explosion, in his annual report shows a total of 36 fatalities in that district. The production of coal, per life lost, was 67,137 tons. There were shipped to market 1,964,723 tons, and the total production was 2,416,915 tons.

Edwardsville—Operations have been suspended at the Woodward colliery, owned by the D. L. & W., in order that necessary improvements may be made to the interior workings. Many doubtless wonder why suspensions for repairs are so numerous at this colliery, but it must be remembered that the Woodward is no longer a new mining operation. In times gone by more coal was sent to this market from this one concern alone than half a dozen other collieries, and it is still one of the greatest coal producing collieries in the entire anthracite region.

Bituminous

Patton—The supply and oil house of the Pennsylvania Coal & Coke Corp. was destroyed by fire on March 19. The burning oil made a blaze that was visible on the snow for many miles around. Defective wiring is thought to have been responsible for the blame.

Lansford—The steam shovels and scraper lines operated by the Lehigh Coal & Navigation Co. for more than a year, have almost removed the huge culm bank in the very heart of this growing town. This company is making a special effort to have the bank removed by spring in order to permit the erection of a fine $200,000 high school building.

Shamokin—After being enveloped by a huge blaze of sulphur at the Buck Ridge colliery on Mar. 20, John Soplasky, a driver boy, tried to walk along the gangway to alarm miners at work. A rescuing party found him terribly burned, and he will probably die. Five men in the rear of the boy and who had heard his cry, as the flaming sulphur approached, lay on their faces and escaped being burned. They were overcome by bad air. The rescuers took them to the surface, where they were revived. The fire was extinguished the next day.

Shenandoah—As George W. Isgate, 55 years old, and John Decrish, 18 years old, employed at the Thomas Colliery (sometimes known as the Kehley Run) were warming themselves on the morning of March 20 in a shanty on top of a culm bank on the side of the Locust Mountain when the earth opened and both men and shanty were swallowed. The breach is about 60 ft. in circumference and 75 ft. deep, and apparently leads to old workings 500 ft. deep. Rescuers set to work in hope the victims were still alive, but have to work cautionusly as the earth and rock were still caving on March 22. The shanty contained a large heating stove, which caused fear of the workings catching fire.

State Mine Inspector A. B. Lamb and officials of the company are directing the rescue work. Thousands have been attracted to the scene, and an extra force of police was called to keep them away from danger.

John Drimes, employed near the shanty, when the others disappeared, saved himself by grasping a steam pipe and clinging on until help arrived.

The colliery is operated by the Madeira-Hill Company.

KENTUCKY

Whitesburg—It is reported that the new mining towns of Benham, Poorfork, Dizney and Yocum's Creek, in the Harlan County field, will receive power from the Pocket, Va., station, making it unnecessary for the several companies interested in that part of the county to erect individual power plants.

Louisville—The Louisville Property Co., through which the Louisville & Nashville Ry. and the Atlantic Coast Line R.R. control a large area of coal lands in eastern Kentucky, held its annual meeting last week, in spite of the injunction proceedings brought by I. W. Bernheim, a minority stockholder, who brought suit to compel a change in management. Milton H. Smith, president of the Louisville & Nashville, retired as president of the property company, being succeeded by W. L. Mapother, vice-president of the railroad company.

OHIO

Martin's Ferry—Fire for a time threatened the mining town of Titonsville, near here, when nine dwellings of the Russel Coal Co. were destroyed recently. Powder stored in a number of the houses hampered the firemen in fighting the flames.

Columbus—The mine operators in Ohio are coöperating with the state mine department and the new Safety Superintendent, J. M. Roan, in educating the miners in all districts to look after safety to a larger degree than formerly. Mr. Roan has held a number of meetings with miners recently in which he instructed them in safety methods. An especial effort is made to minimize accidents in the eastern Ohio district, where they have been the most numerous.

OKLAHOMA

Oklahoma City—The State of Oklahoma is planning to enter the mining business, in the hope of providing enough coal for state institutions. The state attorney-general has been asked to condemn coal depsits underlying the penitentiary farm at McAlester. It is planned by the state board of prison control to utilize convict labor in working the operation. It is estimated that in this way coal can be provided for the state institutions at less than $1 per ton, as compared to an average of $2.70, paid during the past year. The fourth Oklahoma legislature passed an act authorizing the mining of coal under the penitentiary farm, and future proceedings will be based on this measure.

KANSAS

Pittsburg—Coal miners in district No. 14 of the United Mine Workers of America will pay 20c. monthly for the benefit of the strikers in the Michigan copper zone. A vote recently was taken on the proposition and showed a big majority to be in favor of the extra assessment. District No. 14 comprises the Pittsburg, Kan., mines. Of 12,000 miners in that district, about 10,000 are working, indicating that about $2000 monthly will be raised by the assessment. The plan took effect Mar. 1.

ILLINOIS

Gillespie—The week ending Mar. 14 was a banner week of coal hoisting at the Superior Coal Co.'s mines here. The three mines produced 13,432 tons for one day, the tonnage for the mines being as follows: No. 1, 4393; No. 2, 4431, and No. 3, 4608.

Springfield—The mine of the Cora Coal Co. at Andrew, north of this city, on the C. P. & St. L. R.R., was damaged by fire a few nights ago. The loss is estimated at $8000, and is partially covered by insurance. In addition to the framework of the shafts, four coal cars, two of them loaded, were burned.

COLORADO

Trinidad—The Colorado Fuel & Iron Co. have brought suit for damages to the extent of $1,000,000 against the United Mine Workers of America; and have secured body judgment against John T. White, president; Frank J. Hayes, vice-president, and a score of others. The charge to injure the business of the corporation through a combination of mine workers, in the basis of the suit.

INDIANA

Terre Haute—The Essanbee Mines Co. has moved its headquarters from Clinton to this city.

Sullivan—The Carlisle Coal & Clay Co. has reopened its mine, after three years' idleness. It employs 40 men.

Boonville—At a labor conference in the First District of Indiana, a resolution was adopted, opposing the mining of coal in the state by the stripping process.

Terre Haute—The Indiana Bituminous Coal Operators Association, at its quarterly meeting, reëlected the following officers: Hugh Shirkie, Terre Haute, president; David Engle, Oakland City, vice-president; Phil. H. Penna, Terra Haute, secretary-treasurer. Thirty operators, representing all fields in the state, were present.

CALIFORNIA

Vallejo—After 100 tons of coal had been removed from the hold of the army collier Jupiter, it was discovered on March 18, that she had not been on fire and that no damage had been done. Spontaneous combustion had progressed far enough to start the coal smoking, but had not reached the point of ignition.

ARKANSAS

Clarksville—The Spadra Creek Coal Co.'s "Monkey Run" coal plant was destroyed recently by fire, with a loss of approximately $50,000.

CONSTRUCTION NEWS

Fairmont, W. Va.—The Fairmont Mining Machinery Co. is planning a large addition to its present plant. This addition will be built during the coming summer.

Richmond, Ky.—C. G. Bowman, banker and coal operator, has contracted with Todd & Son for the construction in Hazard, Ky., of a two-story and basement brick dwelling 80x88 ft., which will be used for storerooms and offices. It will cost $22,000.

Fayette, Mo.—The Howard County Coal Co. will install a $25,000 brick plant near their coal mine, recently known as the Russell mine. They will manufacture bricks from the fireclay, which will be produced at the same time that the coal is mined.

Big Creek, Ky.—The Big Creek Coal Co. are starting work on another new coal mining plant at head of Pond Creek, and the construction of a two-mile spur of the Pond Creek R.R. to the new plant. Mining will begin by July 1, it is expected. They will develop 1000 acres around the new plant.

Greensburg, Penn.—The S. J. Harry Co. has been awarded a contract by the Salina Coal & Clay Co., for sinking and timbering two shafts near Avonmore. The shafts will be used for mining clay and for mining the Freeport vein of coal. The coal in the vicinity is said to be of an excellent quality.

Leavenworth, Kan.—It has been announced that the owners of the Home mine which was destroyed by fire recently will start rebuilding at once. Careful estimates place the loss at $25,000, two thirds of which is covered by insurance. No harm was done to the underground operations or timbering.

Whitesburg, Ky.—The Mineral Development Co., general offices at Philadelphia, Penn., have announced the development of 500 acres of coal lands on Colly Creek near Ermine, five miles from here, and the building of a four-mile branch line of the Lexington & Eastern R.R. The work of the new development is billed to start Apr. 1.

Salina, Penn.—The Salina Coal & Clay Co., of this place, a corporation with an authorized capital stock of $175,000, has in process of erection here, one of the largest fire-brick plants in the country, which is expected to have a daily capacity of 100,000 high-grade fire-bricks. In addition to its output of fire-bricks, the company expects to ship between 700 and 800 tons of coal daily. E. A. Serrin, of Greensburg, Penn, general manager of the company, is in active charge of the work.

Balboa, C. Z.—The Isthmian Canal Commission has just awarded to the Ingersoll-Rand Co., of New York City, the contract to furnish three large direct-connected, electrically-driven air compressors, of the Duplex type, embodying the new Ingersoll-Rogler valve. The combined capacity of these units will be 10,000 cu.ft. They will be installed in the Balboa shops, where the air will be used for general repair work in the shops, and also on the new dry dock. This equipment is to form a part of the permanent canal equipment.

Logan, W. Va.—The Main Island Creek Coal Co., of which John Laing, of Charleston, W. Va., is president, recently awarded a contract to the Link-Belt Co., of Nicetown, Philadelphia, for designing and building their new tipple equipment, consisting of an entire steel tipple, including apron conveyors for bringing the coal down the hillside, shaking screens for separating it into the various sizes and picking tables and loading booms for better preparing the coal for the trade and permitting it to be loaded into railroad cars with the minimum amount of breakage. The tipple will be erected near here.

INDUSTRIAL NEWS

Cherokee, Kan.—The Hamilton Coal Co., which recently abandoned prospecting on land near here, has resumed work on the Russell farm.

Waynesburg, Penn.—T. R. Huffman and G. E. Rice recently sold to the Bixler-Ohio Coal Co., of Ohio, 500 acres of coal for $37,500, and engineers are now on the property laying out the mines.

Cross Creek, Penn.—John A. Bell, representing Pittsburgh capitalists, has given notice to farmers in this township that he will accept options on the purchase of their coal, aggregating 1220 acres. The price for the coal is said to be $125,000.

Indianapolis, Ind.—A judgment of $6625 was obtained in the Superior Court of this city, by William C. Shoemaker against the receiver for the Carbon Coal & Clay Co., for use of machinery valued at $30,000, on which the company failed to pay the rental and other charges.

Princeton, Kan.—Much interest is manifested by operators of Missouri in recent discoveries on the Vernie Boxley farm near here, where a vein 45 in. thick was struck. The coal was found at a depth of 512 ft., the vein being covered by 5 ft. of slate. A couple of feet of fireclay underlies the coal. Drilling also is being done on the Kesteron and Mason farms, near Princeton.

Joplin, Mo.—The American Concentrator Co., of this city, are moving their entire business to Springfield, Ohio, where they will be permanently located in future. The new location will provide very much better facilities for the manufacture of their products, and it is the intention of the company to erect immediately an up-to-date testing plant for handling coal and ores of every description.

East Liverpool, Ohio—The Rhea mine at West Point, near East Liverpool, has been bought by the Kirk-Dunn Coal Co. The main office will be at Salem, Ohio. Many changes and improvements are being made. A new tipple is being constructed and the mine will be operated electrically. This company has recently acquired over 3000 acres of coal land under which lies a 5-ft. vein of fuel.

Birmingham, Ala.—The Government is now making an exhaustive test of Alabama coals at the ports of Mobile and Pensacola, for use on war vessels, etc., and the reports are that the coal has been found to be equal to the majority of the West Virginia and Pennsylvania coals, which they have been using. It is expected that this test will result in the Government placing contracts for Alabama coal for use through these ports.

Calgary, Alta.—Sir Donald Mann, vice-president of the Canadian Northern Ry., states that by opening up a new line making connection with the Brazean coal fields of Alberta, about 250 miles north of the Crows Nest fields, the railway will be enabled to secure its coal supply at a dollar per ton less than other roads. The direct connection established between the mines and the cities of Edmonton and Calgary will reduce the cost of coal at those points to one-half of present prices.

Montreal, Que.—H. A. Lovett, of Montreal, president of the Canadian Coal & Coke Co., which last year acquired the properties of the Letlebridge Collieries, Ltd., Western Coal & Coke Co.. Ltd., Pacific Coal Fields, Ltd., and St. Albert Collieries, Ltd., announces that for the purpose of permanent financing the company has authorized the issue of $3,000,000 par value of bonds, and for temporary financing has authorized the issue of $1,500,000 of short-term securities, for which the bonds are pledged as collateral.

Louisville, Ky.—Roy Wilhoit, president of the bankrupt Wilhoit Coal Co., has purchased the assets of the company, including about 2000 acres of valuable coal land on Ewing's Creek, in the Harlan County field, for $31,000. Mr. Wilhoit states that he will handle the properties at present through Roy Wilhoit & Co., which have been organized for that purpose, with the view of leasing two of the three seams on it for operation, the other being now under lease to the Walkins Creek Coal Co., which is operating it.

PERSONALS

Alfred W. Calloway was recently elected president of the Davis Coal & Coke Co., of New York City, in place of J. M. Fitzgerald, resigned.

Albert E. Oliver, formerly superintendent of the National Fuel Co., at Bowen, Colo., has resigned to take charge of the Huerfano Coal Co., Walsenburg, Colo.

L. W. Robinson, of Punxsuatawney, Penn., president of the Rochester & Pittsburgh Coal & Iron Co., has purchased the estate of the late Joseph Jefferson on Jupiter Island, in Florida.

Edgar Connell, superintendent for the last five years of the Enterprise colliery, at Shamokin, Penn., operated by W. L. Connell, of Scranton, resigned on March 18, to enter the retail coal business. He will be succeeded by Alfred Hall, of Scranton.

H. F. Miller, who for the past year has been associated with the advertising department of the Otis Elevator Co., and for four years previous to that, with the Western Electric Co., has been appointed advertising manager of the Goulds Manufacturing Co., of Seneca Falls, New York.

Edward H. Coxe, of LaFollette, Tenn., has resigned as general manager of operations for Neil Robinson, receiver of the LaFollette Coal, Iron & Ry. Co., to take effect May 1. Mr. Coxe will be succeeded by George M. Shoemaker, now superintendent of the Rex No. 1 mine for the receiver. J. M. Page, who was for some months superintendent of Rex No. 2 mine, recently suspended, will succeed Mr. Shoemaker as superintendent of Rex No. 1 mine.

J. B. Nessel has been appointed general freight agent of the Pittsburgh & Lake Erie R.R., to fill the vacancy occasioned by the promotion of W. A. Newton, to a similar position with the New York Central & Hudson River R.R. Mr Nessel was an incumbent of the office some two years ago, at which time he was transferred to Cleveland as general coal, coke and ore agent. His re-appointment is especially gratifying to the Pittsburgh district people.

W. L. Morgan, formerly state mine inspector, eighth district, East St. Louis, Ill., was appointed instructor in the Miners' and Mechanics' Institute, by Dr. James, president of the University of Illinois. The appointment was approved by the board of trustees of the University Feb. 16, 1914. The law authorizing the formation of the Miners' and Mechanics' Institute was the act of the 47th assembly, but it was left for the next legislature to provide the means for carrying this law into effect.

OBITUARY

Fred F. Lange, one of the best known mining engineers in the Oklahoma coal field, was found dead in his office at McAlester, Okla., on Mar. 20. His lips were burned with carbolic acid, and a party-filled bottle of the same drug was found beside the body. Mr. Lange formerly was in the employ of the government. At the time of his death, he was in the segregated land office at McAlester.

William C. Bullitt, died early on Sunday morning March 22, at his home in Philadelphia. Prominent for many years as a leader in reform movements, he was one of Philadelphia's best-known citizens. He was a member of the firm of Casther, Curran & Bullitt, large domestic and export coal shippers and mine owners.

Mr. Bullitt was the son of the late John C. Bullitt, one of the leaders of the Philadelphia bar, who is best remembered as president of the commission which drafted the Bullitt law, creating the present city charter of Philadelphia. The son was born on June 18, 1856, on his father's country place in Chestnut Hill. William C. Bullitt received his primary education in Dr. J. W. Faire's classical school and then entered the University of Pennsylvania, from which he graduated in 1876. He studied law at the University of Virginia and later in his father's office.

From 1885 to 1909 Mr. Bullitt was closely identified with the executive department of the Norfolk & Western R.R. His first connection with that corporation was as assistant to the president. Subsequently he was elected a vice-president. He became an authority on constitutional law, and entered other fields, ending with the coal operating firm in which he was a partner at the time of his death. The concern has extensive mining operations in the Pocahontas coal field in West Virginia.

Mr. Bullitt's clubs were the Philadelphia, Rittenhouse, Philadelphia Country, City, Southern, St. Anthony, and University, of New York. He is survived by his widow and three sons.

NEW INCORPORATIONS

Johnstown, Penn.—The Conemaugh Smokeless Coal Co. has been incorporated here with a capital of $500,000.

Carlisle, Ind.—The Chicago-Carlisle Coal Co. has been incorporated here, with $100,000 capital stock, to operate coal mines. The directors are George A. Van Dyke, Webster A. Patterson and Robert J. Frank, all of Chicago.

Bloomington, Ind.—The McDaniel-Freese Coal Co. has been incorporated here, with $15,000 capital stock, to deal in fuel. The directors are Simeon C. Freese, A. Freese and Lucian C. McDaniel.

Dover, Del.—Articles of incorporation were filed here at the State Department for the Columbia Coal Co., capital $5,000,000. The objects are to acquire oil, coal and mineral lands in all parts of the United States, especially in Western Pennsylvania and Ohio. The incorporators include W. M. Pile, George C. Steegler and Lawrence W. McCarthy.

Allbright, W. Va.—The Cheat River Coal Co. has been organized here to mine and market coal and other minerals. The capital stock is $500,000, of which $50,000 has been subscribed and paid. J. Clyde Markley, A. R. Falcom, S. T. Seale, J. W. Menesee and R. W. Mason, all of Allbright, are incorporators

Birmingham, Ala.—The Canal Export Coal Co. has been organized with a capital stock of $300,000, of which $165,000 has been paid in. The new company will engage in coal mining, selling and exporting on a large scale. R. H. Elliott, of Birmingham, is president; E. P. Kimbrough, of Greensboro, vice-president; W. C. Lovejoy, of Montgomery, secretary; and R. B. Evins, of Greensboro, general council. The main offices of the company will be located in Birmingham.

TRADE PUBLICATIONS

Third Annual Report of the Director of the Bureau of Mines, 1912-13. 118 pp., illus.

Permissible Explosives Tested Prior to Jan. 1, 1914. By Clarence Hall. Bureau of Mines, Tech. Paper 71; 12 pp.

Electric Switches for Use in Gaseous Mines. By H. H. Clark and R. W. Crocker. 1913. Bureau of Mines, Bull. 68; 38 pp., illus.

The Sampling and Examination of Mine Gases and Natural Gas. By G. A. Burrell and F. M. Seibert. Bureau of Mines, Bull. 42; 116 pp., illus.

Production of Explosives in the United States During the Calendar Year 1912. Compiled by A. H. Fay. 1914. Bureau of Mines, Tech. Paper 69; 8 pp.

A Preliminary Report on the Utilization of Petroleum and Natural Gas in Wyoming. By W. R. Calvert. 1913. Bureau of Mines, Tech. Paper 57; 23 pp.

Department of the Interior, Bureau of Mines. "A Preliminary Report on Uranium, Radium and Vanadium." By Richard B. Moore and Karl L. Kithil, 101 pages, 6x9 in., illustrated.

Reports of the Topographic and Geological Survey Commission of Pennsylvania, 1910-1912. Cloth-bound volume, 6¼ x 9½ in., 182 pages, illustrated with maps, drawings and halftones.

CATALOGS RECEIVED

The Dræger Oxygen Apparatus Co., Pittsburgh, Penn.—"Here it is at last! What everybody has been wanting!" The Dræger self-rescuer. Eight pages, 6x9 in., illustrated.

New Link-Belt Data Book on Silent Chain Drives

For the first time in history, an Engineering Data Book has been published by a manufacturing concern, which will enable users of power to select the correct Silent-Chain Drives for their work and determine exact costs from list prices shown in the book. Besides giving complete Engineering Information on Silent-Chain Driving in simple and compact form, Data Book No. 125 describes many uses of Silent Chain for the efficient transmission of power and gives specific reasons and illustrations showing application in a large variety of uses. Link-Belt Silent Chain is a series of links connected by joints which consist of segmental case-hardened bushings and case-hardened steel pins. The chain is as flexible as a leather belt—as positive as a gear. Its rated efficiency is 98.2 per cent. on actual test. It will transmit any amount of power quietly. Over 200,000 installations, we understand, were drawn upon for the information contained in this data book. The book is the only work of its kind and consists of 112 pages, bound in flexible red cover. Copies can be obtained free of charge by addressing the manufacturers, Link-Belt Co., 39th St. and Stewart Ave., Chicago.

Coal Trade Reviews

General Review

Spring business in anthracite opening up buoyantly, with numerous orders from all points. Some last-minute buying in bituminous, but consumers mostly show a discouraging lack of interest in the impending suspension. Railroads beginning to accept consignments in the Lake trade.

The coal year is closing with current business in anthracite at a complete standstill but a marked activity on negotiations for the new year. As usual, the individual operators initiated selling at the April cricular about the middle of this month, but the big companies have consistently maintained the regular winter schedule, although most of the loading during the past week has been for April delivery at the spring prices. The line trade is also active on the new business. The unexpectedly long duration of cold weather has served to clean up stocks in an unusual manner, and a heavy trade is anticipated through April and May.

On the eve of what appears to be a certain suspension in the principal bituminous coal districts of the country, the market continues relatively dull and listless. Some last-minute business has developed, causing a slight stiffening in prices, but, on the whole, the trade is far from what would normally be expected at this time. In the Pittsburgh district, occasional shading of prices is noted, though the large companies are demanding premiums and the nominal market continues at the regular circular. There is little confidence in the possibility of a long suspension and consumers seem to be well stocked for any emergency that may arise.

In Ohio, consumers, as a rule, refuse to be influenced by the possibility of a suspension, while the warm weather has caused a lull in the domestic business and dealers are endeavoring to clean up stocks rather than accumulate supplies. The railroads are beginning to accept lake coal, which may relieve the pressure; contracts in this line are being negotiated on the same basis as last year, but subject to any change in the wage scale.

The spot demand at Hampton Roads is light, the movement being confined almost entirely to contract; other West Virginia coals are dull and heavy, in spite of the near approach of the lake shipping season. The eastern Kentucky district, which will not be involved in the labor controversy, is anticipating a heavy business in the event of a suspension. The feature of the Southern market at the moment is a sharp decline in the prices of fuel oil, which may seriously affect the coal business.

The general indifference of consumers to the possibility of a serious strike has created a great deal of uncertainty in the Middle Western markets. There has been some stocking, particularly on the part of the railroads, which has developed a hardening tendency in the market, but this is not by any means of notable proportions. Contracts for the new coal year are being signed without any provision for increased cost of production.

EASTERN MARKET

BOSTON

Pocahontas and New River extremely dull but less anxiety over prices. No change in Pennsylvania grades, although a fair movement all-rail, due in part to possibility of suspension. Anthracite stocks fast running down and a good trade prospect for April. Stove shortage looks serious.

Bituminous—The situation on the Hampton Roads coals is practically at a standstill. There is ample supply at the loading piers and bottoms are despatched in record time. The few buyers here that are interested in making early purchases are now all cared for, and those who preferred to postpone are refusing to be hurried. A slower or duller period has not been experienced in this market since the summer of 1912. The price level has not been modified, however, and all hands seem content to await developments. On the whole there is rather less anxiety over price-shading than a week or two ago, and that is a hopeful sign. The producing interests are about agreed that nothing is to be gained by forcing coal on a reluctant and hesitating market.

The supplies of spot fuel at the distributing points are small and with only a moderate inquiry. The continued cold weather has given the trade a slight impetus but the outlook is hardly encouraging.

Aside from requisitions for shipment in conjunction with anthracite from Philadelphia the demand for the Pennsylvania grades is without special change. There is only a scattering business and then only for the most popular coals. All-rail the movement is fair, considering general conditions, and prices are showing up rather strong. The possibility of a suspension Apr. 1 is an element in that territory particularly but what uneasiness there is exists only in mild form at the present writing.

Anthracite—Stocks that were kept light in anticipation of warm weather and early April shipments have been fast depleted the past two weeks and the prolonged winter has had dealers guessing. They are running borrow and loan accounts with one another on the various domestic sizes and the trade is in excellent shape for the beginning of the new season.

The problem of getting a sufficient supply of stove is a serious one with practically all the dealers. The shipping companies are firm in declining orders that do not include a fair amount of other sizes.

Current quotations on bituminous at wholesale are about as follows:

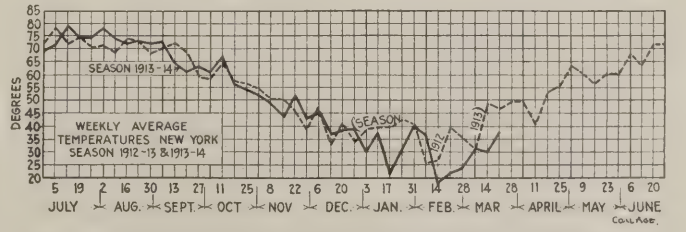
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.90	2.92@3.02	
New York*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.73@3.83
Providence†				3.68@3.78

*F.o.b. †On cars.

NEW YORK

Considerable activity in anthracite at the spring circular. Prepared grades generally easy but all the steam sizes short. Bituminous at a standstill pending the conclusion of the labor conferences. Demand light.

Anthracite—The close of the coal year finds practically all of the business being negotiated at the opening circular. This has been the market with individuals since Mar. 20, and, although the companies are nominally maintaining their winter circular, there is no business being negotiated on this basis. Loading at the tidewater piers is entirely at the April figures, but deliveries will not be made before that time. The line trade is also good on April business, and the indications point to an active business through April and May, due to the unexpected duration of low temperatures.



In the prepared grades, stove is quite short with some, but long with others, while chestnut is short all along the line, egg in good demand, with a fair supply, and pea the same The high-grade buckwheats are scarce, even at premium prices, while the low grades are also short. The better qualities of rice are practically out of the market entirely, and the off grades difficult to obtain at premium prices. The high grades of barley are equally as scarce as rice, but the others are in fair supply at normal prices. We quote the New York hard-coal market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.00		$5.05	
Egg	5.25	$4.85@5.35	5.30	$4.80@5.30
Stove	5.25	4.85@5.35	5.30	4.80@5.30
Chestnut	5.50	5.10@5.55	5.55	5.05@5.50
Pea	3.50	3.55@3.65	3.50	3.50@3.60
Buckwheat	2.75	2.75@3.00	2.70@3.45	2.60@2.90
Rice	2.25	2.25@2.35	1.95@2.20	2.00@2.30
Barley	1.75	1.75@1.85	1.70	1.60@1.80

Bituminous—The uncertainty in the labor situation has brought the local market to a complete standstill. There appears to be little stocking, and the agencies are in doubt about accepting what orders do come in, because of possible difficulties in filling them. A slightly increased demand is noted, due, in part, to anxiety over the labor situation and also to the colder weather. Considerable lake coal is reported sold in West Virginia and slack continues stiff in the Fairmont region. Local buyers are showing a desire to close contracts at last year's figures, or better, where these represent the lower opening scale. Eastern consumers are content to hold off, pending further developments.

The car supply on the Baltimore & Ohio R.R. have been deficient, which has withheld considerable tonnage. Mines are reported to be working under increased production. We continue last week's quotations which are probably a little stiffer, as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; George's Creek, $3.15@3.25.

PHILADELPHIA

Anthracite quiet, with the exception of steam sizes, which continue in good demand. Better tone to bituminous, indicated by increased tonnage, and slightly better prices.

Anthracite—Outside of a slightly increased demand for coal at retail, caused by the lower temperatures of last week, the domestic market is simply marking time, awaiting the opening of the spring business. Pea, buckwheat and rice, however, not being effected by the discount, still continue in good demand, and while the market lasts, the operators are producing and lifting from stock every ton possible. The advent of mild weather is likely to cause a decided falling off in the call for these latter sizes, as they are largely used for the generation of heat in the large office buildings and apartment houses.

The first of next week will see the opening of the season of 1914 and 1915 and indications point to an active demand for at least two or three months. The unusual weather conditions during March has reduced dealer's stocks, to such an extent that they will go into the month with little or no coal. It is understood that there will be no change whatever in the circular prices with the exception that the state tax will apply on all sizes.

It has not been a particularly successful year for the retail dealers in this locality. The open weather prevailing until March, when one snow storm followed another, making deliveries expensive and rapidly wiping out any profits made earlier in the year, caused the season to be a poor one. The fact that dealers were able to dispose of practically all of their stocks, is about the only bright spot in the situation; it is the exception that Apr. 1 finds the dealers with cleaned up yards.

Bituminous—Slightly better conditions mark the situation in bituminous trade, as indicated by heavier production, and higher prices. This may or may not be due to the possibility of trouble on the first of April, but it is fact that there is a disposition on the part of large users to take on a surplus. Quotations are from five to ten cents better than last week, and with the car movement again normal, deliveries are fairly prompt.

BALTIMORE

Poor transportation stiffening up the soft coal trade but gas-coal market still weak. Continued cold weather helps the anthracite business.

With nearly all the Pennsylvania operators complaining that they cannot get enough cars to move the coal as desired, a stiffening of the market has developed. Inquiry showed that little or no Pennsylvania steam coals were offering at the mines for quick delivery at below 95c. and $1, while the better grade fuels were easily commanding from $1.15 to $1.35.

The weakest feature of the market just now is the West Virginia gas coals. Even the approach of the lake season does not seem to help the situation. Three-quarter is freely offering at 85c., and even less at times. Slack, as a result of a sharp demand from the cement industry, is showing renewed strength. West Virginia steam coals are selling at about 90 to 95c. at the mines.

Considerable coal has been loaded at the piers recently, the railroads having been able to clean up all the surplus that accumulated due to their inability to rapidly discharge frozen cars. A number of large shipments are being made the present week on foreign account. The coastwise shipping remains rather dull, except for the movement in company-owned collieries, principally to New England ports.

More snow at the outset of the present week, with a temperature at times below the twenty mark, boosted the retail anthracite trade. The present winter, while mild at the outset, has been much longer drawn out than for a number of seasons past.

CENTRAL STATES

PITTSBURGH, PENN.

No prospect of scale settlement at Chicago conference, and suspension in prospect. Slightly improved demand due wholly to this prospect, but prices merely maintained at circular level. One coke contract at an advanced figure but general market quotable unchanged.

Bituminous—The Interstate Joint Conference, in session at Chicago since Tuesday, Mar. 17, has reached no agreement on a wage scale for two years or four years from Apr. 1, and is not at all likely to reach any. Reports are in the circumstances more or less untrustworthy. One is to the effect that the miners are willing to renounce the mine-run demand if the check-off is continued.

Demand for coal has slightly increased, and mines are operating still better, probably at an average of fully 80%, taking the Pittsburgh district as a whole. Prices have stiffened only a trifle, being held down by competition from other districts, which are willing to absorb some freight disadvantage in order to market their coal. Whatever increase there has been in demand for coal since the first of the month is purely in anticipation of a mining suspension, as domestic trade has become slack again and there is no increase in consumption by manufacturers.

There is occasional slight shading of regular prices, while one or two large interests are willing to sell free coal only at a premium of 10c., but in general the market is quotable at the regular list: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—One contract for furnace coke at $2.10 has just been put through, covering 10,000 tons a month for the second quarter, but the circumstances are such that the market is not squarely advanced to that level, since the sale was to a merchant firm who will apply the coke on contracts with customers requiring a strictly first grade. Prompt coke is in very poor demand and the market easy in consequence. The market continues quotable as follows: Prompt furnace, $1.90@2; contract furnace, $2@2.10; prompt foundry, $2.40@2.60; contract foundry, $2.40@2.60, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connnellsville region in the week ending Mar. 14 at 353,405 tons, an increase of 7715 tons, and shipments at 377,045 tons, a decrease of 6797 tons.

BUFFALO

Generally heavy bituminous stocks and market dull, with no further stir anticipated. Anthracite season closed and consumers all want April delivery. Coke unchanged.

Bituminous—There is a general disposition to consider the coal season closed, so far as bituminous sizes are concerned. Consumers have stocked up considerably of late and seem to feel safe, no matter what happens. In many cases they are quite unable to carry any more, as storage capacity is all taken up. This does not indicate that the trade has been satisfactory, for the margin of profit has been small at best and considerable coal has been sold after accumulating more or less car service. This is always the case when the prices drop off, for the miners never seem to learn that consignment business is disastrous. There is not much unsold coal in transit now.

That the coal men are uncertain as to the future of the trade is shown by the few bids on public-supply contracts. There is sometimes only a single bid and on the city waterworks tender there were only three, though this is the one usually most contested. The lowest bid this year was by the Valley Camp Coal Co. of Cleveland, $2.07 for 35,000 tons of slack on a 13,500 B.t.u. test. The company is not represented here.

There is less confidence than formerly in the proposed suspension of mining because of the fact that the operators will not hold together.

The quotations of bituminous continue fairly steady on the basis of $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, with Allegheny Valley about 25c. less. There is a market for all the slack offering.

Coke—There is no stir in coke. Prices are steady, but only on the supposition that they have reached the bottom. The plan is to cut down production to meet the situation and wait for developments. Prices are still based on $4.50 for Connellsville foundry.

Anthracite—Practically all orders for anthracite are now

for April delivery. The local trade has run down very fast of late. There has been four lake cargoes added to the fourteen loaded sometime ago, which will end that branch of the business till the lake season opens. Some of the anthracite companies have so much of the large sizes left over that they do not know just how to turn and do not like to load anything but the smaller sizes into vessels now. Recent furnace construction is said to favor the smaller sizes even more than formerly.

TOLEDO

Market in a waiting attitude. The steam output small, considering conditions. No demand for domestics.

With seasonably fair weather now, local dealers are awaiting the outcome of the operators and miners conference. In previous years large consumers were always accustomed to anticipate a possible strike but purchasing agents have as a rule, failed to consider present conditions as serious and have engaged little storage stocks. The reserve supplies in and about Toledo, are unusually small.

The domestic grades are quiet. There are a few small orders, track coal being in more ready demand. The local market is waiting future developments. Transportation matters are in excellent shape and the opening of the new Pennsylvania bridge will facilitate traffic.

Prices are holding to the following:

	Pocahontas	Hocking	Jackson	Pomeroy	Massillon	Pittsburgh	Cambridge
Domestic lump..	$2.25	$1.25	$2.50	$1.75	$2.50	$1.40	$1.40
Egg.....	2.25	1.25	2.50	1.50	2.50	....	....
Nut.....	1.75	0.80	2.00	1.75	2.50	1.35	1.20
¾ lump.....	....	0.90	....	....	....	1.20	1.20
Mine-run.....	1.40	1.15	....	....	....	1.10	....
Slack.....	....	0.70	....	....	....	....	....

COLUMBUS

On the eve of a suspension the trade is quiet and dull. The price list off and there is little demand for stocking. Domestic business about over for the season. Most of the trade playing a waiting game.

The coal trade in Ohio is quiet and there is little to indicate the coming suspension which is believed to be inevtable. Stockng on the part of steam users is not active and the domestic demand is about over. On the whole operators as well as jobbers are playing a waiting game and are not inclined to figure ahead.

The warm weather has caused a lull in domestic demand, which was the life of the trade during the latter part of February. Dealers have been trying to clean up their stocks and consequently they have been careful in their orders as they are loath to enter into the summer season with large stocks. What few domestic orders received are for small quantities and for immediate shipment.

Steam users are either depending on West Virginia coal, or have prepared for a short suspension. Many of them have stocks to last for 30 to 45 days, which is expected to be the length of the suspension. Jobbers say that consumers refused to be influenced by talk of a suspension as on former occasions. Railroads have stocked up heavily and most of the larger lines have supplies to last for about two months.

As a result of the lull, operations have not been active during the past week. The Pomeroy Bend district reports almost full time and about 90% of the average. In the Hocking Valley the output has been about 65% and the same in the smaller fields. In eastern Ohio some of the companies report about 75 to 85%, while others say that 50% is the average. During the remainder of the month operations are not expected to be active.

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	$1.45 @ 1.35	.....	$1.50 @ 1.40	$1.40 @ 1.35
¾ inch.....	1.30 @ 1.25	$1.20 @ 1.15	1.35 @ 1.30	1.30 @ 1.25
Nut.....	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run.....	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack..	0.80 @ 0.75	.....	0.90 @ 0.85	0.75 @ 0.70
Coarse slack.....	0.70 @ 0.65	0.95 @ 0.90	0.80 @ 0.75	0.65 @ 0.60

CLEVELAND

Two days of raw cold weather created a good retail business. But succeeding warm weather and the surplus coal on track has kept prices low and the market dull. Lake shipments started last week.

The marked dullness of the local market was in no wise improved last week. Operators and jobbers all had more coal on track than they could move. Concessions as large as 10c. below cost were reported on coal in car service and with this competition to meet some remarkably low prices were quoted.

The heaviness centered particularly around fine coal. No. 8, Middle district, Youghiogheny and Fairmount grades were freely offered on a competitive basis. Almost hourly telephone communication was held with those attending the joint conference at Chicago, developments being hoped for that would furnish a foundation for higher prices; in other words a sine die adjournment or assurance of no agreement. When it became evident that the conferences would be carried into the present week, no attempt was made to hold the market. Where possible orders were canceled or postponed and attempts made to trade coal en route for that to be shipped this week, but the wholesale trade was too well supplied to relieve the market in this way.

The railroads began accepting lake coal the middle of the week and this may relieve the pressure somewhat. Lake shippers canvassed the vessel market for boats to load before May 1, but found little boat capacity available. Most of them were loaded last fall and those made ready during the winter were promised some time ago. Considerable lake coal will be loaded if the market remains at the present low level. The railroads are loading their own equipment with this coal and charge no car service until May 1. Those who are not lake shippers are barred from taking advantage of this service as the railroads will reconsign to local trade only upon the payment of all-rail rates and car service on regular local shipment basis.

The attempt to break the freight rate from Lake Erie to Lake Superior to 25c. apparently has been abandoned and 27½c. is being offered. Shippers generally are holding back contracting until the Chicago conference is over. Some lake coal has been negotiated subject to any change in the wage contract but the business is not brisk because of large stocks at the upper lake docks.

Prices at which spot coal and coal en route were sold last week were as follows:

	Pocahontas	No. 8	Middle District	Fairmount	Youghiogheny
Lump, ¾ in.	$3.10	$1.85@1.90	$1.85@1.90	$1.90	$2.35
Egg.....	3.10				
Mine-run..	2.75	1.85@1.90	1.85		2.25
Nut.....		1.95	1.95		2.20
Slack.....		1.80	1.75	1.85	1.90

DETROIT

Active opening business anticipated. Many orders already on hand. A 30-day suspension would do much to help the market.

Bituminous—While the steam grades are showing a tendency to drag, indications point to an active opening on the domestic fuels. Irrespective of whether a suspension occurs on Apr. 1, the numerous orders already coming in for April delivery are sufficient to assure an active business. It is hoped, however, that there will be a suspension in mining of about 30 days' duration, as this would help to clean up stocks and put the business on a firmer basis. As yet, there has been no change in the price level, and slack coal continues to be the leader in spite of heavy shipments.

Coke—The local coal market is decidedly stiffer, with orders accumulating far beyond expectations. Semet Solvay is quoted at $3.25 on contract, with Connellsville foundry, 72-hr., $2.75 and gas house at $2.75 f.o.b. ovens.

HAMPTON ROADS

Dumpings for the week fair. Demand still light on all grades. Largest single cargo of the week goes to Brazil.

The movement of coal from Hampton Roads piers during the week has been only fair. During the early part indications were that dumpings would be extra heavy, but toward the end vessel tonnage fell off and shipments have not come up to expectations. A few large shipments have been made coastwise and to the foreign trade. The largest percentage of this as usual, went to the New England market although there was some movement to one or two of the Southern ports. Of the export business the largest single shipment went to Venice, this amounting to approximately ten thousand tons. Demand all week has been light for spot coal and so far as can be ascertained practically all that moving has been on contracts.

Export shipments for the week have gone to Rio de Janeiro, Laplata, Bermuda, Vera Cruz, Curacoa, Naples, Canal Zone, St. Thomas and Havana. There has been some movement of high volatile coal in addition to the New River and Pocahontas run-of-mine. Prices on all grades remain practically the same as they have been for several weeks.

LOUISVILLE, KY.

Moderately severe weather has continued, enabling the retailers to clean up stocks. Little new demand as buying is hand-to-mouth in all quarters. Prices steady at the low levels prevailing recently.

Following several days of mild weather, there was another snow-storm on Thursday resulting in renewed orders for the retailers, few of whom had any difficulty in filling them. Few of them were forced into the market, the reluctance to buy

any more coal than absolutely necessary to fill immediate needs not being confined to domestic consumers, by any means.

The absence of any stocking demand is one of the remarkable features of the present situation, especially in view of the continued talk of a strike next month. If there is labor trouble in any of the fields, it is certain that the Eastern Kentucky mines, not being involved, will have all they can do in supplying the demand from other quarters. In this case it is apparent that regular customers may find it difficult to secure coal, which should result in a heavy demand for summer stocks by the retailers.

In view of the slack demand, prices remain at the same low level as for some weeks past, $1.50 for first-class block being about the limit. Generally speaking, there is ample nut and slack to satisfy the steam market, in spite of the short production of the domestic grades, and prices are only moderate on this and other steam grades, 85c. being about the top, with a light demand.

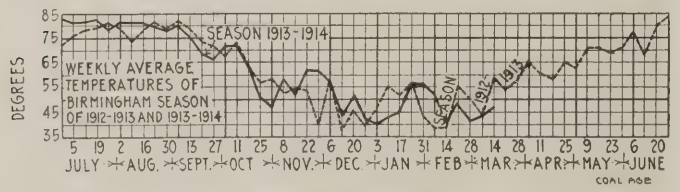
SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Domestic lump moving, but steam coal quiet. Practically no market for either furnace or foundry coke. Only a small tonnage of pig iron sold, but at prices in advance of $11 2 F., f.o.b. Birmingham. Car situation satisfactory.

The severe cold weather of the past ten days has brought out orders for rush shipments of lump coal, and the majority of the operators claim to have had the best business in that line for several months. However, as the steam-coal market is quiet, some orders for lump were refused, there being no way to dispose of the screenings. The demand for steam coal is small, at the present time, many of the mines running only two and three days a week, but it is thought that conditions will shortly improve. Blacksmith coal is normal, both as to tonnage and price.

Furnace and foundry coke are dull, but, as the railroads have reduced the rate $1 per ton to Western points after having raised them $2 per ton on Jan. 1, the Birmingham manufacturers are again preparing to go after this business. The reduction makes it possible to again put Alabama coke in the Western territory. Furnaces report only a small tonnage of pig iron sold, but the prices have advanced and are well over the $11 mark for 2 Foundry f.o.b. Birmingham for the first half of 1914. The car situation is satisfactory.



NEW ORLEANS

Cut in price of fuel oil from Mexico affects the coal market. Prices unchanged but tendency is to soften. Stocking for discount season to begin next month. Rise in Alabama rivers increases movement.

Mexican crude sold at 35c. a barrel less than has been paid during the last year. As yet there has been no further concession made by coal dealers since the reduction of six weeks ago but in the face of the marked decrease in oil it is feared that the advantage which has been gained during the past year, will be lost. With several weeks of uninterrupted cold weather, followed by a brief mild spell and another cold wave, stocks have been reduced in the local yards to nearly a normal level, and there will be little tonnage carried over. Stocking on a smaller scale will begin next month.

In order to take advantage of high water in the Warrior River, the New Orleans & Alabama Transportation Co. has taken its power barges out of the merchandise trade and will concentrate its efforts in bringing down as great an amount of coal as possible during the season of high water, which is likely to continue until June. As yet the company has not secured sufficient coal to become a factor in the market although it continues to make contracts at fifty cents a ton lower than the companies handling up-river coal or those dealing in Alabama all-rail product.

INDIANAPOLIS

Mines busy supplying a heavy storage demand from large consumers. Railroads giving better car service. Prices hold stiff on all grades. Retail quotations unchanged.

There is not much change in local conditions. The weather kept seasonably cool until the season officially ended Mar. 20 and the car service has improved temporarily, at least so that most mines in the state have been running full time. The storing of coal against the possibility of a shut-down resulting in a steady run of orders. Little has transpired to indicate that there will be suspension, but large coal users have learned to be forehanded.

The domestic trade averages up well, although purchases are mostly for stocking-up and will be largely limited to that until the end of the season. Screenings and other steam grades continue in good demand at prices well up the maximum of the winter. The railroads have been among the large purchasers and there is less likelihood of their confiscating coal, as in former years, in case work is suspended at the mines. Retailers in this city are still selling at the prices set Sept. 20. It is doubtful if there has been a former year when prices were so uniform throughout fall and winter.

ST. LOUIS

Lack of interest among buyers the feature of the present situation. Little surplus buying except among larger consumers. Basis of new contracts not providing for increase in cost of production.

The passive attitude of the coal-buying public previous to a strike period is one of the greatest surprises that the trade has had in many years. During the past week there has been several purchases of storage coal made, but not to the extent that was anticipated, and not anywhere near the volume in past years under the same conditions. Several railroads have been buying for the past two or three weeks, but only in small quantities, though increasing during the past ten days. At most steam plants there is little storage coal in sight, with the exception of those in the lead belt, and two or three large manufacturing plants on the east side. The coal buyers seem to think that even should there be a shutdown, it will only be for a short time, and when the mines resume again, the operators will be just as eager for business as now, and prices will be on a correspondingly low level as usual.

Until the beginning of the present week, it has been a summer market, as far as prices have been concerned, but this is only on the larger sizes, screenings being lower than at any time last summer. With the beginning of the present week there has been a change, but even at the best, prices will not be anything like they were at the last suspension. No increased cost of production is anticipated for the coming year, as far as the Illinois fields are concerned, and some operators and shippers are already in the market with contracts, for both one and two years.

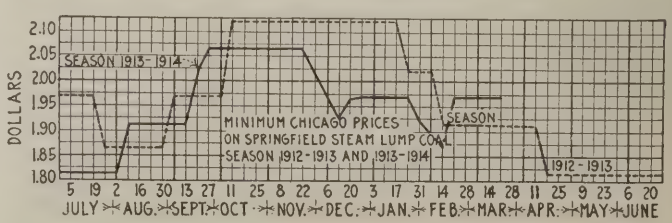
During the past week something like 250 to 300 cars of anthracite have been sold for April shipment, and about the same amount for May and June. Some smokeless has been bought for April delivery, and some also for May and June, but not the tonnage that was expected.

There is absolutely nothing doing in coke, gas house and byproduct being a drug on the market, and the future is somewhat uncertain for fuel of this character.

The circular market at the close of the past week was as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump				$0.90 @ 1.00	$1.15
3-in. lump			$1.50		
6-in. lump	$1.35 @ 1.50		1.30	1.15 @ 1.25	1.35
Lump and egg	1.85 @ 2.15	2.25			1.15
No. 1 nut	1.30 @ 1.45				
Screenings	0.75 @ 0.85			0.65 @ 0.70	0.75 @ 0.80
Mine-run	1.10 @ 1.20			0.80 @ 0.85	
No. 1 washed nut	1.50 @ 1.60	2.25	1.50		
No. 2 washed nut	1.25 @ 1.35		1.25		
No. 3 washed nut	1.25 @ 1.30				
No. 4 washed nut	1.25 @ 1.30				
No. 5 washed nut	0.80 @ 0.85				

The April anthracite circular, f.o.b. St. Louis, will be: Chestnut, $7.05; egg and stove, $6.80; grate, $6.55. The smokeless circular for April will be: Lump and egg, $4.35; mine-run, $4. On Arkansas anthracite, the April circular will be: Lump, $5.25; egg and chestnut, $5.50; pea, $4.50.



KANSAS CITY

Operations much curtailed but prices steady at a low level. Little new business anticipated.

Despite more favorable weather conditions, operations in Kansas and Missouri are still limited to about 50% of total capacity. Quotations have remained steady at the rock bottom prices which have prevailed for several months past. The last of March made a desperate effort to retrieve the results of the early part of the month, with only fair success. Consumers anticipating warmer weather have refused to order and the same is true of retailers, who are clinging to the old hand-to-mouth basis.

FOREIGN MARKETS

GREAT BRITAIN

Mar. 13—As a result of stormy weather, tonnage is being delayed and stocks of coal are excessive. In the circumstances it is an easy matter to secure concessions for prompt supplies, but colliery owners regarding this adverse state of affairs as only temporary, are holding with firmness for late March positions. Quotations are approximately as follows:

Best Welsh steam	$4.50	Best Monmouthshires	$4.11
Best seconds	4.38	Seconds	3.93
Seconds	4.14	Best Cardiff smalls	2.64
Best dry coals	4.26	Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

PRODUCTION AND TRANSPORTATION STATISTICS

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for January and the seven months ending Jan. 31, 1912 and 13, in short tons:

	January				Seven Months			
Destination	1914	%	1913	%	1914	%	1913	%
Tidewater	408,994	25	377,520	30	2,023,497	19	2,068,111	22
East	300,426	18	303,493	24	1,555,035	14	1,518,698	16
West	887,284	54	489,985	39	6,568,361	61	5,437,455	58
Total	1,596,704		1,170,998		10,146,893		9,024,264	
From Connections								
Bituminous	47,448		92,894		671,724		334,56	
Anthracite	1,645,195		1,264,270		10,828,030		9,366,178	
Coke	34,256		30,764		215,253		165,700	

NORFOLK & WESTERN

The following is a statement of the tonnage shipped over this road during February and the first two months of this year, as compared with corresponding periods of 1913, in short tons:

	February		Two Months	
Coal	1913	1914	1913	1914
Tidewater, foreign	122,944	119,110	267,006	270,425
Tidewater, coastwise	337,202	311,679	646,120	649,333
Domestic	1,413,398	1,235,686	3,030,292	2,712,531
Coke				
Tidewater, foreign	4,909	15	9,964	15
Domestic	147,938	95,854	291,134	214,599
Total	2,026,391	1,762,344	4,244,516	3,846,903

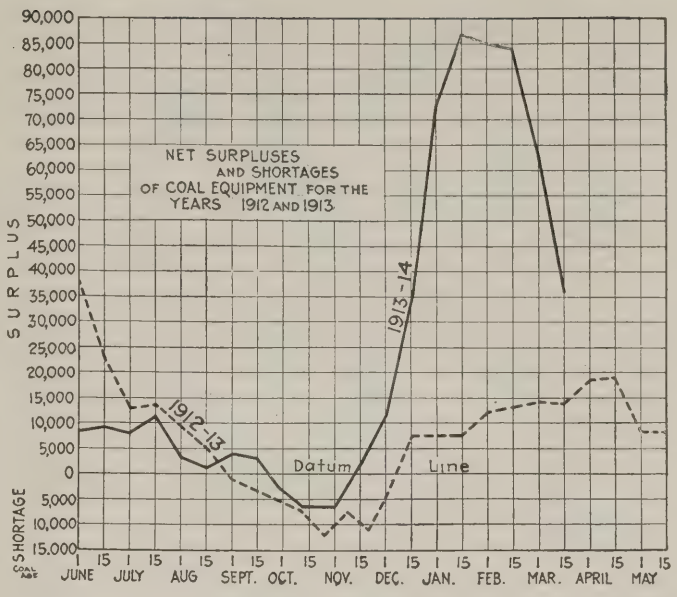
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Mar. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	892	0	**892**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	1,109	1,865	756
Ohio; Indiana; Michigan; Western Pennsylvania	15,087	440	**14,647**
West Virginia, Virginia, North & South Carolina	4,029	900	**3,129**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	5,837	0	**5,837**
Iowa, Illinois, Wis., Minn.; North & South Dakota	3,021	77	**2,944**
Montana, Wyoming, Nebraska	1,527	0	**1,527**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	3,099	0	**3,099**
Texas, Louisiana, New Mexico	425	0	**425**
Oregon, Idaho, California, Arizona	4,107	0	**4,107**
Canadian Lines	0	0	0
Total	39,133	3,282	**34,851**

	Nov. 15	Dec. 1	Dec. 15	Jan. 1	Jan. 15	Feb. 1	Feb. 15	Mar. 1
Surplus	10,520	17,621	36,435	72,535	87,149	85,489	84,775	64,822
Shortage	8,477	5,095	2,295	57	789	102	239	1,394
Net*	**2,043**	**12,526**	**34,140**	**72,478**	**86,360**	**85,387**	**84,536**	**63,428**

***Bold face** type indicates a surplus.



COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Mar. 23:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	85	84½	85	85	84½
American Coal Products Pref	104¾	104¾	104¾	106	104¾
Colorado Fuel & Iron	33¼	32	33¾	34½	28½
Colorado Fuel & Iron Pref	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com	47	47	47	....	....
Island Creek Coal Pref	88½	87½	88½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	21⅛	21	21⅛	23½	17⅞
Pittsburgh Coal Pref	92½	92	92½	93½	86
Pond Creek	18¼	17⅝	18½	....	....
Reading	166¾	163½	165⅝	172¼	161¼
Reading 1st Pref	89	88⅝	89	89	87½
Reading 2nd Pref	....	....	90	93	90
Virginia Iron, Coal & Coke	50¼	50¼	50¼	52	40

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	97	98½	99	99	91¼	99
Colo. F. & I. gen. 6s	106¼	110	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	79½	80	79	Mar. '14	76½	82
Cons. Ind. Coal Me. 1st 5s	..	76	76	Feb. '14	76	79
Cons. Coal 1st and ref. 5s	89	92	89	89	89	89
Gr. Riv. Coal & C. 1st g 6s	91	..	99⅛	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s		..	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	91	..	93⅛	93⅛	93⅛	93⅛
St. L. Rky. Mt. & Pac. 1st 5s	87	88	87½	87⅝	84	87⅝
Tenn. Coal gen. 5s	80½	82½	80¼	80¼	77	82
Birm. Div. 1st consol. 6s	100	103⅛	103⅛	103⅛	97⅛	103⅛
Tenn. Div. 1st g 6s	101½	Sale	101½	101½	101½	103
Cah. C. M. Co. 1st g 6s	101¼	103	102½	Mar. '14	101	102½
Utah Fuel 1st g 5s	101	..	103	July '13	..	..
Victor Fuel 1st s f 5s		78	80	May '13	..	..
Va. I. Coal & Coke 1st g 5s	92½	83½	93	93	92½	95

DIVIDENDS

Central Railroad of New Jersey—Regular quarterly dividend of 2% payable May 1 to holders of record Apr. 17.

Lehigh Valley—Regular dividend on both the common and prefered of $1.25 payable Apr. 11 to holders of record Mar. 28.

The Reading Co.—Regular quarterly dividend on the common of 2% payable May 14 to holders of record Apr. 27.

St. Louis, Rocky Mountain & Pacific Co.—Regular quarterly No. 7 on the preferred of 1¼% payable Mar. 31 to holders of record Mar. 22 to Mar. 30.

Central Coal & Coke Co.—Regular quarterly dividend on the common of 1½% and 1¼% on the preferred both payable Apr. 15 to holders of record Apr. 1 to Apr. 15.

Island Creek Coal—Regular quarterly dividend on the common stock of 50c. payable May 1 to holders of record Apr. 23 and $1.50 on the preferred payable Apr. 1 to holders of record Mar. 23.

Westmoreland Coal—Dividend of 3½% payable Apr. 1 to holders of record Mar. 18 to Apr. 1.

American Coal Products Co.—Regular quarterly dividends of 1¾% on both the common and preferred, the former payable Apr. 1 to holders of record Mar. 25, and the preferred payable Apr. 15 to holders of record Apr. 10.

Financial Department

Colorado Fuel & Iron Co.

President J. F. Welbom, in the 21st annual report for the fiscal year ended June 30, 1913, says in part as follows:

Results—Gross earnings were $24,315,888, an increase of $47,435, and operating expenses amounted to $20,695,621, an increase of $199,451. Income from other sources increased $78,936, making the net income, before deducting charges, $4,375,895, a decrease of $73,079. After providing for all fixed charges, including sinking funds, etc., there remained a surplus of $1,727,192. A preferred dividend of 4%, or $80,000, was paid July 1, leaving a balance of $1,647,192 to be carried to profit and loss.

A dividende of 35% on the preferred stock, amounting to $700,000, was paid out of profit and loss Mar. 20, 1913.

Bonds, Merger—In accordance with the action of the shareholders, taken on June 17, our $14,067,000 debenture bonds then held by the trustee under the Colorado Industrial mortgage, have been cremated and the properties of the Colorado Industrial Co. were transferred to the Colorado Fuel & Iron Co., thereby reassembling the properties under one head. The balance sheet in this report, therefore, includes all of the properties heretofore standing in the name of both companies, and shows their total outstanding bonded debt.

STATEMENT OF PRODUCTION FOR YEARS ENDING JUNE 30

Tons, 2000 lb.—	1912-13	1911-12	1910-11	1909-10
Coal	4,091,667	4,038,852	4,233,756	4,722,832
Coke	784,627	777,993	753,192	905,599
Iron ore	853,878	813,728	841,699	879,630
Limestone	485,756	459,913	425,704	407,517
Pig iron produced	416,467	426,659	397,701	385,602
Finished iron and steel	458,521	485,743	424,421	412,749

RESULTS FOR YEARS ENDING JUNE 30.

	1912-13	1911-12	1910-11	1909-10
Iron department	$14,982,804	$15,140,523	$13,775,664	$13,604,832
Industrial dept. (fuel)	9,333,083	9,127,929	9,159,021	10,034,981
Total gross earnings	$24,315,888	$24,268,452	$22,934,685	$23,639,813
Iron department	2,857,119	2,766,775	2,502,566	2,492,136
Industrial dept. (fuel)	763,147	1,005,507	975,783	1,250,479
Total net earnings	$3,620,266	$3,772,282	$3,478,349	$3,742,615
Add—Income from secur.	563,439	526,270	535,672	499,080
Interest and exchange	192,190	150,423	135,927	127,840
Total net income	$4,375,895	$4,448,975	$4,149,948	$4,369,535
Deduct—				
Bond interest	$2,026,780	$2,039,622	$2,091,610	$2,097,692
Taxes	243,722	226,737	214,785	218,765
Real estate	142,531	138,317	151,263	171,458
Insurance, sociological, personal injury, etc	50,082	64,105	233,602	154,908
Equipment renewal	120,000	120,000	128,106	164,945
Loss on Col. & Wyo. Ry	.....	.....	b10,005	.....
Loss on Crystal R. RR	36,000	36,000	36,000	36,000
Prospecting	29,588	22,965	24,904	18,948
Pref. dividends	*(4) 80,000	(5) 100,000	.....	.....
Total deductions	$2,728,703	$2,747,746	$2,890,276	$2,862,716
Balance, surplus	$1,647,192	$1,701,229	$1,259,672	$1,506,819

b Includes traffic contract guaranty at $25,000 per month ($300,000), less earned from traffic, as per contract for year, $289,995 in 1910-111 and $105,309 in 1908-09.

*The dividend above deducted in 1912-13 is the 4% ($80,000) paid July 1, 1913; there was also declared at the same time a dividend of 4%, which was paid Jan. 1, 1914. An extra payment of 35% ($700,000) was also made Mar. 20, 1913 on account of the 74% accumulated dividends, leaving about 39% still due.

BALANCE SHEET JUNE 30

Assets—	1913	1912	Liabilities—	1913	1912
Properties and sec	$62,210,218	$15,749,791	Common stock	$34,235,500	$34,235,500
Equipment	.....	27,062,157	Pref. stock	2,000,000	2,000,000
Cash on hand	5,280,426	4,453,007	Funded debt	x45,266,000	1,813,0000
Stocks and bonds	15,282,450	7,381,644	Accounts and bills pay	954,982	950,600
Accounts and bills rec	3,749,457	3,914,562	Hospital	93,156	14,616
Subsidiary cos	140,911	2,415,811	Accrued bond int	831,574	834,633
Manufac. stocks, etc	3,075,831	2,682,515	Tax payment fund	100,000	100,000
Stripping, etc	18,759	193,,60	Pref.dividends	80,000	100,000
Accr. divs. and int	84,062	88,989	Sink fd.—real est	1,483,071	985,116
Miscellaneous	152,128	145,275	Miscell. funds	287,719	239,734
			Profit and loss	y4,732,240	3,904,161
Total	$89,994,242	$64,177,360	Total	$89,994,242	$64,177,360

x Includes Col. Fuel & Iron Co. 5% gen. mortgage bonds, $5,638,000; Col. Fuel Co. 6% gen. mortgage bonds, $240,000; Grand River Coal & Coke Co. 6% 1st mortgage bonds, $863,000, and Col. Industrial Co. 5% 1st mortgage bonds, $38,525,000.

y After deducting the $700,000 extra dividend (35%) paid Mar. 20, 1913 on account of accumulated divs. on pref. and also $101,085 for depreciation and account of dismantled partly constructed merchant mill, but before and after deductions amounting to (net) $18,027, but before deducting the 4% dividend ($80,000) paid Jan. 1, 1914.

CONSOLIDATED BALANCE SHEET JUNE 30

The Colorado Fuel & Iron Co. and Subsidiary Companies

Assets—	1913	1912	Liabilities—	1913	1912
Iron etc.,lands	$54,862,468	$55,555,789	Common stock	$34,235,500	$34,235,500
Equipm't, etc.	28,592,342	28,446,687	Pref. stock	2,000,000	2,000,000
Railroads	5,810,427	5,818,795	Funded debt—		
Cooperage plant	30,468	30,791	Colo. Fuel 6s.	240,000	280,000
Timber lands, etc	84,000	73,346	Colo. Ind. Co. 5s	33,437,000	33,437,000
Store bldgs., etc	425,273	419,103	Rocky Mtn., 5s	483,000	499,000
Telegraph sys.	54,300	54,300	Gr. Riv. C'l, 6s	863,000	868,000
Inventories, etc	3,865,644	3,427,445	Pueblo Realty Tr.Co.,6s	505,398	506,823
Accounts and bills rec	3,277,022	3,582,771	Accounts, etc. pay	1,952,272	1,863,915
Cash	5,563,138	4,713,436	Accr. bond int	835,599	845,183
Stocks and bonds	473,710	341,481	Accrued taxes.	113,500	113,500
Cash(trustees)	8,278	4,668	Pref. dividend	80,000	100,000
Reserve funds	99,341	99,341	Balance	22,827,646	22,284,015
Accrued interest	16,487	21,418	Total	103,210,915	102,630,941
Royalties in adv	48,015	41,570			
Total	103,210,915	102,630,941			

Additions—To meet the increased demand for openhearth steel, the executive committees on Apr. 21, 1913, authorized the construction of three openhearth furnaces (at a cost of about $500,000), as an addition to the plant of 12 openhearth furnaces now in operation.

Wages—On Apr. 1, 1912, an increase was made in the wages of coal-mine and coke-oven operatives, which added approximately $25,000 per month to the payroll, and on Mar. 1, 1913, steel-works employees were advanced an amount which represented an increase of approximately $20,000 per month in that payroll; the total of these two advances equaling at least $500,000 per annum. These increases represented a charge to the fiscal year under review of approximately $300,000 more than was borne by 1911-12.

Note—For the previous annual report of this company, see Coal Age, Vol. 3 p. 358.

Pennsylvania R.R. Coal Properties

The annual report of the P. R.R. for the year ended Dec. 31, 1913, has the following regarding its coal holdings:

In accordance with the policy heretofore announced as to the proposed sale of this company's security holdings in the anthracite coal companies owning properties served by its system, namely, the Susquehanna Coal Co., Mineral Railroad & Mining Co., and the Summit Branch Mining Co., your board deemed it desirable to first compact the ownership of the securities and properties of these coal companies into the Susquehanna Coal Co. Therefore, there has been sold to the Susquehanna Coal Co. the capital stock and debt of the Summit Branch Mining Co., held by your company, and upon the transfer of its property and rights to that coal company the Summit Branch Mining Co. will be dissolved. Your company is also the owner of one-third of the capital stock of the Mineral Railroad & Mining Co., the balance being owned by the Northern Central Railway Co. That company operated lands leased from the Northern Central Railway Co. and from the Manor Real Estate & Trust Co., but being unable for many years to pay the prescribed royalties, it transferred its 999-year leases to the Suspuehanna Coal Co., effective Jan. 1, 1914, and steps have been taken looking to the dissolution of the Mineral Railroad & Mining Co. The lands of the Manor Real Estate & Trust Co., operated by the Mineral Railroad & Mining Co., have been sold to the Susquehanna Coal Co., and negotiations concluded for the sale to it of the other lands operated by the Mineral Railroad & Mining Co. for the Northern Central Railway Co. subject to fixing the final price. Under the foregoing arrangement payment for said lands will be made by the Susquehanna Coal Co. in its 5% -5-year gold bonds, which are exchangeable for its first mortgage bonds if and when the same are issued by that company.

The purpose of vesting the ownership of these properties in the Susquehanna Coal Co. is to insure the continued operation of the unprofitable as well as the profitable mines, and thereby conserve the coal supply, and so that should a purchaser be found for the securities of the Susquehanna Coal Co., held by your company and the Northern Central Railway Co., the new owners will obtain possession of the properties subject to these mining obligations.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 14
Issued Every Saturday
Hill Publishing Company

NEW YORK, APRIL 4, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

CAMERON

Send for These Cameron Bulletins

They describe the very latest

CENTRIFUGAL PUMPS

CAMERON



The Cameron Double Suction Volute Centrifugal Pump is adapted for medium head service.

Its design is the simplest. The casing is horizontally split, allowing quick, easy access to all working parts. The impeller is enclosed and perfectly balanced.

In mine service requiring capacities from 50 to 7500 gallons a minute, this pump has proved to be very economical. Its efficiencies are high, and the upkeep low. It may be direct connected to electric motor, or other forms of power drive.

The Cameron Multi-stage Turbine Pump is strong, sturdy and serviceable.

For high head service it meets the demand not only for a dependable but also an economical pump.

Its efficiencies are high, and continue over long periods of service. This advantage is fully realized where you have long, steady pulls of pumping, as in mine work.

It is a very compact pump. All parts accessible by means of the horizontally split casing. **Built in two, three and four stages, for a wide variation of speed and capacity, and any motive power.**

The Cameron Single Suction Volute Pump is the pump for low head service.

It has the fewest number of parts. The impeller is of the open type, made of hard cast iron, carefully ground to fit the casing closely and insure perfect balance.

All the way through this pump is simple, strong and rugged. It is unusually efficient in handling mine water containing grit and small solids. It may be driven by electric motor, or other forms of power apparatus.

Standard sizes up to 12 inches are kept in stock for immediate delivery.

You know the reputation of the Cameron Pump. The training and experience gained during half a century in building pumps insures in these new types the very best design, materials, workmanship and performance. ¶ These CAMERON CENTRIFUGALS will give you splendid service. Investigate their merits. See page 35 for advertisement on Cameron Steam Pumps.

CAMERON

A. S. Cameron Steam Pump Works

Offices the World Over

NEW YORK

LONDON

4-4-14

CAMERON



Barsteel Heavy Haulage Locomotive

4 Features of Baldwin-Westinghouse Barsteel Electric Mine Locomotives That Assure Maximum Tonnage with Least Expense

The Cast Steel Bar Frame which gives great strength with least weight; permits easy access to, and excellent ventilation for the motors.

The Vauclain Removable Gib which greatly facilitates the removal of journal boxes and permits inspection or replacement of all wearing parts with a small cost of time and labor.

The Oil and Waste Lubricating System for the motors, with specially designed bearings for long life in service, which has been adopted as a standard after years of investigation.

The Commutating-Pole Motors which insure sparkless commutation at all loads. As a result, the commutator and brushes are long lived and require little attention, brush renewals are seldom required, and carbon and copper dust inside the motor is practically eliminated.

These features are but few of many which have been incorporated in Baldwin-Westinghouse **Barsteel** mine locomotives in order to give the user the greatest possible service. You can obtain them only when you specify Baldwin-Westinghouse.

Address either company for full information.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 APRIL 4, 1914 NUMBER 14

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 551

Calls attention to the erroneous idea on the part of the public that coal-mine owners are hard-hearted and selfish in the conduct of their business. One operator, tiring of criticism, made the newspapers a proposition.

IDEAS AND SUGGESTIONS: *Pages* 552-554

Are the Services of Mine Officials Fully Appreciated?—Pass It On—*Interesting Ideas Developed at an Alabama Mine.

PUMPING IN COAL MINING: *Page* 554

ANTHRACITE DUST NOT EXPLOSIVE: *Pages* 554-555

*A SAFETY CAGING DEVICE: *Page* 555

MINE CAVING PREVENTED BY HYDRAULIC FILLING:

*SELF-STARTING MOTORS FOR MINE PUMPS: *Page* 556

Some notes and comments on the advantages of self-starting electrical apparatus, as applied to coal mining. Remote control is one factor that may often be used to advantage. W. H. Easton. COAL AGE, Vol. 5.

*A PORTABLE SELF-CONTAINED MINE PUMP: *Page* 557

*A NEW HORIZONTAL MINE PUMP: *Page* 557

THE PROPER CHOICE AND CARE OF MINE PUMPS: *Pages* 558-559

Practical pointers showing what conditions should be considered in erecting a mine pump and what precautions should be taken to secure it the best results and longest life. C. W. Crawford. COAL AGE, Vol. 5.

*A NEW MINE PUMP: *Page* 559

THE ALBERGER PUMPS OF THE PENNSYLVANIA COAL CO.: *Page* 559

*COMBINED AIR LIFT AND PUMPING SYSTEM: *Pages* 560-561

General requirements of the Pohle air-lift compared with the systems in common use of pumping with steam or compressed air. Advantages of the Jones' combined air-lift and pumping system. Lewis Jones. COAL AGE, Vol. 5.

*A MAMMOTH MINE PUMP: *Pages* 562-563

Describes a most ingenious design of pump built for a vertical head. COAL AGE, Vol. 5.

*THE PRINCIPLE OF THE CENTRIFUGAL PUMP: *Pages* 563-565

The modern centrifugal pump can be made to perform practically any pumping duty common to coal mining. Its peculiar advantages are simplicity, low-maintenance cost and its ready connection to the high-speed motor and steam turbine. J. D. Cone. COAL AGE, Vol. 5.

STUDY COURSE IN COAL MINING: *Page* 585

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 586

INQUIRIES OF GENERAL INTEREST: *Page* 587

MINING SUSPENSION OPENS WITH LARGE STOCKS ON HAND: *Page* 565

ACETYLENE LAMPS IN BLACKDAMP: *Page* 566

*THE DEVELOPMENT OF MODERN TYPES OF MINE PUMPS: *Pages* 567-568

Some notes on the gradual evolution of the modern drainage engine, and a pictorial description of the different types. COAL AGE, Vol. 5.

*STRIPPING A MINE BY HYDRAULIC METHODS: *Pages* 568-569

Where the overburden is exceptionally tenacious, the steam-shovel method of stripping a mine is impractical. Under such conditions, a hydraulic plant consisting of a portable giant and a sand pump has been substituted with remarkable success and small expense. P. J. McAuliffe. COAL AGE, Vol. 5.

*ELECTRIC PUMPING PLANT AT TILMANSTONE COLLIERY: *Pages* 570-573

A detailed discussion of the construction, installation and operation of the electric pumping plant in use at the Tilmanstone Colliery, Dover, England; with an appended set of instructions for the switchboard and sinking-pump attendants. COAL AGE, Vol. 5.

A LAUDABLE WORK: *Page* 573

METHODS OF WEIGHING AND COMPUTING MINE OUTPUTS: *Pages* 574-575

Inadequate weighing facilities are a prolific cause of labor troubles at many mines. Methods of eliminating these are discussed, and valuable notes are given on the accepted practice in computing production. Neill Hutchings. COAL AGE, Vol. 5.

WEST VIRGINIA OPERATORS APPOINT SAFETY INSPECTORS: *Page* 576

AGREEMENT TO END STRIKE: *Pages* 577-578

*STEAM WASHER FOR CLEANING OVERALLS: *Page* 578

EDITORIALS: *Pages* 579-580

One Way to Advance Loyalty and Efficiency—The Western Fuel Co. Agreement—Coal Buying on a Large Scale—Stone-Dust Stoppings—Some Things Are Beyond Understanding—Operators Are Not a Unit—Wanted a Leader.

RECENT JUDICIAL DECISIONS: *Page* 582

DISCUSSION BY READERS: *Pages* 583-585

Widths of Opening and Pillar—Safety or Refuse Chambers in Mines—The Certificate Law. Letters Nos. 24 and 25—Fan Ventilation.

COAL AND COKE NEWS: *Pages* 588-591

COAL TRADE REVIEWS: *Pages* 592-596

ADVERTISING INDEX: *Page* 64

NUMBER OF COPIES PRINTED THIS ISSUE 12,000

None sent free regularly, no returns from news companies, no back numbers.

Putting It Down In Black And White

The Weekly Ad-Talk Page

¶ "That is a thing I can *say* to a man but I can't put it down in black and white." ¶ This is a very frequent attitude with the non-advertiser—he is actually *afraid* to back his goods in plain, cold print from which no man can get away. ¶ There are of course, some facts in every business, which it is not well to spread broadcast. ¶ But generally beware the man who will *say* what he wouldn't put down in black and white. ¶ And, conversely, pin your faith to the manufacturer who makes it a practice to put his claims and promises down in cold type as a bond for his good faith. ¶ In short, buy advertised goods!

COAL AGE

Vol. 5 NEW YORK, APRIL 4, 1914 No. 14

There are plenty of people who really and truly believe that most coal-mine owners are hard-hearted, grasping individuals, who spend their time hatching schemes which will enable them to stifle legitimate competition, or tie down their employees, and a little inquiry among your friends and acquaintances will probably convince you that such opinions are held, not alone by the ignorant, but by many intelligent people who seem to be conscientious seekers after the truth.

Of course, when you ponder a moment and recall that the only interesting articles about the coal industry that appear in the daily papers have to do with explosions (generally attributed to carelessness and greed of the mine owner), strikes (the miners' officials always insist that all violence is incited by the thugs in the employ of the operators) and coal famine among the inhabitants of city tenements during blizzard weather (generally illustrated with cartoons), you will understand how these wrong impressions have been formed.

If you should tell all of your friends that the average profit on a ton of coal, f. o. b. railroal cars at the mine, is under 10c. per ton, most of them would think you crazy and the remainder would be so little impressed by the simple statement, that they would forget about it within the hour. You must make a startling statement of fact, if you desire to erase an impression created by careless and uninformed news correspondents.

To illustrate: In a certain large city, not so far from a coal district, domestic coal was being delivered at $4.50 per ton. This $4.50 was divided as follows:

Lump Coal f. o. b. cars at mine	$1.50
Freight	1.60
Hauling in town	.50
Retail dealer's commission	.90
(This had to absorb all bad debts, etc.)	
	$4.50

During a period of extreme cold weather, one of the dailies began to feature the usual articles about the robber coal barons. A certain coal baron, having no sense of humor(?), decided to let the newspapers in on the ground floor, and so, made an offer to the associated charities of the city, to donate to them, at the mine, as many tons of coal as the newspapers would agree to have handled by the railroads and then delivered to the needy.

This looked mighty good to everybody; but when the business managers of the newspapers got to figuring, they treated the editor who had stirred up the trouble, to some sure enough excitement, and no newspaper in that city has printed a cartoon, describing coal barons, since that memorable famine.

Ideas and Suggestions

Are the Services of Mine Officials Fully Appreciated?

SYNOPSIS—Many foremen and superintendents spend a lifetime in the service of some companies without proper and adequate remuneration. One sure way to repress loyalty is to cause men to believe they are working for wages alone.

What does the coal-mining business hold out to the average mine foreman and superintendent to stay in the game? We know of several concerns operating a number of mines who can point to men grown gray in ten, fifteen and twenty years' service as foremen or superintendents, while during the period of their service, several general managers and general superintendents imported from other districts have come and gone without achieving any striking or lasting results.

Some of these foremen—excellent fellows by the way—never attained a superintendency, and the best of the superintendents who, by reason of their intelligence and loyalty, achieved such sobriquets as "Old Reliable," "War Horse," etc., never advanced to the position of general superintendent for the company they served so long.

Does it not appear strange that such men continued to give faithful service to one new general manager after another? But the reason is plain. As a rule they stayed because they become fixed in habit and yet believed that perhaps some day the concern would get tired of changing practices, spending money, etc., as the result of importing new managers; and the hope was ever present that they themselves would find their opportunity to fill the coveted place.

After all it only takes two or three such disappointments to make a man realize that he is getting too old to change companies. The result is that many good executives are side-tracked, and knowing how hard it is to pull up and move, they stay and do their best. This is so essential a factor after all to the successful operation of mines, that the job they have is theirs for keeps, but nothing better.

A great deal is heard nowadays about "efficiency." The superintendent more than any other man is expected to get the results, "scientific management" and "efficiency" hope for. But what of the superintendent himself? Is anything in the way of reward held out for him in seeking the accomplishment of almost hopeless tasks? He is the man expected to deliver the goods. Is he sufficiently paid for it?

How many coal-mine superintendents can count *years* between salary advances? Logically and naturally a superintendent is paid what is properly termed an individual rate. He is paid for his worth in the position he holds. The fact that so many men go from one company to another is proof of this. But what of the great number who remain loyal to one concern? Does the management see that their faithfulness and value because of their experience, etc., are rewarded?

It may not read well in cold print, but there are many honest and efficient men, capable of filling positions as general superintendent and general manager, working today as foremen and superintendents for concerns who have imported from other districts men of far less knowledge of the mining game, and especially of local conditions, to lord it over these same men, because the newcomers bear the official cognomen of general superintendent or general manager. The old employees carry the load and in most cases deserve the credit for any success achieved by the imported "G. M." When the latter did not achieve success, were they let out with him? Certainly not. The company knew better.

It is generally admitted that the man who works just for his pay is not the best workman. However, some companies appear to treat some of their oldest and most loyal employees as if they were working for their wages alone. *They are not.* They are working for the *honor* of proving their faithfulness and loyalty. This is worth as much to some of them as their pay. But the recognition of this honor on the part of the company which should be given in annual salary increases, is in too many cases overlooked or withheld too long.

Loyalty is not going to become extinct. It is a tremendous influence in the adherence of men to one concern for the best years of their lives. When loyalty does become extinct and all men work for pay alone, it will be a sorry state of affairs.

The best way to repress loyalty is to withhold appreciation for it in the salary check. We heard of a man who held a responsible position with a big concern, but whose rate had not been changed for several years, who wrote his boss asking for a change in rate. He said: "Increase it or decrease it, just as you like—what I'm after is a change." It is not going to hurt a good mine foreman or superintendent to voluntarily raise his salary once a year. The man who can't stand it is the one you must locate sooner or later. From those who do stand it, an increasing quality of service will be obtained. Look over the list of your old employees. What you find in the way of salary recognition (or lack of it) may surprise you.

Pass It On

Look over the trade periodicals on your desk this morning; also step out in the back room where you keep your office supplies and take stock of the publications you have piled away for future reference. There must be quite a stack of them out there gathering dust and occupying much needed space. How many times have you gone into that supply room to run through the back numbers and dig out an article you recollect vaguely of having seen some time or other? Not very often; have you?

Again consider those magazines just laid on your desk among the morning's mail. Do you go through them carefully? The chances are that when you pick up one, you turn the pages quickly, noting only the illustrations, until you come to an article bearing on your own particular product. This you skim over hastily, or digest carefully, as the importance of your correspondence allows. Again you move along rapidly, stopping a moment to note market quotations, until finally you toss the magazine to the back of the desk, with the mental remark that you will look through it again when you have more time.

How many men in your organization, or under your orders, ever see that paper to which you can spare only a scant quarter of an hour? Many of those men are ambitious; some are real thinkers. They may need only the word picture of how other men are solving problems common to your business to start them to thinking about the unconquered difficulties right in your own plant.

More than one great manufacturing organization of the present day owes its success to the discovery of the simple truth that the more brains there are focused on certain problems, the better chance those problems have of being quickly and surely solved. Trade books and publications so disposed that they can be looked over and their articles of interest discussed during leisure moments, such as the noon hour, make one of the best ways of awakening interest in the work at hand.

Did you ever think of the tremendous amount of labor required to analyze the latest developments and ideas in a particular field; to investigate the newest apparatus and processes; in short to produce a useful readable business magazine? That periodical into which you look for a few moments contains the best thoughts of a score or more of men who are top-notchers in their lines.

Has your business got all the benefit possible out of that magazine which you will soon lay aside to continue the morning's dictation? Cannot some of those men, on whom you rely for the smooth and noiseless operation of the business machine, glean one more idea from its pages? Even one useful idea may mean thousands of dollars in plant economies or improved product.

Therefore; for the inspiration of your men and the advancement of your business; after you have read your trade paper, *pass it on.—Power.*

Interesting Ideas Developed at an Alabama Mine

The accompanying photograph illustrates several very interesting ideas that have been developed by W. J. Lovejoy, mine foreman at the Acmar slope of the Alabama Fuel & Iron Co., Acmar, Ala.

In the foreground is a stretcher which can be placed on top of a mine car or a lumber wagon and a patient transported on same will be quite as comfortable as if he were riding in an invalid's carriage.



VIEW AT ACMAR MINE OF ALABAMA FUEL AND IRON CO., IN ALABAMA

Just back of the stretcher, is the railed-manway entrance to the mine. Every man entering the mine first passes the fireboss' shack, where he is given instructions by the fireboss, if any instructions are to be given. He then passes through the turnstile, which is shown just under the circular disk fastened to the side of the fireboss' shanty. Around the circumference of this disk are notches which are numbered consecutively, and each time

a man passes through the turnstile, the disk is advanced one notch, thus registering automatically the number of men who have entered the mine.

Just beyond the turnstile are the checkboards; one for in and one for out. With this arrangement, a man cannot forget to see the fireboss before going to work, nor can he enter the mine without being accounted for, to the officials.

Acmar produced the largest tonnage of coal at any mine in Alabama, for the year 1913, namely 443,026 tons. This is a rather remarkable record, considering that the mine was opened in October, 1911, and only ran 275 days during 1913. The coal seam is pitching and all coal is hauled to the surface up a single-track slope.

Pumping in Coal Mining

The question of pumping, in the operation of a coal mine, is a very important and often expensive one. Some of the problems that arise are difficult ones to solve. Especially is this true in mines under shallow cover and in the working of seams that outcrop on the hillside and dip into the hill.

It often happens that the desire to get quick returns has resulted in the coal being worked out close to the crop. On going into mines of this class, it is common to find water coming in from all sides, often in small streams. As long as the flow of water is regular, it is possible, by a proper system of ditching and the use of siphons to conduct the water to sumps located in the mine at convenient points, to control the water and keep the mine in working condition.

It is, however, in the class of mines to which I have referred where the coal along the outcrop has been worked out and surface drainage enters the mine, that the greatest trouble is experienced in reference to keeping the mine in working condition, at certain seasons of the year. During heavy rains and spring freshets, so much water enters the mine through the outcrop, that it is, in many cases, practically impossible to prevent the drowning out of the working places. This condition may continue for several days.

To install a sufficient pumping capacity to handle the water at such times would mean that many pumps would stand idle the greater part of the year. Such inrushes of water cause the operator much uneasiness. The extra pumping equipment may be necessary to insure the safety of his mine, to say nothing of keeping the mine in working condition. A considerable investment is thus often tied up in equipment that is useless a large portion of the time.

It is with the hope of saying something of benefit that will enable some engineer or operator to overcome these difficulties, that I offer this short article. COAL AGE, as a mining paper, has no equal in the way that it gives the reader a wide and practical insight into all kinds of mining questions.

Referring to the conditions I have mentioned, I would advise the building of dams to hold back, temporarily, such an inrush of water as I have described and would suggest that, in the development of almost every mine, there are some vacant or abandoned "flats" or "levels" that have been developed and are being held for the finishing of the dip workings. My suggestion is that, in many instances, such places could be sealed off by a substantial dam, so as to form a storage reservoir, capable of receiving and holding the quantity of water that is in excess of the regular pumping capacity during any inrush of water into the mine. In adopting such a plan, arrangements should be made by which the water flowing into the mine could be diverted and drained into this reservoir.

By this means, it would only be necessary to maintain a pumping plant of sufficient capacity to handle the average daily amount of water made in the mine. During wet seasons, the water in excess of this daily average amount could be stored in the reservoir thus provided; and, in the drier seasons, the pumps could be made to drain this area.

Wherever such a plan can be adopted, it would save a large and useless equipment and would avoid the additional expense that would be required to provide extra men and fuel for the operation of the pumps, at certain seasons of the year.

Anthracite Dust Not Explosive

HARD-COAL OPERATORS DELIGHTED—PREVIOUS JUDGMENT CONFIRMED

A series of important tests have been conducted during the last two weeks at the Bureau of Mines' station at Pittsburgh, and the experimental mine, near Bruceton, Penn., to determine whether Pennsylvania anthracite dust is explosive when firedamp is present. The culminating experiments were carried on Mar. 24, at the Pittsburgh station in the presence of Messrs. James E. Roderick, chief of the Pennsylvania Department of Mines, Harrisburg; M. J. Brennan, inspector, Pottsville; A. B. Lamb, inspector, Shenandoah; S. J. Jennings, inspector, Pittston; D. T. Davis, inspector, Wilkes-Barre; G. B. Hadesty, division superintendent; Mr. Garner and Mr. Price, representing the Philadelphia and Reading Coal & Iron Co.; W. G. Whildin, general superintendent of the Lehigh Coal & Navigation Co.; W. S. Norton, chief engineer of the Alden Coal Co.; H. R. Owens, of the Lehigh Valley Coal Co.; W. Gordon Thomas, of the Lehigh & Wilkes-Barre Coal Co.; Charles Enzian, the representative of the Bureau of Mines, Wilkes-Barre; George S. Rice, chief mining engineer, and Spencer P. Howell, explosive engineer of the Bureau, both of Pittsburgh.

The tests have been of tremendous interest to all those concerned in mining anthracite, since there are large amounts of anthracite dust unavoidably made in mining, and if the dusts were inflammable it would be a very serious problem, almost impossible to overcome.

The British experiments in their experimental gallery have indicated that the Welsh anthracite is inflammable, and this awakened some doubt whether the Pennsylvania anthracite dust might be inflammable. To the great delight of all who witnessed the tests, not only did the anthracite dust not prove explosive without firedamp being present, but even in an explosive mixture it did not prove inflammable, and also tended to lessen the length of flame of an explosive firedamp mixture.

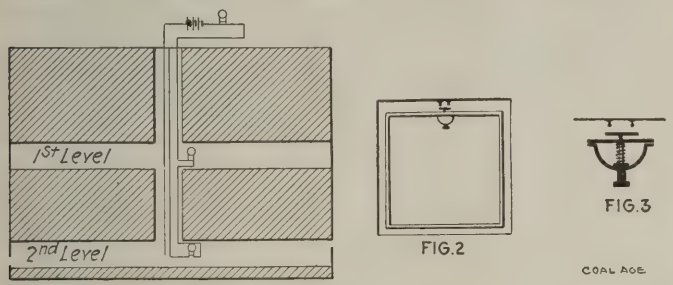
Chief Roderick believed that the matter was of such great importance to the anthracite industry that he brought four of his inspectors from Luzerne and Schuylkill counties, which contain perhaps the most gaseous mines in the world. He expressed himself as being greatly

pleased with the conclusive demonstrations. While he and other inspectors and operators of the anthracite district have been very positive from results of many years' experience that the anthracite dust was not inflammable when firedamp was not present, they hitherto could not assert that it might not extend the flame of the firedamp explosion. Now they think that it has been shown beyond question that its presence tends to limit rather than extend the flame.

A Safety Caging Device

Last June a patent was granted on a safety device for a shaft cage, which promises to help the "Safety-First" movement. By the use of this invention, the danger of riding a shaft cage is reduced to a minimum. Should anything happen while the cage is in motion, the pressure of a button signals the engineer to stop; likewise signals may be given to raise the cage or lower it as may be desired.

The invention is nothing more than the application of the principle of the electric bell. Fig. 1 shows a vertical section of a shaft, illustrating the method of wiring. Two



General and Detail Sketch of Apparatus

lines of No. 6 copper wire, parallel to each other and about 4 in. apart, are run from the top to the bottom in both compartments of the shaft. These wires are connected with storage batteries and electric bells, one of which is located in the engine room and the others on the different levels, or wherever desired. Fig. 2 shows a plan of a shaft and the relative position of the circuit-closing apparatus is shown in detail in Fig. 3.

The contact bar, which is of copper, is held in position by a coiled spring under tension. When the button is pressed the contact bar touches both shaft wires, thereby completing the circuit and ringing the bells. This is attached to the cage directly under the bonnet and in such a position as not to interfere with the caging of the car or the dumping of the coal.

The argument may be advanced that the device is unreliable in that the circuit may be closed either by the bonnet or other metallic parts of the cage. This can only happen by the offending parts being disarranged and is really an argument in favor of the device, for should such a thing happen, it would merely be a case of the cage reporting that it is in need of prompt attention or possibly immediate repairs.

The apparatus has the approval of government officials and has been installed at No. 15 mine of the O'Gara Coal Co., Carrier Mills, Ill., by Mr. Schellenger, the inventor, at which mine he is employed as hoisting engineer. Those who have tried the device say they have found it to be a complete success.

Mine Caving Prevented by Hydraulic Filling

Hydraulic filling of the abandoned mines in the anthracite region is the only solution of the mine-cave problem, in the opinion of Charles Enzian, local engineer for the anthracite district of the Federal Bureau of Mines, who has just submitted a report to the Federal Department of Labor, embodying recommendations as to what is best to be done.

Mr. Enzian states that hydraulic filling is practicable and profitable, and was devised for the double purpose of disposing of refuse and the reclaiming of pillars. He states that it is also bringing about the elimination of the unsightly spoil banks, and that this waste, caused by an exacting market, will soon be the exception rather than the rule.

He also maintains that it will eventually prevent the pollution of streams and injury of river flats, which are subject, after floods, to deposits of culm mixed with fine clay, loam and silt.

"State and local regulation," he continued, "were directed against such conditions and a number of civil and criminal suits at law hastened the installation of the filling systems, the operations of which produced, and will continue to produce, valuable results.

"The extent of stream pollution and of land damage as a result of dumping mine refuse along water-courses is often under-estimated, but may be realized by a casual survey along rivers with tributaries among the coal fields. Almost every spring the tributaries overflow their banks and enormous quantities of culm and silt are washed into the rivers, which deposit the mixtures on the lowlands and in the channels of the rivers.

"Not only is the transported material a source of destruction to vegetation along the bottom lands, but the action of the streams involves a great waste of natural resources, as proven by the fact that during the years of 1910 and 1911, over 90,000 tons of coal were dredged from the North Branch of the Susquehanna River, several miles below Wilkes-Barre."

Mr. Enzian points out the fear entertained by property holders and contends that hydraulic filling should be utilized more extensively because it permits of higher extraction, will prevent cave-ins and will prove valuable in extinguishing mine fires and for arresting squeezes.

He points out the aid which can be given by cities, saying that ashes and garbage, by proper arrangements, could be dumped near hydraulic filling plants and by this means conveyed into the mines at predetermined points. Mr. Enzian also suggests that many industrial plants could use this very system to advantage. Railroad companies could, moreover, secure large quantities without much expense by conveying the ashes from the industrial centers in the cars that are now taken back empty.

"The availability of sand, gravel, loam and river silt are now limited to the northern field," he continued, "but if the various glacial silt deposits in the Wyoming and Lackawanna Valleys can be made available the problem of procuring material for hydraulic mine filling can be considerably simplified."

He stated that several attempts had been made, but failed, and that he believed the failures due more to lack of persistent effort and to crude methods than to the engineering impossibility. He also pointed out that along the Lehigh Valley, as far east as Bethlehem, and in the iron- and zinc-ore belts of New Jersey, large quantities of zinc slag could be obtained. Mr. Enzian contended that crushed stone might also be used, though its practicability has not yet been determined. He inferred, however, that the cost would not be so great as imagined.

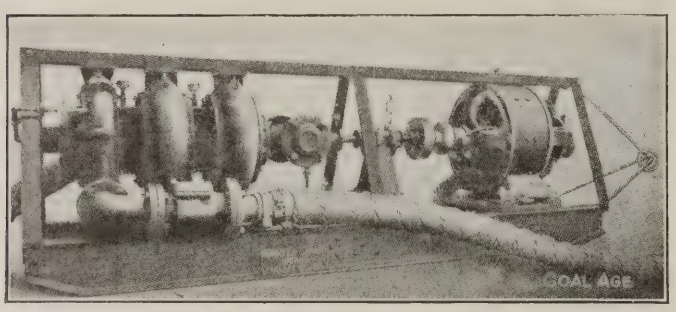
Self-Starting Motors for Mine Pumps

By W. H. Easton*

SYNOPSIS—Some notes and comments on the advantages of self-starting electrical apparatus, as applied to coal mining. Remote control is one factor that may often be used to advantage.

The self-starting, direct-current electric motor for mine service is a comparatively recent innovation, but it has proved highly successful in operation and has become popular among operators who have used it. Mechanically, the self-starting motor is similar in every respect to the ordinary direct-current motor and most of the electrical features are the same, the only difference being in the fields. In the ordinary motor the fields are usually "lightly compounded"; that is, there is a shunt-field winding and a light-series winding. In the self-starting motor a heavy-series winding takes the place of the light one.

The difference from an operating standpoint is that the ordinary direct-current motor must be started by



Typical Application of Direct-Current Self-Starting Motor. Pump Is Mounted on a Skid to Be Lowered Down an Incline

means of a starting box, in which there are several steps of resistance that must be cut out gradually as the motor speeds up; if the motor, while at rest, were subjected to the full strength of the current, it would simply burn up. The self-starting motor, however, by virtue of its heavy series field, can be connected directly to the line and will start gradually and without injury.

Advantages of the Self-Starting Motor

This motor has three distinct advantages, as follows:

1. Possibility of Remote Control—The ordinary motor must in general be started by visiting the motor and turning the lever of the starting box by hand. The self-starting motor needs no such attention. All that is necessary is to close the circuit-breaker of the motor circuit in the power house and the motors start up automatically.

Furthermore, when the power fails temporarily for any reason, the motors, of course, stop, but when the power returns the self-starting motors start up at the same time. Ordinary direct-current motors will not do this, as the starting box is so arranged that it is automatically thrown to the off position when the power fails and so each must be visited in turn. Where there are many widely scattered motors, considerable time is necessary to start them, a loss entirely eliminated by the self-starting motor.

2. Elimination of the Starting Box—Since the starting box is eliminated, it follows that the motor connections are of the simplest possible character with no contacts, resistance, and complicated wiring to cause trouble as a result of dampness and corrosion. While starting boxes can be obtained that are proof against corrosion, it is obviously advantageous to do away with them.

3. Compactness of the Equipment—The unit formed by the pump and motor is entirely self-contained except for a simple knife switch. It is, therefore, more easily installed and moved than the ordinary type with its starting box and wiring.

Direct-current, self-starting motors can be furnished in sizes up to 20 hp. for 220- and 500-volt circuits. The maximum full-load speed is 1100 r.p.m., as this type of construction is not practicable with motors of higher speeds. Squirrel-cage alternating-current motors of the same ratings can also be thrown directly on the line, but no special changes in construction are required for this type of motor.

Starting Current—One fact that must be borne in mind with these motors is that on starting they draw several times full-load current from the line. This is ordinarily of no importance since the time during which this heavy current is required is short and the starts are few. Under some circumstances, however, the heavy load proves objectionable. By dividing up the motors into several groups so that only a few are started at once, the total instantaneous rush of current may be reduced.

Speed Regulation—Another factor of importance is that the no-load speed of these motors is greater (sometimes as much as 50 per cent.) than the full-load speed. Where the motor is directly connected to the load this is of no importance, but they are not well adapted to driving machines that may be lightly loaded or to connection by means of belts since the belts may break.

Applications

The self-starting motor finds its ideal application to the centrifugal pump and mine fan or blower. It has demonstrated its usefulness in this field and a large number have been in successful service for several years.

It has also been used extensively for driving triplex plunger pumps, although the motor manufacturer has been loath to recommend it for this service. It has, however, made good for this purpose, and if the motor manufacturer is fully informed of the intended application, he can, in most cases, supply a satisfactory drive. Crushers, coal conveyors and other machines have also been successfully driven by these motors, but the same caution applies to these uses. For damp locations, the coils should be impregnated so as to render them moisture-proof. This process greatly adds to the reliability of the motor under the severe conditions of mine service.

The price, it may be said, is but little higher than that of the ordinary compound-wound motor of corresponding size and speed. Vertical, inclosed, back-geared and other modified types, as well as the standard horizontal open type, can be obtained.

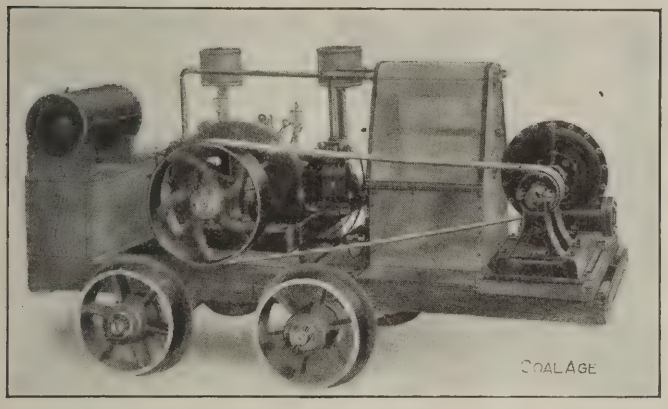
*Westinghouse Co., East Pittsburgh, Penn.

A Portable Self-Contained Mine Pump

By A. W. Dickinson*

In many mining districts, where the deposits sought have only a shallow cover, the ingenuity of the operator is frequently taxed to devise a means of ridding the workings of surface water. Where the area of the mine is small, and the water can be easily drained to a central point, it is a simple matter, but where the mine covers a considerable area and electric power is not available scattered bodies of water may become troublesome.

In the Bevier coal field in Macon Co., Missouri, the Central Coal & Coke Co., of Kansas City, operates a slope opening known as Mine No. 25. The coal bed is



A Unique Style of Portable Mine Pump Designed for Special Service

flat and the face is nearly a mile from the slope collar. As the cover is thin (in many places not exceeding 30 ft.), there are numerous fissures or cave-holes which allow water to enter. Where the influx from such sources cannot be ditched to a sump, it is necessary to employ water-boxes.

The water-box may be efficient for small quantities of water on a haul not exceeding 600 ft. in length, but if it is necessary to move the liquid further, other means should be used, as the water-box is not only costly for long hauls, but interferes with gathering.

The writer conceived the idea of placing a number of pump stations near the working face, where the water was giving trouble, and utilizing a portable gasoline-engine-driven pump. Five stations were accordingly located with a pump at each. Two holes were drilled from the surface at each station, one to take a 1½-in. pipe and the other a 2-in. pipe. A gasoline engine of 8 hp., and a centrifugal pump with 2-in. suction and 1½-in. discharge were arranged on a mine car bed and the unit started on its rounds. The exhaust from the engine was led up the 2-in. pipe to the surface, while the discharge of the pump passed up the 1½-in. pipe.

This pumping outfit in charge of one man was in continuous operation for 8 months, being a success and, to a large extent, solving the water problem. At the end of this time, the Hayton Pump Co., of Quincy, Ill., following my suggestions, furnished another similar portable unit shown in illustration.

Four pumps of this type are at the present time in use, the metal of each having successfully withstood the action of the acid water and the grit from the sump.

*Superintendent, Central Coal & Coke Co., Kansas City, Mo.

A New Horizontal Mine Pump

An interesting type of horizontal mine pump is that which recently has been placed on the market by the Deming Co., of Salem, Ohio.

The air chamber is built very low and broad, so that the pump can be taken into shallow entries. Access to the discharge valve is obtained by removing the air-chamber, which is held in place by six bolts. The water end is unusually heavy, being constructed of cast iron to resist mine water. The valves are of rubber and are mounted on bronze grid seats screwed into the deck. The piston rod is of bronze and works through a deep

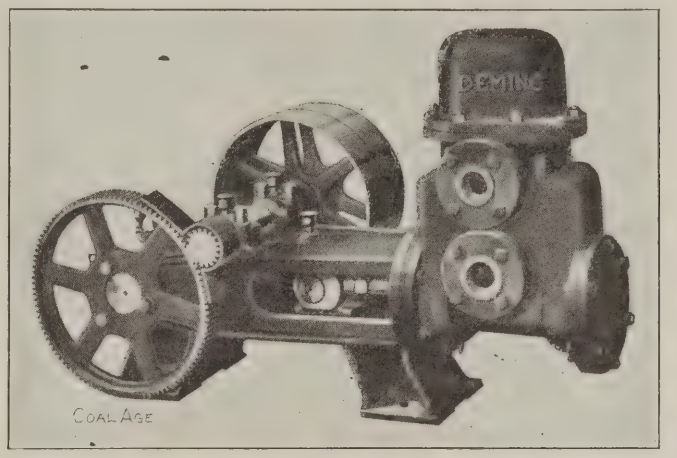


Fig. 1. A 6x6-In. Pump Having Capacity of 55 Gal. per Min.

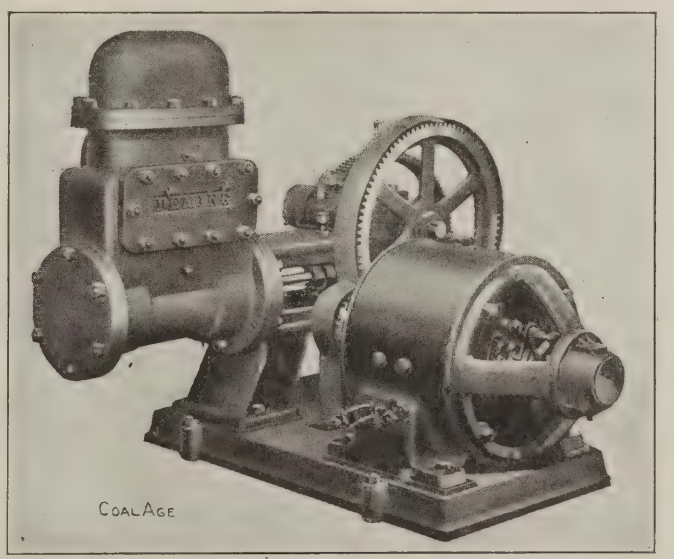


Fig. 2. Same Pump Fitted with Sub-Base and Gearing Connection for Motor

stuffing-box with bolted gland. The cylinder is fitted with a heavy bronze liner.

The illustrations show the 6x6-in. pump, which has a capacity of 55 gal. per min., when running at 55 revolutions. These 6x6-in. pumps are fitted with 3-in. suction and 2½-in. discharge pipes.

The standard construction includes tight and loose pulleys, with grease cups and wrenches, as shown in Fig. 1. The pump can also be fitted with a sub-base, and with gearing connection for the motor, as shown in Fig. 2. These pumps are intended for a 75-lb. pressure.

The Proper Choice and Care of Mine Pumps

By C. W. Crawford*

SYNOPSIS—The writer gives a few practical pointers showing what conditions should be considered in erecting a mine pump and what precautions should be taken to secure to it the best results and longest life.

The discharging of water and the choice and care of pumps are prime sources of worry in mining operations. No operator can go home at night with assurance that his mine will be running in the morning; the superintendent is liable to call at any hour, and the mine even may be laid out for days at a time. Pumps are chosen for their local popularity, or for their cheapness; and, more often than otherwise, too small a pump is installed, with the result that it must be pushed beyond its endurance. Fifty strokes a minute is fast enough for the majority of pumps, but the pump makers recommend one hundred, hence the user is encouraged to thrash his pump to death before he realizes it.

Pumps are erected usually by the pump man, who uses whatever material he can get; the superintendent ordering whatever equipment he has in stock, if any, which is usually one or two sizes too small—never too large. Short elbows are used almost universally and air chambers frequently are ignored. No thought is given to the velocity of the water in the pipes; a pump being considered a good one when it discharges, horizontally, a full pipe at the surface, regardless of power and obstructions.

The water is compelled to travel at six or seven times the velocity of the piston, instead of three or four, with the result that half the power is absorbed in friction and in butting against short elbows. Usually, the air chamber is water-lagged, and the column of water has to be started at each stroke from a dead rest. Frequently, the air is let out of the air chamber by a cock at the top, or half way up. No provision is ever made to supply the air chamber with air, unless by an unintentional leaky suction pipe. Packing of the piston is neglected as long as water appears at the top, and the sloshing backward and forward on the piston head of the loose packing and the follower often cause broken pump rods. Bad or cheap packing is sufficient cause for scoring cylinders and pump rods.

These are some of the abuses mine pumps are subjected to, but many of them can be, and ought to be, corrected. Acid mine water can neither be ignored nor combatted with impunity or any hope of permanent elimination. Pumps are made comparatively acid-proof, but it requires the utmost effort of the pump maker and the pump user to accomplish even moderate success, and they do not always work together. "Where there's a will, there's a way," and confident coöperation of pump maker and pump user could be made to alleviate somewhat the ills both parties have to contend with.

Pumps generally are ordered too small to meet the increased flow that is sure to come, forgetting that slower speed and fewer hours per day mean ultimate saving. The wear of a pump is in proportion to the distance traveled by the piston, regardless of the quantity of water discharged. The power expended is equal to the horsepower of the load plus the friction of water in the pipes, plus the obstruction of elbows, through this latter can be reduced by using long elbows. In the absence of long elbows, two 45-deg. elbows with a nipple between are a good substitute. Pipes larger than are prescribed by the pump maker ought to be used—the larger the better. Suction pipes should be fitted air-tight, and should have an air cock to admit a small quantity of air to replenish that carried out of the air chamber by the water. It is not known generally that water under pressure in contact with air absorbs the air, thereby reducing the hydrostatic pressure of the column and exhausting the air chamber, with the result that a constant supply of air is required to keep the air chamber filled. The folly of the pump engineer letting this air escape by a cock is too preposterous for common belief, nevertheless it frequently is done.

Pump pistons, or plungers, ought to be packed with soft packing—the softer the better—but braided, and filled with tallow and graphite. The packing should be screwed up solid and kept so by frequent examination. Also, the packing should be renewed frequently by repacking with the same material refilled with tallow and graphite. If this were done, cylinders of genuine babbitt metal could be used in all acid mine waters, as well as pump rods covered with genuine babbitt. This bit of information may be rated as superfluous by pump men, but it already is being used with success and general satisfaction.

Pump cylinders generally are made of a composition called bronze, or phosphor-bronze, containing zinc. The zinc is used to obviate the air bubbles that are inevitable in casting copper and tin-phosphorus, being a scavenger, to clean the metal; the zinc fills up the chinks, as it were, and makes the metal solid. It is doubtful if the zinc fully combines chemically with the copper and tin. Anyway, the acid water dissolves the zinc and leaves the face of the cylinder as rough as a sheet of sandpaper. Pure phosphor-bronze, without zinc, wears smooth, but is a very rare composition, owing to the difficulty of eliminating air bubbles, and few shops use it.

Lead-lined pumps have met with unqualified success, being invulnerable against the corrosive action of mine water. In some localities pumps could not be used at all—the water being hoisted in tanks under the cage—until the introduction of the lead-lined pump. Ordinarily, pumps lasted six months, and solid bronze pumps one year, in extremely acid mine water, whereas the lead-lined variety are good indefinitely.

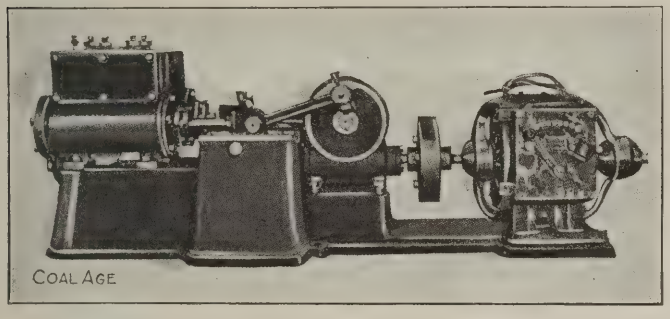
Electric motors have the perversity of running at their own power and speed, and hence the pump must have a resistance equal to the power of the motor. If its load is greater, it becomes overloaded, and the gearing and frame, therefore, must be inordinately strong, and apparently out of proportion with steam-driven pumps.

*President, Crawford & McCrimmon Co., Brazil, Ind.

Geared motor pumps are noisy and subject to breakage of gear; therefore, the general practice now is to drive with belts. Belts for this purpose in mines must be waterproof, and pumps equipped in this manner should be driven only at moderate speed.

A New Mine Pump

The J. C. Stine Co., Tyrone, Penn., have recently put on the market a new, direct-connected, electric, mine pump especially designed for hard service. A number of these pumps have now been in service in the mines of some of the largest coal companies for several months past and have given good satisfaction in every case. Some of these in use are operating under severe conditions; one in particular is reported as having been in operation 24 hr. a day during the past three months. Comparing the



THE J. C. STINE ELECTRICAL MINE PUMP

work performed by this pump with that of two other pumps manufactured by two of the largest pump builders in this country, one mine superintendent pronounces it as, beyond question, the best pump in operation in his mines. This superintendent has 15 electrically driven pumps working in the mines in his charge.

The J. C. Stine duplex pump is fully described in a circular just off the press and which enumerates its several special features, among which are the following:

The duplex cylinders are double acting and cast in a single piece. The power and water ends of the pump together with the intermediate connections are mounted on one solid casting, with all faces properly machined to permit any part to be taken off for examination or repair or to be replaced, without disturbing the other parts.

A balance-wheel coupling on the motor shaft absorbs all shocks or pulsations incidental to high-speed machinery and gives a constant torque. The speed-reducing device is said to be absolutely noiseless and simple, consisting of a bronze worm gear, meshing into a polished worm of high-carbon steel previously hardened. These worms are cut at such an angle as to give the highest possible efficiency, which careful tests have shown to yield 97 per cent. of power transmitted. The worms run in a bath of oil, being inclosed in a cast-iron gear case absolutely tight. The bearings are bushed with bronze, the bushings being renewable at slight cost; but this is not often required, owing to their being immersed in oil. Ball-thrust bearings at the ends of the worm shafts greatly reduce and practically eliminate friction.

Careful attention has been given to the anti-corrosive qualities of this pump. The cylinder castings are of dense cast iron, the cylinders being bushed with anti-acid metal. Where the mine water is very corrosive, the entire cylinder is cast in anti-acid metal, at a slightly extra cost. There are eight valve seats of large area, to permit the ready flow of water with slight frictional loss. They are made of anti-acid metal, accurately fitted and interchangeable. The valves likewise are of anti-acid metal filled with vulcanized india rubber, the metal casing resisting the pressure and protecting the rubber valves, which may be reversed, giving twice the wear.

The side plates, one on each cylinder, furnish ready access to the valves, which is an important feature in the design of mine pumps. All important parts exposed to corrosive action or wear are made of anti-acid metal or special Tobin bronze. The crossheads are fitted with large babbitted-bearing surfaces and have large, removable crosshead pins. The connecting-rods are of steel, both ends being bushed with renewable bronze bushings. The cranks are set at right angles on the crankshaft.

The Alberger Pumps of the Pennsylvania Coal Co.

About two years ago the Alberger Pump & Condenser Co. built for the Pennsylvania Coal Co. two turbo-centrifugal motor-driven sinking pumps. These units are being used for unwatering service in a mine which has been flooded for some time and is now being reclaimed. Each unit consists of a two-stage vertical-shaft centrifugal pump, with a circular cast-iron cradle-piece mounted on the pump body, on which the driving motor is supported. Each unit is 4 ft. 4 in. in diameter by 10 ft. 9 in. high, so that it is small enough to be lowered through practically any mine or water shaft. In this installation each unit is mounted in a steel float of sufficient depth and buoyancy to carry the load imposed by the equipment, and designed to lower in a shaft approximately 6x10 ft. between guides. Rods and bails are also provided for raising or lowering the unit as required.

Each pump has a capacity of 2000 gal. per min. against a total dynamic head of 350 ft., when operating at the full-load speed of an 1800-r.p.m., 60-cycle induction motor. The head of 350 ft. is the maximum which will be encountered in this case, but at the beginning of the operation when the water was high in the shaft, the head was about 100 ft. By correct impeller design the increase of load under heads lower than normal, which is characteristic of centrifugal pumps, is so limited that a 300-hp. motor is not overloaded under any condition of capacity or head. This is a desirable and valuable condition as it permits of handling all of the water which the pump will pass at the lower heads with a wide-open valve, and without increasing the load imposed on the motor to any considerable extent. Therefore, the gain in gallons per minute pumped is considerable, with a corresponding reduction in the time required for the whole operation.

In case the unit is required to operate in future in some location where the shaft is smaller, the pumps and motors can be removed from the floats, and as each unit is self-contained, it can be supported by a frame or bails and lowered by a hoist.

Inaccessibility in the working location was one of the principal difficulties encountered, but was successfully overcome, and the installation today represents a marked advance in the method of dealing with unwatering problems in the anthracite field, and one for which the engineers of the Pennsylvania Coal Co. deserve great credit.

Combined Air Lift and Pumping System

By Lewis Jones*

SYNOPSIS—General requirements of the Pohle air-lift compared with the systems in common use of pumping with steam or compressed air. Advantages of the Jones' combined air-lift and pumping system.

The Pohle air lift used in pumping water from a depth below the surface, is too well known to require a special description. As early as 1885, Doctor Pohle experimented with air introduced into the water column, which was thereby overbalanced by the greater weight of a shorter water column and, as a result, the water was lifted to the surface without pumping. It can be readily understood, however, that this system would require at least a 50 per cent. submergence of the column pipe, in order that the system may work with reasonable efficiency; and this was found not to exceed 65 per cent. at the best. For that reason, the application of the system, in practice, has been limited.

In his application for letters patent, Doctor Pohle showed the adaptation of his pumping system to mines, by sinking a well hole below the level of the sump in the mine and allowing the mine water to flow into this well. In the development of the system, it was further suggested that the air lift could be divided into stages.

For example, a submergence of the first water column to a depth of 50 ft. below the level of the sump in the mine, would suffice to raise the water to a height of 50 ft. above that level, by means of the air lift. At this point, the water was discharged into a standpipe, the lower end of which was at the level of the sump in the mine. this standpipe gave a submergence of another 50 ft. for the second-stage column pipe; and by its means the water was raised to a height of 100 ft. above the sump level.

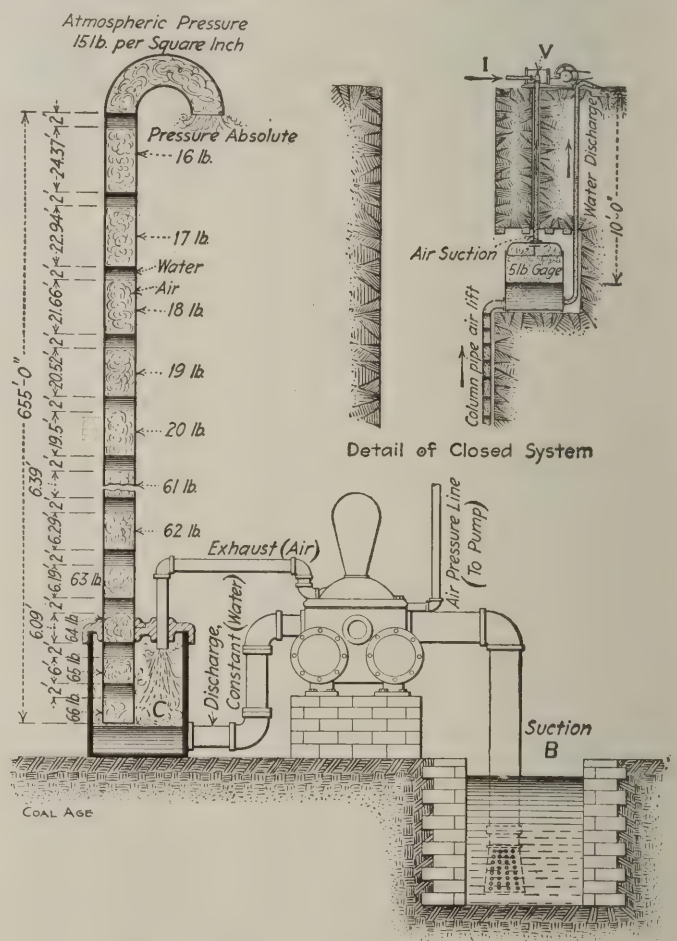
As the efficiency of each stage would range downward from 65 per cent., the final efficiency of a multi-stage air lift is necessarily very small. It is these features of low efficiency and necessary submergence that makes the genral application of the air-lift system prohibitive in most cases of mining. Its legitimate field of operation is confined to the pumping of deep wells in which the water rises to a height sufficient to give the necessary submergence of the column pipe.

The most common system of pumping used in mining employs the direct-acting piston or plunger pump, which is generally operated by steam; but, in many cases, owing to the large losses by radiation in conducting the steam from the power plant to the pump, air is being substituted to operate the pump. The efficiency of the average direct-acting steam pump rarely exceeds 50 per cent. of the indicated horsepower of the steam cylinder, and often ranges as low as 40 per cent.

In the use of air for the operation of the pump, there are other considerable losses, the chief of which, perhaps, arises from the necessity of carrying the full air pressure for practically the entire length of the stroke, thus preventing the utilization of the expansion of the air in the cylinder. This full air pressure is necessary in pumping, because of the constant load and the absence of the flywheel for storing up the power in the early part of the stroke, for utilization in the latter part, during expansion. As compared with a first-class steam engine, the direct-acting steam pump uses from six to ten times the amount of steam, because of the inability to utilize its expansive power in the cylinder. This is also true in the use of air for operating the pump.

The Combined Air Lift and Pumping System

With a full knowledge of these conditions and requirements, Lewis Jones has devised a combined pumping-and-air-lift system, known as the Jones System of Compressed-Air Pumping. The general arrangement of the system is shown in the accompanying illustration. The prime mover in the system is a direct double-acting piston or plunger pump operated by compressed air. To this extent, the arrangement is identical with that of an ordinary compressed-air pumping plant.



Combined Air Lift and Pumping System

The special feature by which the Jones system of pumping differs from the common system is the utilization of the exhaust air of the engine, which is conducted

*Brooklyn, N. Y.

directly into the air chamber *C*, into which the pump discharges the water drawn from the sump or basin *B*, shown on the right. At each stroke of the pump the water discharged into the chamber *C* rises to a certain level in the pipe and in the chamber alike, which level is determined by the equilibrium of pressures between the water and the air exhausted into the chamber. The pressure of the air overcoming that of the water drives the latter into the column pipe until the water level in the chamber sinks sufficiently to allow of the entrance of the air into the pipe. This is followed by a fall of air pressure in the chamber and the water again rises in the chamber to a certain level, as before. The action is thus intermittent, filling the column pipe alternately with air and water.

Advantages of the Combined System

Another special feature that makes this system superior to the Pohle air lift is the exact measurement of the air and water by the pump, which acts as a meter for both air and water. The combined air-lift-and-pumping system is also superior to direct pumping by air or steam, in two respects: 1. For the same air or steam pressure, water is lifted to a greater height because of the decreased density and weight of the water column, consisting of air and water combined. 2. Since the air expands freely as it rises in the column pipe, its expansive force is wholly utilized in this system. This expansion of the air, as it rises in the column pipe, is illustrated in the accompanying figure, which shows alternate layers of air and water; but, while the thickness of the water layers remains constant, and is shown as 2 ft., the thickness of the air layers increases from 6 ft. at the bottom to 24.37 ft. at the top of the pipe.

In his illustration, Mr. Jones has taken the trouble, estimating on a gage pressure of 50 lb. per sq.in., at sea level (65 lb. absolute), to calculate the exact thickness of each layer of air alternating with a water layer corresponding to 1 lb., or a thickness of $1 \div 0.434 = 2.3$ ft. The result of this calculation showed that, ignoring the friction in the pipe, water would be lifted a height of 655 ft. by a gage pressure of 50 lb. Assuming a discharge of, say 400 gal. per min. through a 5-in. column pipe, the friction of the water flowing through the pipe would reduce this head less than 50 ft., making the actual possible lift, under these conditions, somewhat over 600 ft.

In the usual system of pumping by steam or compressed air, without the assistance of the air lift, a gage pressure of 50 lb. per sq.in. would not elevate the water to exceed 100 ft. in vertical height. As previously stated, for the purposes of the present calculation, a size of pump cylinder and piston speed were assumed such as to give a thickness of water layer, corresponding to each stroke of the pump, of 2.3 ft., which represents a pressure of 1 lb. per sq in. The pressure exerted by the uppermost layer of water, in the column pipe, on the air beneath it would thus be 1-lb. gage, or 16 lb. absolute. Each successive layer downward exerts an additional pressure of 1 lb. on the air beneath, as indicated in the figure. Although the actual distribution of the air in the water, in the column pipe, will vary more or less from this theoretical representation, the effect is the same.

Reference has been made to the utilization, in this system, of the expansive power of the air, which expansion is carried farther here and made more complete than in our best multi-cylinder engines when exhausting against atmospheric pressure. It has long been the ambition of designers of steam engines to accomplish this desideratum, in high-class engines; but it has been found impossible of accomplishment in engines of the reciprocating type. The employment of the air lift in combination with a pumping system, as contemplated by the Jones system, therefore, accomplishes that which has been mechanically impossible in reciprocating engines, and affords the largest possible recovery of energy.

The small amount of air absorbed by the water, in this system, is negligible. Also, the slippage of air past the piston in the air cylinder is counter-balanced by the effect of its later presence in the column pipe. A point of no little importance is the fact that the friction of packing is very much less under the low pressures required in this system. Not only is this true, but less trouble is experienced with leaky joints and valves, under the reduced pressure. In the ordinary system of pumping, a greater thickness of pipe is required in the lower sections of the column, and the pump is generally of heavier build. The combined air-lift and pumping system thus presents many points of superiority over the system in common use.

Another point worthy of mention is the fact that, in case the pump is moved to a lower level, and the head thereby increased against which the pump must operate, a distinct advantage is obtained by arranging a bypass to admit a sufficient quantity of air into the column pipe so as to reduce the head and enable the pump to perform its work under the same gage pressure as was employed at the higher level. The freezing at the exhaust of the air cylinder, so common to pumps operated by compressed air, is entirely avoided when the exhaust of the air cylinder is carried into the air chamber, as in this system.

The Closed System

There is some economy to be derived in the operation of the compressor by adopting what is known as the "Closed System," which is illustrated in the detailed sketch shown in the accompanying figure. In this system a closed tank *T*, made of boiler iron, is set in a space prepared for it in the side of the shaft near the top; but at such distance below the surface as to maintain a static head or air pressure, in the tank, of from 5 to 10 lb. per sq.in. The 5-lb. gage pressure marked in the illustration will elevate the water from the tank to the surface a distance of 10 ft.

In this system, the air and water from the column pipe discharge into the tank near the bottom, the air rising to the upper portion of the tank, where it is drawn off by the compressor. An automatic valve *V*, in the air pipe leading to the compressor, is so arranged that if the tank pressure falls below the required static head, the valve shifts and the compressor draws its supply of air from the atmosphere, by the intake pipe *I*. The static head maintained in the tank forces the water up the discharge pipe to the surface.

The advantage of the closed system is that air is delivered to the compressor under a pressure equal to the static head plus the atmospheric pressure, thereby increasing the efficiency of the compressor. Owing to the absorption of some of the air in the water, the compressor is compelled to take air from the atmosphere to supply this deficiency, but the action is automatic.

A Mammoth Mine Pump

SYNOPSIS—Describes a most ingenious design of pump built for a service of 2500 gal. per minute against a 750 ft. vertical head.

The Scranton Pump Co. recently installed for the Lytle Coal Co., Lytle, Pa., a compound condensing mine pump, considered by engineers to be a most modern and ingenious design.

The conditions under which the pump had to operate were exceptional, and many special mechanical features had to be incorporated to overcome the obstacles. Conditions of service demanded a pump to handle 2500 gal. per minute against a vertical head of 750 ft., with steam pressure ranging from 70 to 110 lb. On account of varying steam pressure, and the fact that 24 hours service was required, it was necessary to use a 30-in. steam cylinder provided with cut-off valves with a patented adjustment

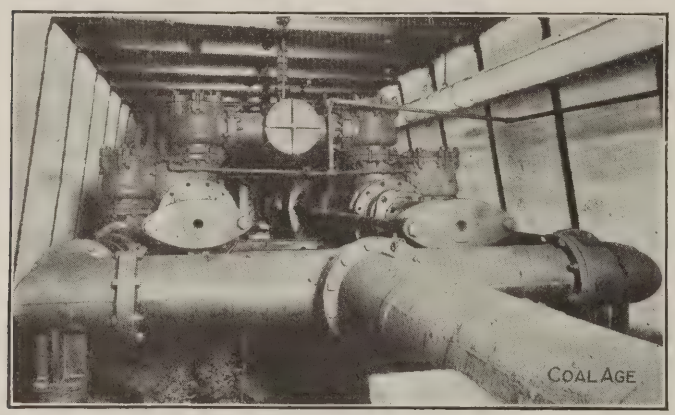


FIG. 1. VIEW OF PUMP ROOM, PUMP AND CONDENSER

which could be set while the pump was operating at its maximum capacity. The low-pressure cylinders are 50 in. in diameter with 14-in. diameter plungers and 48-in. stroke. Owing to the 24 hours service demanded of pump, all parts where possible were made interchangeable; through bolts were used in the water end, and special features were installed so as to make all necessary repairs in the shortest possible time.

The high- and low-pressure cylinders are connected in a manner to allow new piston rings to be placed on high- or low-pressure pistons without taking pistons off rods, or dismantling cylinders.

UNIQUE VALVE DESIGN

The water valves are of the double-beat type with valve seats of special bronze and valves of leather securely locked between two bronze plates. See section of valve chamber and valve, Fig. 2. The object of this design is to secure the greatest valve area with the minimum lift, thus permitting the pump to operate at maximum speed without undue pounding and excessive wear on valve and seat.

Entire water end of pump was wood lined so as to protect the cast iron from the action of the acidulous water.

The valves on steam end were located on the under side of steam cylinders, allowing complete drainage of condensation, or entrained water from the high- to low-pressure cylinders and through the exhaust without danger to cylinder heads or pistons. These valves operate in removable cast-iron bushings with milled ports. With this arrangement and the adjustable rods on valve gear,

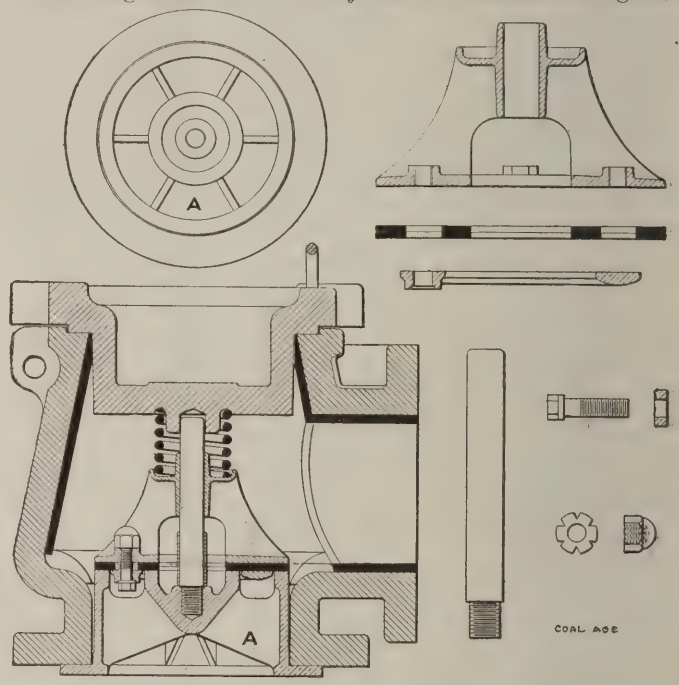


FIG. 2. SECTIONAL DRAWING OF VALVE CHAMBER AND VALVE

an accurate setting of steam valves can be accomplished.

Hand-hole plates were located on low-pressure cylinder heads to allow access to piston-rod nuts without removing the heavy low-pressure cylinder heads.

The cross stands are of the four-bearing type with long bronze bushed bearings and oil pockets of two-quart capacity, affording practically automatic lubrication of rockershafts.

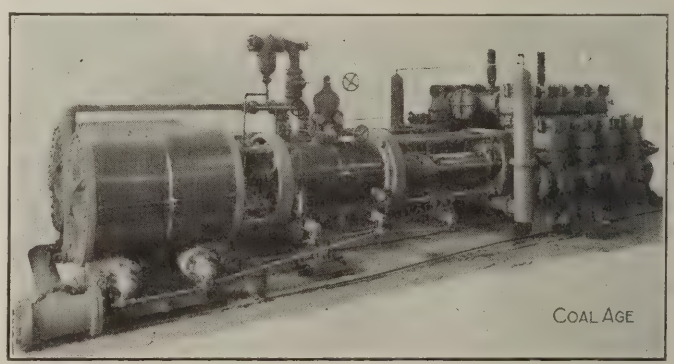


FIG. 3. A MAMMOTH, COMPOUND, CONDENSING MINE PUMP

This machine weighed 90 tons, and an idea of its size can be determined from the fact that it required a pump room 22 ft. wide, 65 ft. long, and 13 ft. high to accomodate pump and condenser.

The exhaust from low-pressure cylinders is taken care of by a single-cylinder independent air pump and jet condenser of the most improved type. Steam cylinder is 14 in. in diameter, air piston, 20 in. in diameter, and all of 24-in. stroke.

The steam end was arranged with special valve gear; the auxiliary slide valve of the "V" type, which insures against the valve not seating, and a double-ported steam chest to admit steam to chest piston, which in turn operates the main slide valve. This construction allows the proper cushion for chest piston and prevents slide valve from overtravel, thus absolutely guaranteeing full stroke and continuous operation of condenser. The air end was of the sectional type, special for mine work so as to reduce repair expense, and save considerable time in replacing worn-out parts.

The air piston was of special bronze and arranged with a soft-rubber ring next to packing. This construction automatically takes up wear on packing and reduces the friction of packing on liner to an extent that the life of the packing and bronze liner is doubled.

The Principle of the Centrifugal Pump

By J. D. Cone*

SYNOPSIS—The modern centrifugal pump can be made to perform practically any pumping duty common to coal mining. Its peculiar advantages are: simplicity, low-maintenance cost and its ready connection to the high-speed motor and steam turbine.

The advent of the high-head, high-efficiency centrifugal pump within the last 10 years has naturally resulted in considerable literature on the subject. The books available are of interest to the scientist, of some little value to the engineering student, but practically useless to all others. There are many practical men who have to buy, install or operate centrifugal pumps, who would like to go into the theory of the matter to some extent without being utterly befogged by a thick haze of higher mathematics. It is to these that I address my remarks and trust that within the limits of a brief magazine article, I can make quite clear the principles surrounding the operation of, what is after all, a very simple device.

*New York.

A pump is a machine for transferring a fluid from one level to a higher level, or for increasing the pressure of a liquid. Both processes being, of course, the same, may, therefore, be performed with the same device, and simultaneously, if necessary.

A centrifugal pump, so called, is a device that uses centrifugal force to accomplish the above ends. Fig. 1 shows a cross-section of a Cameron two-stage centrifugal pump. The essential parts are the shaft *A*, revolved by some external force; the impellers *B*, secured to the shaft and therefore revolved with it; and the casing *C*, in which both these parts operate. All the other parts are details and can be disregarded in the discussion of the principle of operation.

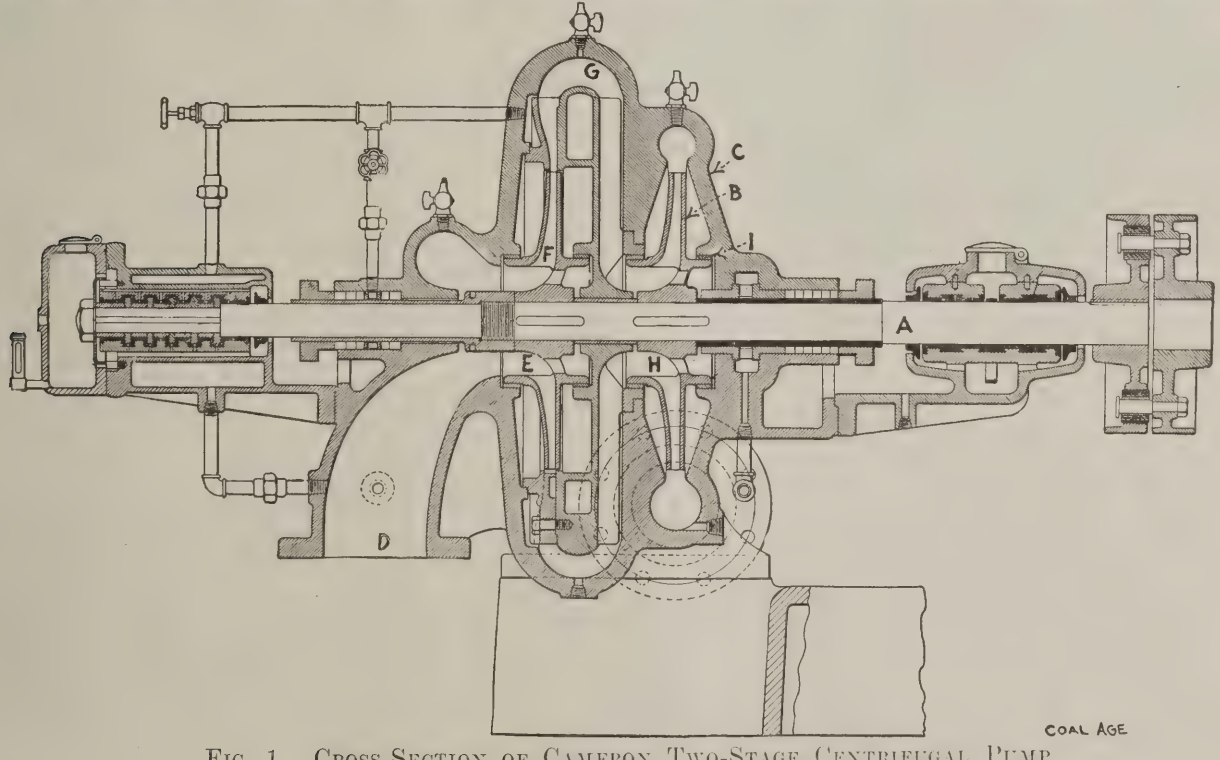


Fig. 1. Cross-Section of Cameron Two-Stage Centrifugal Pump

Water enters the pump at point *D*, called the suction inlet, and passes to the impeller, entering at points *E*. The impeller has curved radial passages *F*, leading from the hub to the periphery. As soon as the water enters the impeller, which is revolving at high speed, the centrifugal force available tends to increase the pressure of the water, and the increment is continuous until the water reaches the periphery of the impeller where cen-

trifugal force ceases to operate and the pressure is no longer increased through the action of this agency.

If water is allowed to pass continuously through the pump, the water in the impeller (being already under pressure) will be thrown off at a velocity dependent upon the peripheral velocity of the impeller. The water then exists under pressure and with a certain velocity. To be of use, this velocity energy must be converted into pressure energy and thus augment the pressure already produced by centrifugal force. This transformation of energy takes place after the water has left the impeller, the efficiency of the pump being largely dependent on the amount of loss that takes place during the change.

Velocity Energy Is Converted into Pressure Energy

In the particular design which we are discussing, this conversion is accomplished efficiently by the use of what is called a diffusion ring. This is a ring entirely surrounding the periphery of the impeller and having at regular intervals a series of enlarging passages. These



Fig. 2. Showing Diffusion Ring

passages are quite small at the inner diameter and rapidly increase in area toward the external diameter; see Fig. 2. Water flows into the small end of these passages and, as the area rapidly increases, the velocity of the water is cut down proportionately and no appreciable work being done, the energy contained as velocity must appear in some other form, and does so as pressure.

The coöperation of the two forces above described is clearly shown by the use of the parallelogram of velocities given in Fig. 3. The line *CF* represents the velocity, and the relative direction of the water flowing through the impeller, the direction, of course, being that of the tip of the impeller vane. The line *PV* represents the velocity of the tip of the vane, and is, of course, tangential in direction.

Now, if we compound these two lines, we will get the intermediate line *AV*, which represents the actual velocity and direction of the water leaving the impeller. Then, by a very simple formula, the designer can conclude from the velocity just what pressure the pump can generate, or working backwards, as is usually the case, can design the machine to give certain definite results.

The pump shown in Fig. 1 is a two-stage machine, i.e., it is equipped with two impellers operating in series, the discharge from the first impeller leading through passages *G* into the suction *H* of the second, where the initial process is repeated and another increment of pressure obtained. By this construction practically any reasonable pressure can be secured, and pumps made in eight, ten or even twelve stages are not uncommon. It is usual to limit the pressure obtained in any one stage to about 90 lb.; and if a higher pressure is desired, add other stages.

What Is Meant by "Thrust"?

No discussion of the centrifugal pump would be complete without some mention of thrust. Thrust is manifested, of course, in all centrifugal pumps. It is caused by unavoidable unbalanced areas at some point inside the pump and it operates to force the running parts violently to one side or the other, resulting in heating, wear and loss of efficiency, unless adequate means are provided to take care of it.

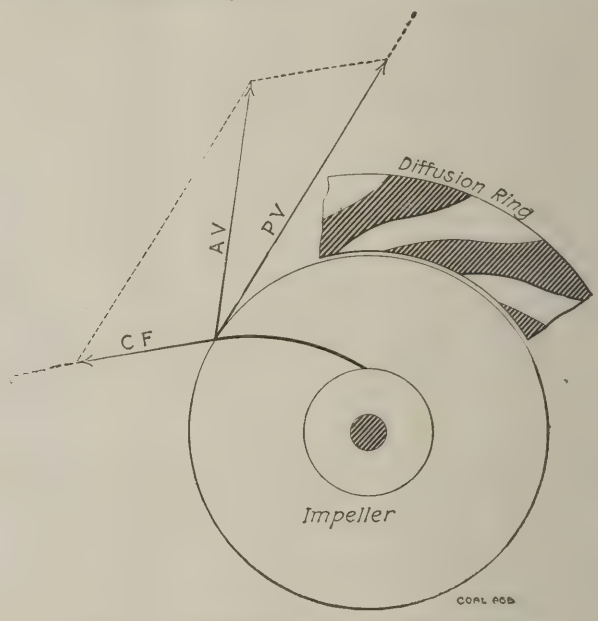


Fig. 3. Parallelogram of Velocities

In the particular pump under discussion, water enters *D* at atmospheric pressure (or less if water is being lifted), and the left-hand side of the impeller within the area of the rings *I* is, of course, under the same pressure. Now, the right-hand side of the same impeller is in more or less communication with the discharge pressure through the leakage which takes place past the wearing rings *I* (some leakage must be allowed here for lubrication), and is therefore practically subjected to the pressure generated in the first stage. This greater pressure on the right-hand side of the impeller acts toward the left and sets up thrust in a direction opposed to the direction of the incoming water.

To take care of this thrust it is usual to supply a marine thrust bearing, and the Cameron pump is so equipped. This is clearly shown at the left-hand end of the shaft. The thrust bearing consists of a series of babbit-lined grooves in a stationary cast-iron shell. In these grooves corresponding steel collars fit. They are mounted on and revolve with the shaft. It will readily be seen that this arrangement provides a series of shoulders which resist lateral movement, maintain the alignment of the impeller, and absorb any tendency to thrust.

Finally, a word as to efficiencies: As in all apparatus, efficiency is the ratio of output to input, and in the par-

ticular case of the centrifugal pump it is the ratio of water-horsepower, as represented by the discharge pressure and capacity, to the brake horsepower supplied to the pump shaft. This is known as pump efficiency. Sometimes overall efficiency is mentioned, and this comprehends the losses in the motive power also. In the case of an electrically driven pump, the overall efficiency would be the ratio of the water output to the watts delivered to the motor, both quantities, of course, being reduced to foot-pounds for purposes of comparison.

Efficiency of Pumps

The efficiencies of the better class of pumps will run from 45 to 75 per cent., depending upon the size of the machine and the particular conditions under which the pump is to work. As a general rule, the high-head, high-speed, large-capacity pump will give the best efficiency.

In a pump having 70 per cent. efficiency, there will of course be 30 per cent. of losses, and these losses will be divided about as follows: Mechanical friction, 5 per cent.; hydraulic friction, 10 per cent.; leakage past the wearing rings, 5 per cent.; eddy currents or whirlpools, 10 per cent.

The field for the centrifugal pump is extending continually. There is hardly any pumping duty that cannot be performed efficiently by this splendid device, with its great simplicity, low maintenance cost, and ready connection to the high-speed motor and steam turbine.

We may expect within the next few years as the art of centrifugal-pump building advances to still further reduce the losses mentioned, thereby attaining still higher efficiencies.

Mining Suspension Opens with Large Stocks on Hand

Just previous to the suspension in 1912, Coal Age reported market conditions as follows:

The tense feeling in the coal market continues unchanged. Consumers and producers are both keenly watching the results of the wage conferences, many of the larger interests having special representatives on the ground to insure reliable and prompt reports on the situation. It is purely a strike market and has been accepted as such by the trade, which is now playing a waiting game.

The movement to the Eastern markets continues to be only sufficient to meet current demands, and none of the companies are accumulating any surpluses. Prices are at the same high level, although they vary considerably with the reports on the labor situation. Water freights are somewhat lower and the railroad congestion is rapidly improving. In the Pittsburgh steam markets there is a disposition on the part of the consumers to shut down their plants rather than buy at the prevailing high prices.

In contrast with which the situation last week, Mar. 28, was reported as follows:

The coal year is closing with current business in anthracite at a complete standstill but a marked activity on negotiations for the new year.

On the eve of what appears to be a certain suspension in the principal bituminous coal districts of the country, the market continues relatively dull and listless. Some last-minute business has developed, causing a slight stiffening in prices, but, on the whole, the trade is far from what would normally be expected at this time. There is little confidence in the possibility of a long suspension and consumers seem to be well stocked for any emergency that may arise.

In Ohio, consumers, as a rule, refuse to be influenced by the possibility of a suspension, while the warm weather has caused a lull in the domestic business and dealers are endeavoring to clean up stocks rather than accumulate supplies. The railroads are beginning to accept lake coal, which may relieve the pressure.

The spot demand at Hampton Roads is light, the movement being confined almost entirely to contract; other West Virginia coals are dull and heavy, in spite of the near approach of the lake shipping season.

The general indifference of consumers to the possibility of a serious strike has created a great deal of uncertainty in the Middle Western markets. There has been some stocking, particularly on the part of the railroads, which has developed a hardening tendency in the market, but this is not by any means of notable proportions.

New Mine-Rescue Station

A station for mine-rescue car No. 4 of the government has been completed at Pittsburg, Kan., recently. The State of Kansas appropriated $3500 for the structure. It contains trackage for the car and rooms for the men in charge, and possibly office room for State Mine Inspector Francis Keegan and his force of deputies.



New Rescue Station at Pittsburg, Kansas

A spur of the Santa Fé R.R. enters the building. Much effort was expended in getting this edifice. It is in the center of the southeastern Kansas coal district and is only about 25 miles from the heart of the Joplin mineral district. Railroad facilities are excellent, the Frisco, the Missouri Pacific and the Kansas City Southern roads being ready with engines almost instantly to take the car out.

Acetylene Lamps in Blackdamp

By John Morris

Considerable interest has been aroused by Doctor Harger's proposal to charge the ventilating current of a mine with carbon dioxide as a means of preventing explosions. I have unfortunately had an experience of working in blackdamp with the aid of acetylene lamps, which in some respects goes far to prove the correctness of some of Doctor Harger's conclusions.

The adit level was the return airway of the colliery and also the drainage level, with the result that a considerable quantity of water ran through it. A fall occurred about 700 yd. from its mouth which banked up the water and completely stopped the ventilation. There was a small shaft about 250 yd. from the mouth of the adit level, the distance from this shaft to the fall being about 450 yd. It was found impossible to carry ordinary naked lights nearer than about 100 yd. from the fall, but an acetylene lamp would burn without trouble.

Note—Excerpt from paper on "Notes on Gobfires and Blackdamp," presented at meeting of the North of England Institute of Mining and Mechanical Engineers, Feb. 14, 1914.

After it had been made certain that the blackdamp had no appreciable effect on the men, several workmen using acetylene lamps were sent in to clear away the fall and work proceeded without interruption in relays. The blackdamp gradually gained until after the second day, a naked light was extinguished five yards inside the small shaft, but the gas appeared to have no ill effects upon the men, although they had to walk over a quarter mile to the fall through an atmosphere in which a match could not be struck. The acetylene lamps also burned as well as ever; and the men were able to work an 8-hr. shift.

The atmosphere gradually became worse until on the fifth day the acetylene lamps burned very dimly and even when a large flame was produced gave out very little light. At this stage some of the men complained of headache, although others did not feel any inconvenience, but all breathed heavily.

The Lamps Burned Dimly and Men Suffered from Headache

Later on, the acetylene lamps began to go out, although placed so as to be quite steady and most of the men suffered from headache and smarting of the eyes, talked rather thickly, were somewhat unsteady and could not do any hard work. So long, however, as the acetylene lamps continued to burn at all, the men were quite capable of looking after themselves.

At this stage, it was interesting to watch the behavior of the acetylene lamps; even when increased in size the flame, which had a bluish color, gave very little light, it stood at some distance, perhaps 2 in. above the burner, went up and down, and seemed to hunt about for air before it finally went out. Even at this extreme stage I did not feel much ill effect with the exception of a slight headache, smarting of the eyes, and a little deafness.

Blackdamp Caused Deafness and Lack of Control over Limbs

Although the atmosphere was now such that the acetylene lamps would not burn,* I remained for about half an hour in the blackdamp in order to find out what the effects would be. Deafness became more pronounced, my limbs did not seem to respond to the will, and on moving about the legs seemed to go wherever they pleased; this was after five days' almost continuous living in the blackdamp. The ill effects disappeared very soon after getting into fresh air. Gob fires could not possibly exist in the atmosphere prevailing at this period, and explosions certainly could not happen, even if firedamp had been present. This experience goes far to prove Doctor Harger's contention that men can with impunity breathe an atmosphere which will not support combustion. I am firmly of the opinion that men could remain, without danger to themselves, in an atmosphere charged with blackdamp so long as acetylene lamps continued to burn.

*According to Dr. Harger, an acetylene lamp will go out when the percentage of oxygen left in the air has been reduced to 9.5. "Trans.," Inst. M. E., 1912, Vol. xliii, p. 132.



Why Not Work on the Flock Instead of on Just Two or Three?

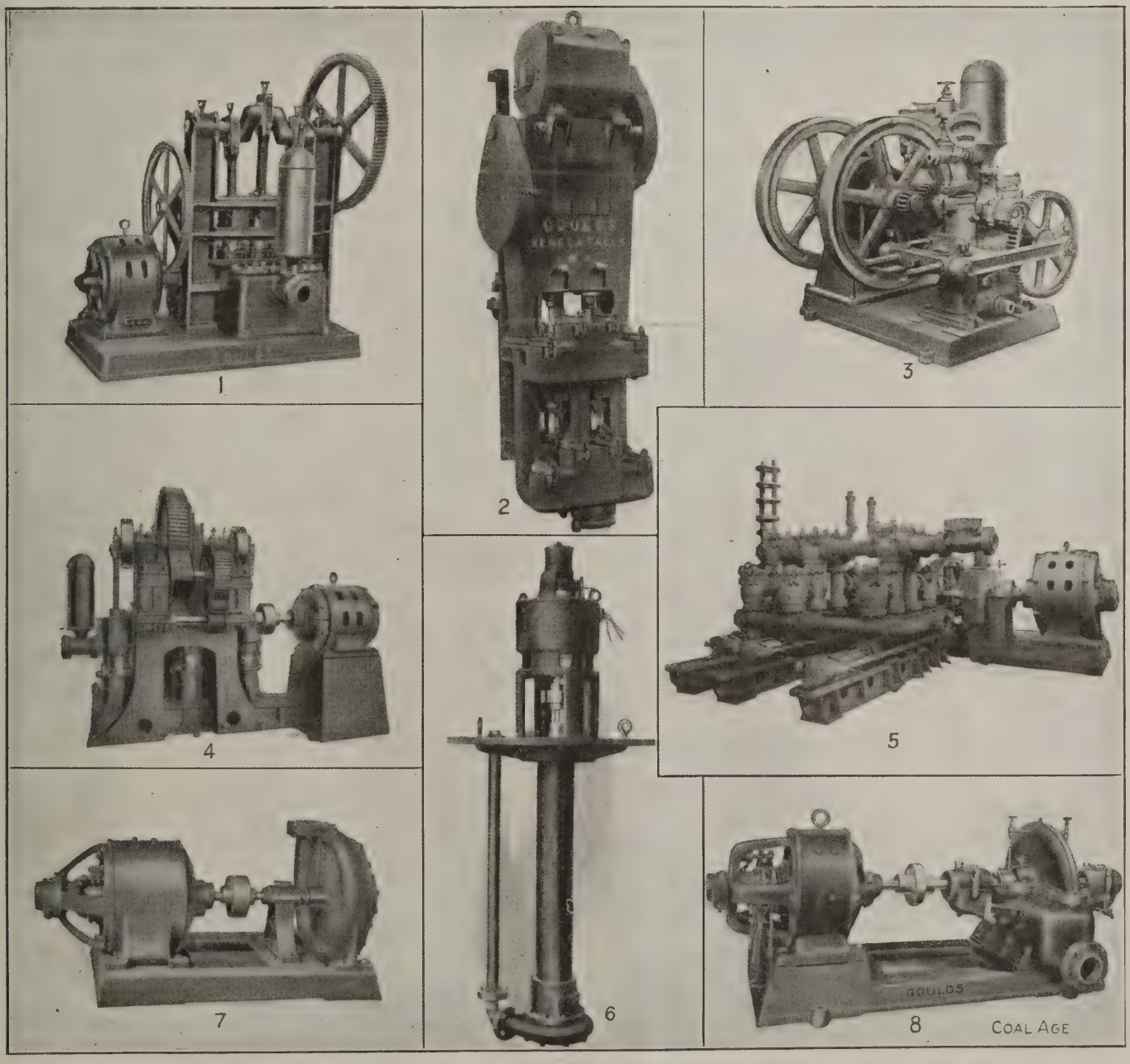
The Development of Modern Types of Mine Pumps

SYNOPSIS—Some notes on the gradual evolution of the modern drainage engine and a pictorial description of the different types.

One of the earliest attempts to unwater mines by means of power-operated pumps was made by Newcomen, in 1705. His was a simple bucket type of pump, connected by means of a long rod, to the walking beam of the Newcomen atmospheric engine. The subsequent invention of the steam engine by Watt lead to the development of the "Cornish" type of pump, consisting of a simple bucket, or plunger pump operated by the crank disk on the engine shaft. The "Cornish" pump was fairly efficient when the pump cylinder could be placed directly under the engine, but when the mine workings extended in various directions from the original location of the engine the water ends were operated by means of long rods through bell cranks and the added friction of these working parts resulted in low efficiencies.

About 1860, the direct-connected steam pump was placed upon the market and being compact and easily moved from one mine to another, it was adopted almost universally. The steam boilers were, of course, on the surface and the long steam pipes, sometimes over 2000 ft. long, occasioned great loss of power. The heat of these pipes and the difficulty of disposing of the exhaust was another serious objection to this style of pump.

In the early '90's a new design of pump was brought out, known as the triplex power pump, driven by an electric motor. The compactness, simplicity and efficiency



Different Types of Modern Pumps Used in Coal-Mining Service

of this unit commanded instant recognition, particularly in the mining districts where the majority of the more important mines adopted it. The power pump requires from 50 to 75 per cent. less fuel than the direct-acting steam pump and its general use has been a big factor in the reduction of operating costs. During the past four or five years, centrifugal pumps have been designed, showing good efficiencies and their use in coal mines is becoming quite common, particularly in West Virginia and the Western fields.

Electrical-operated pumps have been designed to meet every condition in mines and a general description of the more common types are given herewith.

Types of Pumps

Fig. 1 shows a single-acting triplex portable mine pump, designed for pumping sumps and general emergency service. The capacities vary from 50 to 300 gal. per min. and it will pump against elevations of from 300 to 500 feet.

Fig. 2 shows a duplex, double-acting sinking pump. It is designed to be lowered in the shaft to pump from the bottom of the mine to the surface or to a station.

Fig. 3 shows a single-cylinder, double-acting piston pump operated by a gasoline engine. It is built for capacities up to 100 gal. and for heads of 175 ft. It is light and portable and is used generally in the anthracite mines around Scranton, Pennsylvania.

Fig. 4 illustrates a motor-driven, single-acting triplex plunger pump, built for capacities up to 350 gal. per min. and heads up to 400 ft. This style of pump is used in small stations and also for boiler feed.

Fig. 5 shows a typical station pump. These are designed for capacities up to 2000 gal. per min. and heads up to 5000 ft. They are built primarily for mine service and the largest part of any of these pumps will go down in a shaft 3 ft. 6 in. square.

Fig. 6 illustrates a vertical centrifugal sump pump. Its capacities vary from 40 to 50 gal. per min., against from 40- to 50-ft. head.

Fig. 7 shows a motor-driven single-stage side-suction pump, with capacities from 40 to 200 gal., against an elevation of 100 ft. This style of pump has an impeller and is particularly adapted for handling dirty and gritty water.

Fig. 8 shows a motor-driven single-stage double-suction pump, built for capacities from 100 to 7200 gal. per min., against 150-ft. head.

Stripping a Mine by Hydraulic Methods

By P. J. McAuliffe*

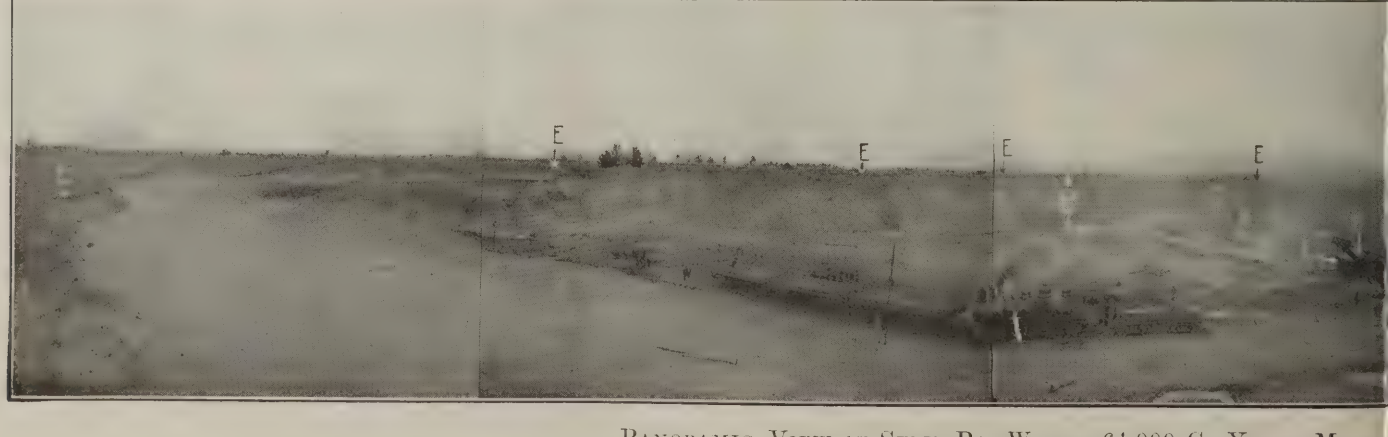
SYNOPSIS—Where the overburden is exceptionally tenacious, the steam-shovel method of stripping a mine is impractical. Under such conditions, a hydraulic plant, consisting of a water pump, hydraulic giant and sand pump, has been substituted with remarkable success and small expense.

At the Rowe mine, at Riverton, Minn., in a district where stripping by means of steam shovels has reached the high-water mark of efficiency, a hydraulic plant for removing the overburden has been installed and operated for a season with remarkable success, equalling, if not surpassing, the very best results of the steam shovels.

The material comprising the overburden, which averages about 54 ft. in depth, consists of sand, gravel and a gumbo clay, which is excessively sticky and tenacious; so much so that, after several attempts to handle it, steam shovels had to be abandoned, as, not only would the track work down out of sight under the shovels, but also at the dump. Even when the cars were lined with 2 ft. of straw the clay often would pull them down the dump with it, or else refuse to leave them at all unless pried loose and shoveled out.

The mine is adjacent to Little Rabbitt Lake, where the water pump, with a capacity of 3500 gal. per min., is placed. The water is pumped through about 1500 ft. of 12-in. pipe to the point chosen for excavation. Here the pipe is reduced and an ordinary hydraulic giant is fitted. The size of the giant nozzle is varied for the different ma-

*Morris Machine Works, Baldwinsville, N. Y.



Panoramic View of Strip-Pit Where 64,000 Cu.Yd. of Mate

terials encountered, but for the average work a 4-in. nozzle is used. The water pressure at the nozzle is about 50 lb. The stream is directed against the bank and the material is washed down a rough channel to where a 12-in. Morris sand pump is located. The suction of the sand pump picks up this water and material and pumps it out through 12-in. pipe to the spoil bank. The discharge pipe of the sand pump varies in length during the season's work from 500 ft. to 1300 ft., with an average of about 1100 ft. The vertical distance from where the sand pump picks up its material to where it deposits it on the spoil bank is 27 feet.

It was found that the material brought down by the hydraulic giant would wash down to the sand pump on a grade as flat as 4 ft. in 100 ft. In other words, the sand pump could be permanently located in one place on a flat-boat or heavy skids while the giant could be worked all around the pump in a gradually increasing circle until this 4 in 100 slope ran out. In the above mentioned average depth of 54 ft., this limit would not be reached until the giant had swept a circle around the pump of 1350 ft. radius.

Compared to the constant moving of cars and tracks for a steam-shovel outfit, this is quite a saving. In all last season's work the location of the sand pump did not have to be changed.

Both pumps were driven by electric motors, the water pump being geared to motor and the sand pump being belt-driven.

This outfit handled on an average of 51,000 cu.yd. of material per month for the season's work, at a cost ranging from 5½c. to 7c. per cu.yd. This cost covers labor, operating expenses, upkeep and office expenses. The best month's performance was in December, when 64,000 cu.yd. were moved in 617 working hours with an average of 103.7 cu.yd. per hour.

The accompanying picture shows a panoramic view of the operation. The entire pit was excavated in five months by the above described plant. The steam shovel shown in picture made the excavation where the tracks are laid only. Here the orebody is reached and the steam shovel is necessary.

This hydraulic method of stripping has been so satisfactory to the mine owners that they have ordered two complete new outfits for the coming season's work. The new sand pumps are made of steel with all parts of extra-heavy proportions. They were built by the Morris Machine Works, of Baldwinsville, N. Y. Before the coming season has passed the mine owners expect to have these sand pumps discharging through 2400 ft. of pipe against a 50-ft. static head.

List of Permitted Explosives, Canada

The list of explosives given below in the First Schedule is a complete table of the permitted explosives that have passed the new Rotherham test.

After Mar. 15, 1914, no explosives except those specified in the following schedules may be used or taken, for the purpose of use, into any mine in which the use of permitted explosives is required by the Explosives in Coal Mines Order of Sept. 1, 1913.

The use of the explosive named in the Second Schedule is permitted only for five years from Jan. 1, 1914, for the purpose of bringing down coal, in the class of mines defined in Clause 11 of the said order.

FIRST SCHEDULE

Explosive	Permissible Maximum Charge in Oz.	Pendulum Swing in In.*
Ajax powder	12	2.69
Ammonite No. 2	10	1.99
Ammonite No. 3	12	2.12
Bellite No. 2	32	2.42
Bellite No. 4	18	2.92
Britonite No. 2	24	2.26
Cambrite	30	1.98
Dreadnought powder	32	2.05
Dynobel	22	2.61
Essex powder	38	2.17
Expedite	32	2.62
Faversham powder No. 2	24	2.61
Haylite No. 1	10	2.18
Kent powder	32	2.01
Kentite	18	2.64
Kynarkite	20	2.21
Melling powder	12	2.62
Monarkite	26	2.67
Monobel No. 1	10	2.81
Negro powder No. 2	20	2.21
Neonal	16	2.56
New fortex	10	2.61
Nitro-densite	28	1.47
Permon powder	18	2.57
Pit-ite No. 2	32	2.15
Pitsea powder No. 2	8	2.64
Sunderite	16	2.66
Super-excellite	10	2.74
Superite	10	2.53
Super-kolax	30	2.10
Swale powder	20	2.50
Syndite	40	2.22
Tutol No. 2	22	2.11
Uplees powder	16	2.64
Westfalite No. 3	12	2.55

SECOND SCHEDULE

Bobbinite

* This is the swing given to the ballistic pendulum, at the Home Office Testing Station, by firing at it a shot of 4 oz. of the explosive. It may be compared with the swing of 3.27 in. given by a shot of 4 oz. of gelignite containing 60 per cent. of nitroglycerin.



Was Handled in One Month by Employing a Hydraulic Plant

Electric Pumping at Tilmanstone Colliery*

SYNOPSIS—A detailed discussion of the construction, installation and operation of the electric pumping plant in use at the Tilmanstone Colliery, Dover, England; with an appended set of instructions for the switchboard and sinking-pump attendants.

The coal measures at Tilmanstone are directly overlaid by a sand bed 20 ft. thick, the latter being met with at a depth of 1150 ft., and proving to be heavily watered. It was decided to install three horizontal-type steam pumps, each having a capacity of 500 gal. per min., the water being admitted to the pump chambers through a series of boreholes, and the flow being controlled by a valve fitted to a safety-boring device.

The writer designed this safety-boring apparatus (Fig. 1), which consists of two tubes, sliding one within another, the lower ends being fitted with flanges turning outwards. By a series of india-rubber washers a water-tight joint is obtained. The upper end of the tubing is provided with a side tap and a through-way valve. The diameter of the borehole, to admit a 2½-in. bore-tube, was 4½ in., and this larger borehole was made specially for the reception of the boring apparatus. The boring apparatus was tested hydraulically to a pressure of 500 lb. per sq.in. Eventually, it was found that the volume of the feeder exceeded the capacity of the pumps installed, when it was decided to install electrically-operated pumps.

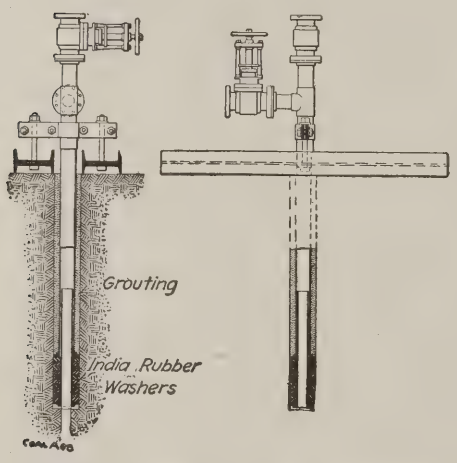


Fig. 1. Safety Boring Apparatus Used at Tilmanstone Colliery

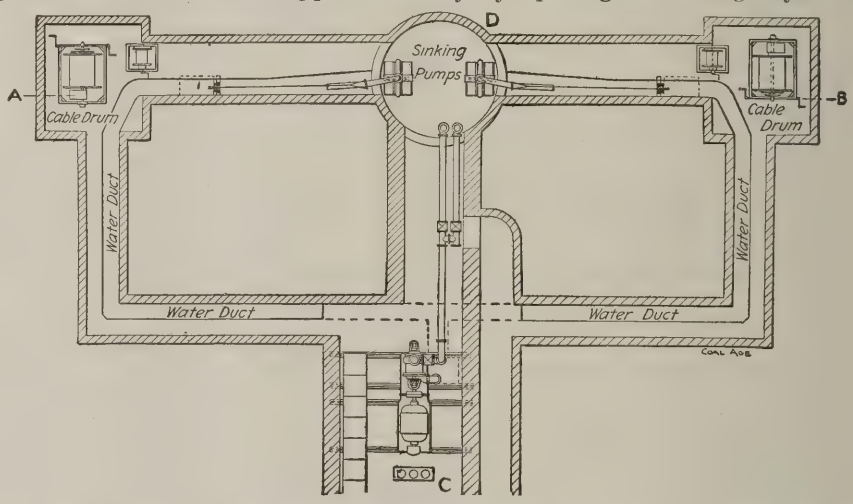


Fig. 2. General Arrangement of Electric Pumping Plant at the 600-Ft. Inset

Figs. 2, 3 and 4 show the arrangements adopted for unwatering the shafts. A pump, inset with suitable waterway-ways and cable-ducts, was made at the 600-ft. level, and in it was installed a horizontal stationary Sulzer pump, direct-coupled to an A. E. G. three-phase-motor wound for 3000 volts, 50 periods. Two sinking pumps were suspended in the shaft on steel-wire ropes. The control of the fixed horizontal pump, and of two sinking-pumps, was carried out from a switchboard, mounted in the 600-ft. pump-room, the switchboard consisting of 10 switch pillars built of sheet steel and totally enclosed.

Each sinking-pump motor was started by its own transformer, contained in a separate pillar, the adjoining pillar being provided with an oil switch, isolating lines and instrument transformers. The oil switch was also fitted with overload and no-volt releases (the latter being interlocked with the starting transformer), and further with an emergency stopping switch fixed on the frame of the sinking pump. Owing to these interlocking connections, it was impossible to close the motor oil switch unless the starting transformer was in the starting position, but in case of emergency, the motor could be stopped instantly by opening the emergency switch, fixed on the frame of the sinking pump. The breaking of the emergency switch trips the oil switch on the pump-room switchboard.

The cables for the sinking-pump motors were carried from the switchboard along the water ducts to the cable drums, connection to the latter being made through slip-rings mounted on the cable-drum shafts. The pilot cable, for stopping either sinking-pump motor, was also carried in a similar manner to a cable drum (see Figs. 2 and 3). The cable drums have steel-plate sides and laggings, and are mounted on shafts carried by strong angle-iron frames. Current was led through slip-rings fixed to the drum shaft, the slip-rings being totally enclosed in a cast-iron case. The high-tension sinking-pump cables were of the three-core rubber insulated and double steel-wire armoured type, each core having a sectional area of $\frac{1}{10}$ sq.in. The armouring consisted of specially fine steel wire to render the cable thoroughly flexible. Each cable was connected to the pump motor by a suitable water-tight cable and box, the end of the cable being brought up from below with a view to preventing moisture finding its way into the cable box. Support for both the main and pilot cables was provided by clamps resting on, and bolted to, the main clamps, carry-

*From paper by Henry J. Wroe, presented at meeting of the London branch of the Association of Mining and Electrical Engineers, on Feb. 6, 1914. The Tilmanstone Colliery, of which Mr. Wroe is the manager, is owned by the East Kent Colliery Co., Ltd., and is situated at Eythorne, Dover, employing about 250 workmen.

ing the pipe column (see Fig. 5). A special feature of the clamp is the provision for liberating the cables without the necessity for removing the main-pipe clamps, and this arrangement proved a great advantage on several occasions.

The two sinking pumps, supplied by Mepis Sulzer Brothers, were of the centrifugal type arranged with vertical spindles. Each was capable of delivering 1200 gal. of water per min. against a maximum manometric head of 870 ft., with four impellers. An injector operated by water from the delivery column was connected with the top of the pump casing from which is evacuated any air taken in by the pump should be the latter be working "on snore." The oil wells for the bearings of the pumps and motors were water-jacketed, the water being taken from the first stage of the pump. Each sinking pump was coupled by means of an elastic coupling to a totally-enclosed three-phase squirrel-cage motor, each motor being capable of developing at 3000 volts, 50 cycles, a continuous output of 500 b.hp. at a synchronous speed of 1500 r.p.m. The upper bearing of the motor carried the weight of the rotor, the weight of the pump shaft and impelled being taken by a step bearing on the pump.

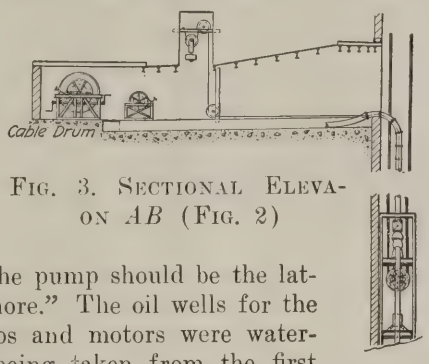


FIG. 3. SECTIONAL ELEVATION *AB* (FIG. 2)

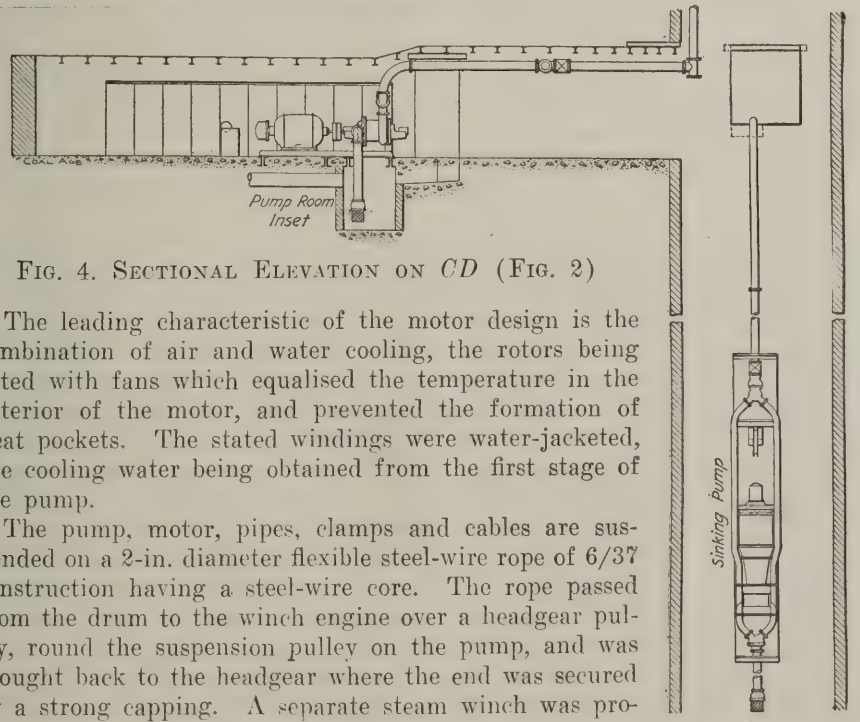
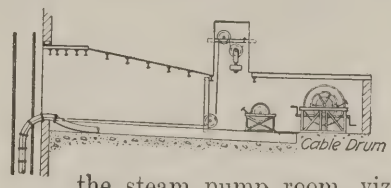


FIG. 4. SECTIONAL ELEVATION ON *CD* (FIG. 2)

The leading characteristic of the motor design is the combination of air and water cooling, the rotors being fitted with fans which equalised the temperature in the interior of the motor, and prevented the formation of heat pockets. The stated windings were water-jacketed, the cooling water being obtained from the first stage of the pump.

The pump, motor, pipes, clamps and cables are suspended on a 2-in. diameter flexible steel-wire rope of 6/37 construction having a steel-wire core. The rope passed from the drum to the winch engine over a headgear pulley, round the suspension pulley on the pump, and was brought back to the headgear where the end was secured by a strong capping. A separate steam winch was provided for each pump, each winch being capable of handling 40 tons (single purchase). Owing to the short lead of the ropes and to the heavy weight to be handled (the final load on each winch being 50 tons), it became necessary to make a traversing arrangement in order to prevent the ropes "copying" on the drum. This traversing gear is shown in Fig. 7. It consists of a massive cast-iron nut, carrying two rollers, the nut being moved to and fro by a strong screw operated by hand wheels, the rope passing between the rollers. In order to facilitate the pipe-changing, two steam winches were fixed at bank, and these lowered the delivery pipes to the 600-ft. level, where they were added to the pipe columns as required. To counterbalance the weight, and to facilitate the taking-in of the hose pipe when a further length of steel piping was about to be put on, it was secured to a wire rope which passed round a series of pulleys, the inbye end of the rope being weighted, as shown in Fig. 3.



PUMPS AT 1140-FT. INSET

A new pump inset was made from No. 3 Pit at the same level as the steam pump room, viz: 1140 ft., and three electric pumps together with suitable switchgear were installed, as shown in Fig. 6. Each pump is of the horizontal stationary six-stage type, rated for a normal delivery of 1000 gal. of water per min. against a manometric head of 1300 ft. The guaranteed efficiency is 73 per cent. All those parts which are liable to excessive wear, such as packing rings and packing bushes, are easily replaceable. These rings and bushes as well as the complete balancing device are made of hard bronze, the latter being armoured by hardened steel rings.

Each pump is mounted on a common bed plate, and is coupled direct by means of an elastic coupling to a three-phase-motor of the ventilated-enclosed type, capable of

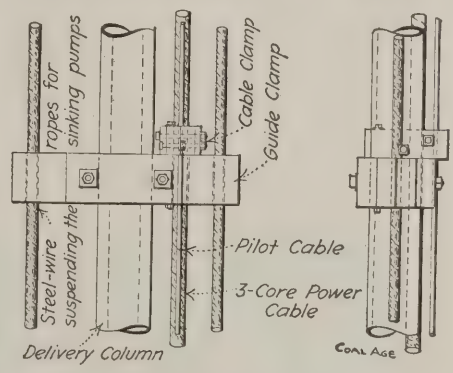


FIG. 5. GUIDE CLAMP AND CABLE-SUSPENDING CLAMP FOR SINKING PUMPS

developing at 300 volts, 50 cycles, a continuous output of 680 b.hp. at a synchronous speed of 1500 r.p.m. The roter has slip rings and brush raising and short circuiting gear. The motor is started by means of a liquid-starter provided with separately mounted protective resistances. The bearings of pumps and motors are ring-lubricated, the bearings being water cooled.

Each pump is connected to the delivery piping through two valves arranged in series, one being the master valve which is always open, the other the gate valve used for controlling the pump-discharge. The foot valves are protected from excessive pressure by a device consisting of two flanges, between which is placed a thin piece of India rubber sheeting. The flanges are fitted to a short piece of tubing connected with the suction piping, and

if, for any reason, the pressure from the column comes on to the foot valve the india-rubber disc between the two flanges is broken before any further damage can be done. The pressure at the base of the delivery column is 520 lb. per sq.in. and it will be obvious that, should this pressure come on to the foot valve, damage either to the valve or to the flange on the suction side of the pump might result. The switchboard consists of three feeder panels, three motor panels, one spare motor panel, one transformer panel containing a 150 k.v.a. step-down transformer, and one transformer switch panel.

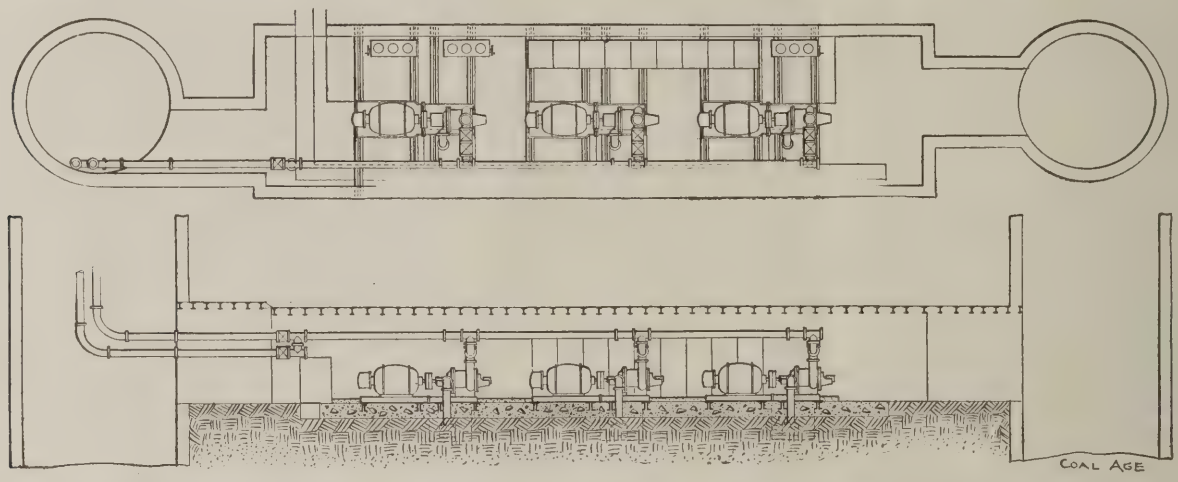


FIG. 6. ARRANGEMENT OF THE ELECTRIC PUMPING PLANT AT THE 1140-FT. INSET

When the coal measures were reached, the water was tubbed out of the shafts, and then the water conditions for the pumps improved very greatly. The quantity of water to be dealt with, has since fallen off very considerably, and arrangements are being made for altering the internal parts of the pumps, so that one pump will easily deal with the whole of the water made at this level. It may be mentioned that during the sinking and unwatering operations, which lasted ten months, not a single stoppage of the electricity supply occurred, and, further, that the sinking pumps and motors, in spite of

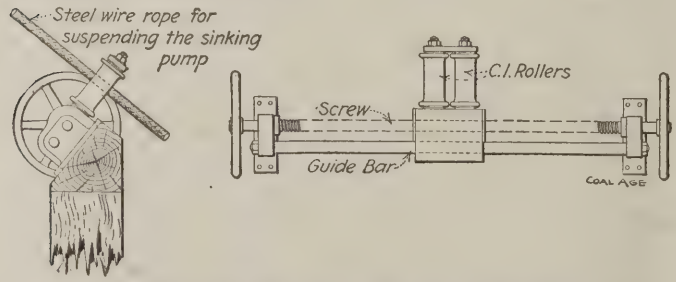


FIG. 7. ARRANGEMENT FOR GUIDING SINKING-PUMP SUSPENSION ROPES ON WINCH DRUMS

the onerous conditions under which they worked, were used alternately in such a way, that pumping was carried on continuously.

With a view to initiating the switchboard and sinking-pump attendants in their duties, and in order to obtain uniformity in the carrying out of the various operations, two sets of rules were drawn up—one for the switchboard attendant at the 600-ft. level, and the other for the use of the sinking-pump attendant. These rules are given in Appendixes I and II as follows:

APPENDIX I

Instructions for Operating Sinking-Pump Switchgear

Before Starting Up

(1) Before starting, inform power house by telephone.

(2) See that the starting transformer is at the "off" position, and that the oil switch and isolating links are open.

Starting Up

(3) Close isolating links. Close oil switch. Put starting transformer quickly in, but not beyond the "starting" position. Watch the ammeter; this will register about 200-250 amperes during starting. When the motor is up to speed, the amperes will fall suddenly to about 60 amps, when (but not before) the starting transformer must be thrown quickly into the "on" position. The gate valve on the pump may now be opened, when the current will increase.

(4) If the motor should not come up to speed in less than a minute, switch off, first the oil switch, and then the isolating links, bringing starting transformer into "off" position, and report immediately by telephone to power house, asking them whether they are ready for another start. If the unsuccessful start is repeated, report immediately to power house, and await instructions.

Shutting Down

(5) Inform power house by telephone. Close gate valve. Open oil switch. Open isolating links. Bring starting transformer into "off" position.

(6) The motor should only be shut down from the pump by means of the emergency switch in case of real emergency, or when changing over, as given in next instruction.

Changing Over

(7) When changing over from one pump to another inform power house. The working pump should be closed down as far as possible without actually shutting it down. The in-going pump is then to be started up in accordance with above instructions. When the in-going pump is up to speed and its gate valve opened, the out-going pump should be shut down by means of the emergency switch. When the out-going pump has stopped, put the emergency switch to the "on" position, thus leaving it ready for starting the pump motor again.

(8) The amperes taken by either of the sinking pump motors, when pumping, must not exceed 82. If this is exceeded the inset attendant must take steps to inform the pump attendant, who must close the gate valve until the current has dropped to 82 amperes.

APPENDIX II

Instructions to Sinking Pump Attendants

General

(1) At the commencement, and at frequent intervals during each shift, the sinking-pump attendant must see that the two motor bearings and the pump-thrust bearing are properly lubricated, and that the bottom bearing under the pump is filled with Stauffer's lubricant.

(2) The packing of the pump gland must be maintained in good condition to prevent air leakages.

(3) The Stauffer lubricators on the pulley pedestals must be screwed up from time to time.

(4) Every precaution must be taken to prevent damage to the cable boxes on the motors.

(5) The pumps must be kept in a clean condition. Dirt and grease must on no account be allowed to accumulate.

(6) The temperature of the jacket of the motor must be observed frequently, and if the motor is found to be unduly warm, the matter must at once be reported.

(7) Any defect in the pumps, motors, cables, or other gear must be immediately reported to the manager or engineer.

Precautions Before Starting Up.

(1) See that the pilot switch is at the "on" position.

Special Note—If the pilot switch is not at the "on" position the pump cannot be started.

(2) See that the gate valve is closed.

(3) See that the strum of the suction is well under water.

(4) Fill the suction pipe and the pump with water from the delivery column, by opening the bypass of the gate valve, and the small valve on the filling piping. When the pump is being filled, the air cocks and the ejector valve must be open, to allow the air to escape from the pump.

(5) After the pump is filled, the air cock and ejector check valve must be closed, and the regulating cock of the cooling water pipe opened. The small valve of the filling piping, and the gate valve bypass, must remain in the same position they occupied when the pump was being filled. When filling the pump, the pressure gauge must be watched, and the bypass valve must only be slightly opened so that the foot valve is not damaged by excessive pressure.

(6) The pump must always be fully charged with water before starting up. If any air remains in the pump, the latter will not work properly, and will have to be shut down.

(7) The shaft coupling must be turned by hand to see that the pump and motor are quite free to rotate.

(8) The sinking-pump attendant must in every instance ascertain from the chargeman that the flexible hose is coupled to the delivery column at the 600-ft. inset before a signal is given to start the pump.

Starting the Pump

(1) The pilot switch must be at the "on" position.

(2) The gate valve must be closed.

(3) The pump must be filled with water.

(4) If one pump is running, its gate valve must be closed for an instant, and must then be opened three complete turns.

(5) Immediately before the signal to start is given, a final examination must be made to see that the in-going pump is full of water.

CODE OF SIGNALS—To start No. 1 pump: Knock 1 and then knock 3. To start No. 2 pump: Knock 2 and then knock 3.

(6) As soon as the in-going pump is up to speed, the oil-circulating system is working, and the cooling water is flowing properly, the gate valve of this pump may be slowly opened to its normal position.

(7) The bypass of the gate valve and the sluice valve of the filling pipe must then be closed.

(8) The gate valve of the out-going pump must then be closed, and the pump stopped by means of the pilot switch.

(9) In the event of the pilot switch failing to stop the pump, the following signals must be given: To stop No. 1 pump: Knock 1 and then knock 6. To stop No. 2 pump: Knock 2 and then knock 6.

(10) After a pump has been stopped, the pilot switch must be placed at the "on" position.

Note—The pilot switch must only be used for stopping the pump when changing over, as stated in the foregoing instructions, or when it is necessary to shut down the pump in case of real emergency.

If the gate valve is opened too wide, a larger quantity of water will be delivered, with the result that the motor will be overloaded.

A Laudable Work

The accompanying photograph of the members of the Coal Miners' Bureau of Research was taken at a banquet recently held at Johnston's Restaurant, Clarksburg, West Virginia.

The Coal Miners' Bureau of Research is an organization of mining men from the vicinity of Clarksburg, and although the membership is largely made up of mine foremen and superintendents, nevertheless there is a goodly representation of miners, inspectors, engineers and operators.

These men meet monthly in the Clarksburg offices of the Consolidation Coal Co. to discuss the many problems that confront them in performing their daily duties. "Safety First" is their slogan. The fact that every man is his brother's keeper has been taken to heart and they are doing what is in their power to safeguard the life, limb and health of their fellow-workmen. The individual views of those present are brought out and discussed. The members are enthusiastic. The organization is growing rapidly. They are doing a good work. May their tribe increase.



COAL-MINING MEN WHO ARE BOOSTING "SAFETY FIRST" IN WEST VIRGINIA

Methods of Weighing and Computing Mine Outputs

By Neill Hutchings*

SYNOPSIS—Inadequate weighing facilities are a prolific cause of labor troubles at many mines. Methods of eliminating these are discussed, and valuable notes are given on the accepted practice in computing production. Because of the varying factors due to washing, boiler consumption, etc., this latter is frequently difficult to arrive at.

There are two main reasons for the weighing of coal: To compensate the miner fairly, and to arrive at the production accurately. The successful operation of a mine necessitates that the amount of coal mined by each miner be determined by weighing. The operator must have the confidence of the miners to the extent of having them feel that every care is taken to pay each one accurately. Nothing on the part of the miner is observed more closely than the weighing of his coal.

The miners will readily contribute a *pro rata* of their earnings to pay the salary of a check weighman, whom they should elect from their own number and whose duty it is to see that all cars are actually and carefully weighed by the company weighman. The employment of a check weighman by the miners should be readily conceded by every coal-mining concern, both as a means of verifying the correctness of the weights and as evidence that the company desires to pay every man all that he earns. Nothing will so quickly establish confidence between the company and the men, while lack of confidence in weights creates much friction and occasionally leads to serious trouble.

Method of Compensating the Miner

The generally accepted plan of arriving at the tonnage of the individual miners is to furnish each man with a number on which to run coal. He is then supplied with brass checks bearing this number, one of which is placed on a hook inside of each car and near the bottom, so it cannot be taken out and another number substituted before it reaches the scales. In the case of cars which are dumped in rotary dumps, the hook must have a clip or spring, so the brass cannot fall out. At the time the car is dumped, the brass check must be removed and handed to the weighman. Right here it should be noted that it is important to have an honest check-puller, and some definite system of handling the checks. In many cases it is easy for a dishonest check-puller to work in collusion with two or three miners and substitute their checks for others when cars are dumped. The superintendent, weighman and check weighman should make it a point to look after the check-pulling carefully.

After the check is handed to the weighman, the weight of the car is recorded on the tally sheet under the number shown, and is then handed to the check weighman to be recorded on his sheet and hung on the check-board. It is suggested that the check-board be constructed so that it will swing in and out of a square opening cut in the weigh shack. The checks are hung on the board inside the weigh house and at the close of each day's work the board is reversed so that the checks hang outside where the men can compare the number of checks on the board with the check weighman's copy of tally sheet posted thereon, without having to crowd inside. This arrangement also enables the men to get their checks as early as they like in the morning, as in many cases men go to work before the weighmen arrive.

Pick and Machine Mining and Dockage

The company weighman and check weighman should make it a rule to balance their sheets at the close of each day's work and the number of checks hung on each numbered hook should agree with the number of cars credited each man on the tally sheet.

Brass checks are best in tallying coal, as leather checks, etc., are difficult to read after becoming soiled. The cost of brass checks is so small and their use so desirable for accurate reading and recording that most companies will find it a paying proposition to furnish them free to the miners and insist that no other kind will be recognized.

Both the company and check weighman should arrive at the mine early enough to see the men before they go in, as many questions arise, even under the best conditions, which the weighmen must be right on the job to take care of. This will save many a trip to the superintendent on the part of the men to secure adjustment and settlement of questions as to tonnage credited, etc. This results in real money saving to both the men and the company.

A distinction should be drawn between pick and machine numbers in mines where there are both, so that the tally sheets will show the amount of each in order that the rate may be properly applied. The best plan of doing this is to have the mine foreman or machine foreman, make up an additional daily report, showing the name and number of each man loading machine coal This should be sent to the time office daily and checked with the tally sheet to see that the machine numbers agree.

In handling dockage the general plan should be to allow the miner credit for his full tonnage, and after the dockage report is looked over and passed on by the superintendent, to charge the miner with the amount. This plan is better than deducting the daily dockage from the daily tonnage because in many cases allowances are made on account of wet places, etc., which would necessitate refunds.

Arriving at Production

In selecting weighmen, care should be taken that only men who are honest and possess the faculty of treating men fairly and courteously be employed. Lack of tact and diplomacy on the part of weighmen, timekeepers and such employees is often responsible for the loss of good miners. The best place to head off trouble is at its source.

The production of a mine should not be considered as

*Accounting Department, T. C. I. & R.R. Co., Brown-Marx Bldg., Birmingham, Ala.

the total of the tipple weights, but is in fact the total tonnage of coal shipped, coked, used for plant purposes, etc. Shipments to market will usually be the largest item. The greater part of the coal will then be weighed in railroad cars over track scales. Where the product used for coking purposes is washed, this should be weighed before going to the ovens. It is desirable to compile monthly figures of the production of a mine in such a way that the total tipple weights will be exhibited in one place and the total inventory or production figures in another. This will show clearly any difference existing as the result of practice and methods pursued. These exhibits should be made up about as follows:

TIPPLE WEIGHTS		
Machine coal paid for	Tons	(pay-roll figures)
Pick coal paid for	Tons	
Dockage	Tons	
Company coal	Tons	
Total tipple weights	Tons	
INVENTORY WEIGHTS		
Shipments to market	Tons	(billing figures)
Dry coal to ovens	Tons	
Dry coal to washer	Tons	
Dry coal to boilers	Tons	
Coal sold employees	Tons	
Slate from picking tables	Tons	
On hand	Tons	
Total inventory weights	Tons	

The item "On Hand" should exhibit the difference between the coal on hand in bins, railroad cars, etc., the first and last of each month. An increase over the previous month can be shown in black and decrease in red.

The tipple weights practically represent the coal paid for, so every concern will carefully scrutinize the total of tipple and inventory weights and endeavor to reconcile or find the cause of any existing differences. When tipple weights exceed inventory weights, the company will be paying for more coal than it is apparently getting. When inventory weights exceed tipple weights, the company is apparently not paying the men for all the coal produced.

The adjustment of differences in tipple and inventory weights must lie in a careful study of existing practices in handling and disposing of the product. At this point many factors arise affecting the final or inventory production of a mine. The product at some mines can be readily marketed without any treatment whatever. If the railroad cars are weighed correctly on track scales, these weights should agree very closely with the tipple weights. Thus the production of the mine is easily ascertained and any small differences can be easily reconciled.

Difficulties in Determining Production

This desirable condition exists at but few mines. At most plants conditions have arisen in the manufacture of coke and the use of coal which necessitate the removal of certain natural elements and impurities by process of crushing, washing, etc. From coal considered as average grade, from 1 to 2 per cent. will sometimes be taken out in this manner. The dockage for this will, in few cases, amount to anything like 1 or 2 per cent. In a great many cases where coal washers are installed, the modern practice is to locate same in close proximity to the mine tipple in order to secure economic delivery from the tipple screens to the washer. In most cases slack is conveyed directly to the washer without weighing. In the process of washing, the slate is eliminated and the wet coal from the washer is either loaded in railroad cars or larries and after being weighed over track scales, is delivered to the ovens or shipped to market.

In figuring the production the tonnage of dry coal delivered to the washer must be known. If it is not weighed before delivery, this can only be figured by a backward process, and in doing this several matters of importance must be considered. One is the amount of slate or refuse taken out of the coal in washing. Unless this can be weighed accurately, the best method of determining the amount is to load the refuse evenly in cars. A careful count of those must be kept and this can be multiplied by the cubical contents of the car in dry refuse to ascertain the total amount. This can be verified from time to time by independent tests. Another factor is that of moisture in washed coal. This must be determined by daily sampling and analysis.

In order to ascertain the amount of dry coal delivered from tipple screens to the washer, it is necessary to take the weight of washed coal loaded in railroad cars or larries, deduct the moisture and add the refuse. In cases where coal is delivered to the washer without being weighed, this is a very important factor in arriving at the production of a mine. It is easily seen that if the moisture or refuse figures are not right, the wrong amount of dry coal delivered to the washer will be obtained. Sometimes it will happen that enough fine coal is carried off in the discharge water from the washer to amount to several hundred tons a year. This is a feature not always considered in the monthly analysis of tipple and inventory weights.

Another vital factor in arriving at the production is the coal consumed at the boilers. In a great many cases coal is delivered to the boilers in mine cars and the tipple scale weights can be used. However, it is a common thing to find coal being delivered by means of conveyors, and in such cases it is rarely weighed and is difficult to estimate. There are good reasons in plenty why coal used for steam purposes should be weighed independent of the value of correct weights for figuring production. The knowledge of the weight of coal consumed is an important factor in working up the cost of steam and the boiler-horsepower-hours.

Factors Affecting Production

It should be clear that the task of arriving at the final production figures for a coal mine embrace the consideration of several important factors and it is obvious that in practice every difference as between tipple and inventory weights cannot be explained clearly on account of the varying factors. Here are some points to be observed closely if the accuracy of production figures is desired:

Inspect and test tipple scales frequently.

Weigh sufficient empty mine cars once a month in the presence of a committee of miners to establish an average tare weight for mine cars.

Weigh all coal delivered boilers.

Weigh refuse from washers. (If possible, refuse should be loaded in railroad cars so track scale weights can be secured.)

Make frequent tests to determine the percentage of moisture in washed coal.

In conclusion, attention is called to a feature of great importance—that of the careful and commonsense weighing of coal over tipple scales. A mine tipple should be so arranged that the cars will slowly drift over the scales without being pushed. It is a common thing to see two or three tipplemen pushing cars over the scales. This naturally adds something to the weight of the car and if allowed for a considerable period the company will pay for something it does not get.

West Virginia Operators Appoint Safety Inspectors

SYNOPSIS—The recent action of certain West Virginia operators appointing safety inspectors for their mines, typifies the general growth of the "Safety-First" idea. A résumé of the duties of a safety inspector.

The "Safety-First" idea has been "taking hold" of late in a most gratifying manner. Popular sentiment finally has become aroused, and much is being said and written on the subject. But even more auspicious than this, is the fact that legislation, directed at the more adequate protection of life, is being both enacted and enforced.

A notable example of this latter was the sustaining, by the U. S. Supreme Court, of the Pennsylvania "Mine-Safety" law, requiring coal operators to leave standing pillars of coal to prevent cave-ins; in the test case of the Plymouth Coal Co. vs. David L. Davis, state mine inspector of Pennsylvania.

There are laws of a like intent in many other states; which is as it should be—for it is not only desirable, but necessary, that we have adequate legislation for the conservation of life and the protection of property.

Of even greater importance, from a practical standpoint, is the tendency of certain representative coal operators to "go on their own" in this respect. Initiative in the right direction is always commendable, and, in this connection, it is something more than that—it is conspicuous. In the past, the promulgation of the "Safety-First" idea has been too often left to lay editors, college professors and stump orators of a political ilk. Yet, even so, the seed was sown which was destined to achieve fruition in the brain of the operator.

A noteworthy example of this is seen in the recent action of certain operators in the West Virginia field, who voluntarily have appointed "safety inspectors" for their mines, in an effort to reduce accidents and fatalities, a splendid example for emulation. Moreover, these operators were not content in carrying out merely their personal obligations in this respect, they went further; they prepared a general letter, over their several signatures, which they forwarded to Earl A. Henry, Chief of the Department of Mines of West Virginia, wherein they outlined the duties of a "safety inspector," as they conceived them, and urged that he use his influence in securing similar action from all other operators in the state.

On receipt of this appeal, Mr. Henry mailed a copy of the letter to every coal operator in West Virginia, urging each to adopt similar provisions for the protection of the lives of those with whose safety they are charged.

Wherefore, let us accord all honor to these progressive and fair-minded operators, and to Chief Inspector Henry.

The letter, which deserves the careful consideration of all concerned, is reproduced below:

Dear Sir—This is to notify you that we have this day appointed a man to fill the position of safety inspector for our mines.

The object of this office is to add to the safety of our employees and the sole duties are to assist the mine foreman in regard to safety to employees.

The entire time must be spent in making inspections of the working places, haulways and traveling ways; he must see that the law is complied with in every respect and that the rules and regulations governing the operation of these mines are closely observed and adhered to, and he shall give all workmen instructions as to safety and safety-methods that are established and may be established in the future.

The following is a list of his duties in detail:

First: He must see that all persons going to and from work enter cars while stopped, that they sit down inside of cars and not up on the side, or on the bumpers, and that all persons remain inside of cars until they come to a dead stop. in no case must he allow persons to get on and off cars while in motion. See that the motormen engaged in hauling men trips use the proper care both as to speed and rough handling.

Second: See that no person carries any larger amount of powder or other explosives into the mine than the law permits.

Third: He shall visit all working places, at least every alternate day, and as much oftener as possible, see that they are in a safe working condition. that all loose coal, slate and rock is taken down, or securely propped, and that the coal is being blasted in accordance with law and rules governing the mine, and that a sufficient amount of air is in circulation, that break-throughs are properly driven, that the oil regulation is not violated, and that men do not carelessly handle powder or other explosives, and that props and caps and all necessary timber be kept up by the workmen and in no case allow them to take any risk for the want of timber; if the timber cannot be had, they must suspend work until same can be furnished. In the event he finds a person working under loose coal, slate or rock, he shall stay with him until same is made safe. Start a system of setting timbers in rooms, the maximum distance apart shall be 3½ ft. and as much closer as the nature of the roof may require; a standard distance of 12 in. from the rail is required, and all posts must be set in the best position to support the roof, which position is most generally at right angles to the weight or roof.

Fourth: He shall examine the roof along the haulways and traveling ways and mark all loose slate to be taken down, and when, in his judgment, he deems it unsafe to wait until after working hours to have it removed, he must have it removed at once, regardless of cost. In no case must he permit any person to work in an unsafe place, except for the purpose of making it safe, and in case it is extra hazardous he shall remain with the workmen until same is made safe.

Fifth: He shall make a daily report of his inspections in a book which is to be kept in the office of the mine superintendent for his examination. He shall be subordinate to the superintendent and keep him informed of any violations of the rules and of his inability to comply with the law or rules, by lack of material of any kind. His daily reports shall consist of the condition of the various working places he visits, violation of the rules and law, by whom, when, where and how, steps taken to remedy same. If any person or persons shall try to intimidate him in the discharge of his duties, state same in his daily report, give name and nature of the offense, and said person shall be dealt with severely.

Sixth: It shall be his duty to see that all stretchers, blankets, etc., are kept in readiness, and that same are returned to their places after being used. He shall include this in his report. A medicine chest with bandages, plaster, cotton, tourniquet, splints and other appliances to render first aid will be in the mine superintendent's office for use in case of emergency. He will be given a key to said office.

Kentucky Mining Institute Meeting

The annual meeting of the Kentucky Mining Institute will be held in Lexington, Ky., again this year on May 8 and 9. A special feature of the meeting will be the state-wide first-aid contest, in which a number of first-aid teams from the various mining companies will participate.

As an attraction for the first day's meeting, it is hoped that the Federal Bureau of Mines will place its immense explosion gallery in Lexington for a demonstration of the explosibility of coal dust, and the dangers of blasting coal with black powder in the presence of dry coal dust.

It is proposed to have a mining show during the meeting, and Secretary Cramer has asked a number of manufacturers to send exhibits for this purpose.

Great Britain is estimated to have a reserve of 189,534,000,000 metric tons of coal, most of it bituminous, while France has 17,584,000,000, also chiefly bituminous. Germany's actual reserve is 94,865,000,000 tons of bituminous and 9,314,000,000 of brown coal, though it is probable that there is a large further reserve.

Agreement to End Strike

SYNOPSIS—A satisfactory and equitable agreement drawn by the company officials in consultation with a duly authorized committee of their employees, which agreement is to remain in force for two years and seven months and has been ratified by vote of the men.

We give below the full text of the agreement entered into early last month between the Western Fuel Co., Nanaimo, B. C., Can., and its employees. The agreement is for a term of three years and its provisions are said to be eminently satisfactory to all parties concerned, and such as will tend to guarantee peace and harmony in the Island of Vancouver, it is hoped, for years to come.

Although the agreement concerns only the underground men, the Western Fuel Co., in keeping with their general practice of looking after the welfare of all their employees, are revising the wage scale of the men employed on the surface, such revision to take effect from the date of the agreement with the underground employees.

In addition to the general agreement, which formed the basis of the settlement of the strike conditions, an insurance scheme has been adopted as a result of the unanimous vote of the men ratifying the agreement, at one of their mass meetings. The insurance plan is appended as a supplementary agreement to the main contract. The full text of this insurance plan and agreement is given below:

Memorandum of Agreement entered into this sixth day of March, 1914, between the Western Fuel Co., hereinafter called "The Company," party of the first part and the employees of the Western Fuel Co., represented by an Agreement Committee, elected at a duly called mass meeting, held Feb. 18, 1914, party of the second part:

Witnesseth—That, for and in consideration of the several conditions hereinafter mentioned and the mutual advantages of both parties, it is agreed by and between the parties hereto, as follows:

1. The rates, terms and conditions in effect at both No. 1 and Northfield Mines, during the month of April, 1913, shall continue in effect during the term of this agreement, except as hereinafter provided.

2. The company agrees to pay all employees covered by this agreement a bonus of 10 per cent. during the term of this agreement; being an addition of ten (10) per cent. to all rates and wages herein specified.

3. The company shall absorb the expense of operating the Protection Ferry.

4. The system of dockage inspection, as practiced at both No. 1 and Northfield Mines shall be continued, with penalties for refuse matter as follows:

No. 1 Mine—Up to and including 50 lb. of refuse per car, double dockage. Over 50 lb. and including 100 lb. of refuse per car, confiscation of car. Over 100 lb. of refuse per car, dismissal after investigation.

Northfield Mine—Up to and including 70 lb. of refuse per car, double dockage. Over 70 lb. and including 140 lb. of refuse per car, confiscation of car. Over 140 lb. of refuse per car, dismissal after investigation.

Provided that any party dismissed may have the right of appeal to the superintendent of mines, whose decision shall be final.

5. The company agrees to a minimum rate of three dollars and fifteen cents ($3.15) per shift, for miners in the lower-seam workings of No. 1 and Northfield Mines. It is understood that the superintendent of mines shall be the judge as to the ability of the party to earn such minimum rate.

6. The company agrees that when a miner is taken from the face to perform daywork he shall receive the miner's day rate.

7. The schedule for loading coal shall be as follows: Upper seam, 30c. per ton; lower seam, 35c. per ton; and for using buggies and laying roads at:

No. 1 Mine—First 75 ft. from dump to face line, five (5) cents per ton additional.

Second 75 ft. from dump to face line, ten (10) cents per ton additional.

Northfield Mine—First 50 ft. from dump to face line, five (5) cents per ton additional.

Second 50 ft. from dump to face line, ten (10) cents per ton additional.

Third 50 ft. from dump to face line, fifteen (15) cents per ton additional.

8. The schedule for rock in coal of upper seam shall be as follows: When rock is 1 ft. thick, $1 per yd. When rock is 2 ft. thick, $2.40 per yd. When rock is 3 ft. thick, $4 per yd.

Above schedule applies only to solid work in stalls. Skipping pillars take one-half of these rates.

9. The schedule for timbers to be as follows: Stringers, 50c. each when 8 ft. long and under; $1 each when over 8 ft. long. Sets, $1.50 each for 9-ft. collars; $2 each for 11-ft. 4-in. collars.

10. The mining, yardage and day rates for No. 1 Mine shall be as shown on Schedule "A," hereto attached and which schedule is made part of this agreement.

11. The mining, yardage and day rates for Northfield Mine shall be as shown on Schedule "B," hereto attached, and which schedule is made part of this agreement.

12. The agreement committee shall consist of three members representing No. 1 Mine, two members representing Northfield Mine and two members representing any new mine operated by the company, after the new mine has been placed on an operating basis.

The company agrees to meet the agreement committee, or a subcommittee thereof, on matters relating to this agreement or any new matters changing the status thereof, or to adjust any matters in dispute between the employees and mine officials; it being distinctly understood that there shall not be any stoppage of work by employees, individually or collectively, pending the hearing of and adjustment of any dispute or grievance during the term of this agreement.

Any vacancy on the agreement committee is to be filled at a duly called mass meeting of the underground employees of the company, or by a pit-head ballot at the mine from which the vacancy exists.

The agreement committee to have the handling of the checkweighmen and gas committee funds.

13. The term and duration of this agreement shall be for a period of two years and seven months, beginning Mar. 1, 1914, and terminating Sept. 30, 1916; and during the month of August, 1916, a mass meeting of the underground employees shall be held to elect a new agreement committee to negotiate a new working agreement, said meeting to be called by the chairman and secretary of the existing agreement committee.

14. This agreement shall be binding upon and respected by the company and its successors, and also shall be binding upon and respected by all employees, who before accepting employment shall endorse this agreement, by their signature in a book containing a copy of this agreement and kept in the company's office: PROVIDED that all employees working for the company at the time of the execution of this agreement and who continue to work for the company shall, by such action, be understood as agreeing to and endorsing all the terms and conditions of this agreement.

15. The day rates applying to No. 1 Mine, and the contract rates applying to the south side of No. 1 Mine, shall apply to and govern all classes of underground work at the new Reserve Mine, when that mine is placed upon an operating basis, and shall continue as the rates for that mine during the term of this agreement unless changed by mutual agreement.

The Reserve Mine when placed upon an operating basis shall have a representation of two members upon the agreement committee, who shall be elected by a pit-head ballot at the mine.

16. This agreement to be effective shall bear the signatures of the manager and superintendent of mines for the company, and the agreement committee for the employees, and the approval signature of the president of the company.

SIGNED, SEALED AND DELIVERED, the day and year first above mentioned.

FOR THE COMPANY—

THOS. R. STOCKETT, Manager.
JOHN HUNT, Superintendent.

FOR THE EMPLOYEES—
JOSHUA NORRIS,
JAMES H. ROBERTSON,
ANDREW THOMSON,
JOSEPH DEAN.

On behalf of the men,
JAMES MILLER, Chairman.

* * * *

SCHEDULE "A"

Mining, Yardage and Day Rates—No. 1 Mine

Mining—Upper seam, per ton, 68c.; lower seam, per ton, 80c.

Yardage, Upper Seam—Levels, $2.50 per yd. and coal. Crosscuts, $2 per yd. and coal. Levels, when less than one-half of height is in white rock, $7.50 per yd., coal to company. Levels when more than one-half of height is in white rock $8 per yd., coal to company. Turning stalls, 5 yd. long by 12 ft. wide, $10 and coal.

Day Rates—Fireboss, $3.65; shotlighter, $3.40; face men, $3.20; bratticemen, $2.85 to $3.15; timbermen, $3.15; timbermen helpers, $2.75; tracklayers, $2.85 to $3.15; tracklayers' helpers, $2.75; roadmen, $2.75; drivers, boss, $3.25; drivers, double, $3; drivers, single, $2.87½; drivers, boys, $1.60 to $2.40; pushers, $2.75; linemen, $3.10; motormen, $2.87½; motormen assistants, $1.60 to $2.40; engineers, diagonal slope, $2.85 to $3.15; engineers, endless rope, $2.75; winch drivers, $1.10 to $2.75; rope inspector, $3.15; endless ropes, men, $2.75 to $2.90; endless ropes, boys, $1.35 to $1.90; rope riders, $1.60 to $2.75; doorboys, $1.10; cager, head, $3.15; cager, assistants, $2.75; miners, $3.15; loaders, $2.75; machine foremen, $3.70; machine runners, 1st class, $3.65; machine runners, 2d class, $3.25; machine runners, 3rd class, $3; machine runners, helpers, $2.75; drillers, 1st class, $3.65; drillers, 2d class, $3.25; drillers, 3rd class, $3; muckers, $2.75; brushers, $2.80; cogmen, $2.75; laborers, $2.75; pipemen, $2.75 to $3.10; pumpmen, $2.75 to $2.85; stablemen, $2.85.

SCHEDULE "B"

Mining, Yardage, and Day Rates—Northfield Mine

Mining—Upper seam, per ton, 68c.; lower seam, per ton, 80c.

Yardage, Upper Seam—Levels, $2.50 per yard and coal. Crosscuts, $2 per yd. and coal. Levels, when less than one-half of height is in white rock, $7.50 per yd., coal to company. Levels, when more than one-half of height is in white rock, $8 per yd., coal to company. Turning stalls, 5 yd. long by 12 ft. wide, $10 and coal.

Day Rates—Fireboss, $3.65; shotlighter, $3.40; facemen, $3.20; bratticemen, $2.85; timbermen, $3.15; timbermen helpers, $2.75; tracklayers, $2.85 to $3.15; tracklayers helpers, $2.75; drivers, boss, $3.25; drivers, double, $3; drivers, single, $2.87½; drivers, boys, $1.60 to $2.40; pushers, $2.75; rope inspector, $3.15; endless ropes, $2.40 to $2.90; rope riders, $1.60 to $2.75; winch drivers, $1.10 to $1.60; doorboys, $1.10; cager, $2.90; miners, $3.15; loaders, $2.75; machine foremen, $3.65; machine runners, 1st class, $3.65; machine runners, 2d class, $3.25; machine runners, 3d class, $3; machine runners, helpers, $2.75; drillers, 1st class, $3.65; drillers, 2nd class, $3.25; drillers, 3rd class, $3; muckers, $2.75; brushers, $2.80; cogmen, $2.75; laborers, $2.75; pipemen, $2.75 to $3.15; pumpmen, $2.75; roadmen, $2.75.

Supplement to Agreement dated the sixth day of March, 1914, between the Western Fuel Co. and its employees represented by the agreement committee:

A It is agreed that in the event of a fatal accident occurring in the mines, or in event of a death resulting from injuries received in the mines, that the operation of the mine in which the accident occurred shall not be suspended on the day of the funeral of the deceased party, but that any employee wishing to absent himself from work for the purpose of attending the funeral shall have the privilege of doing so.

All employees working on the morning, afternoon and night shifts of the day of the funeral agree to contribute the sum of one dollar ($1) per man and fifty cents (50c.) per boy, to a fund to be given to the nearest relative of the deceased party.

The company agrees to duplicate the sum contributed by the employees.

For the purposes of this section all employees whose daily wage is less than three dollars ($3) per shift shall be considered as boys.

The company is authorized to make collections for this fund from the payroll of its employees in manner similar to other collections.

Nothing in this section shall relieve the company of any obligation under the Workmen's Compensation Act, nor shall it relieve the employees of their obligation to the Medical Relief and Accident Fund.

B It is agreed that monthly meetings of the management of the company and the agreement committee shall be held on the first Wednesday of each month at two o'clock in the afternoon at the company's general office.

Special meetings may be called at any time by the management of the company or the chairman of the committee, due notice of such meeting to be given to all parties.

SIGNED, SEALED AND DELIVERED, the sixth day of March, 1914.

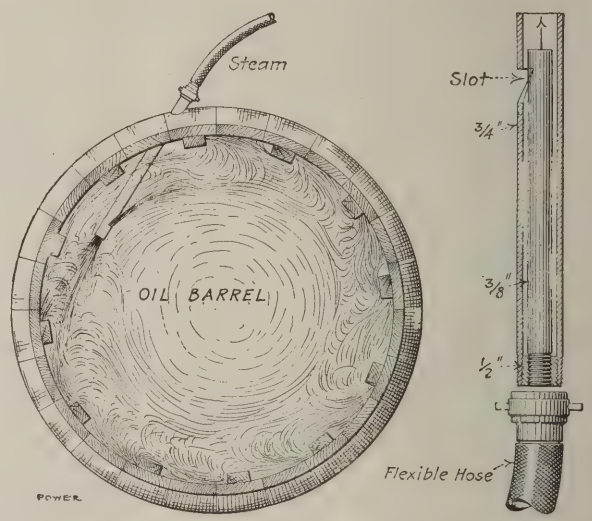
FOR THE COMPANY—
THOS. R. STOCKETT, Manager.
JOHN HUNT, Superintendent.

FOR THE EMPLOYEES—
JOSHUA NORRIS,
JAMES H. ROBERTSON,
ANDREW THOMSON,
JOSEPH DEAN, Secretary.
JAMES MILLER, Chairman.

Steam Washer for Cleaning Overalls

The accompanying sketches show an arrangement a fireman made for washing overalls after considerable experimenting with several similar ideas, none of which was so satisfactory as this.

The outfit as shown consists of a barrel with an injector-like apparatus which may be connected to a steam



PLAN OF WASHER AND SECTION OF NOZZLE

main through a flexible hose connection. Around the sides of the barrel is a series of vertical slats to break up the steady rotation of the water which the injector action gives and to set up counter-current, so that the clothes to be washed are thoroughly agitated.

The barrel is an ordinary oil barrel; the injector was built up of three standard sizes of pipe assembled as shown in the sketch—*Power*.

Canadian Coal Production

The estimate of John McLeish, chief of the Division of Mineral Resources and Statistics, for Canada, shows the production of coal in the Dominion in 1913, and the revised figures for 1912, to be as follows:

	1913	1912
Nova Scotia	7,972,727	7,783,888
British Columbia	2,714,449	3,208,997
Alberta	4,144,377	3,240,577
Saskatchewan	209,175	225,342
New Brunswick	70,311	44,780
Yukon Territory	4,050	9,245
Total for Canada	15,115,089	14,512,829

The output in 1913 was unfavorably affected by labor troubles in Vancouver Island, British Columbia.

Editorials

One Way to Advance Loyalty and Efficiency

The greatest problem of industrial life today is the task of effecting a proper relationship between employer and employee. If satisfactory results are to be obtained in the way of loyalty and efficiency, the workman must be encouraged to have confidence in his superiors.

In furtherance of this end, it is an excellent suggestion that the president, or whoever is the supreme official of each corporation, invite every man in his employ to communicate directly with him, by personal interview or letter, whenever real occasion arises. Nothing is better calculated to foster this feeling of confidence on the part of an employee than the certain knowledge that his ideas, suggestions and complaints will receive the personal attention of the man-at-the-top without first going through the hands of subordinates. Most workingmen have confidence in the "big boss." On the other hand, they are sure to have a feeling of distrust for the small understudy. And this condition is not without cause, for it often occurs that petty officials endeavor to advance themselves in the eyes of their superiors by presenting suggestions from the men under them as their own original ideas.

It will be claimed by some that a plan built on the lines here suggested would be destructive of discipline. This is not true, as has been proved by the successful adoption of such a system at several of the largest industrial plants in America. Great good is sure to result when the workingman is brought to feel that the highest official of his corporation is taking a personal interest in him and is ready to discuss proposals for company betterment with him man-to-man.

The Western Fuel Co. Agreement

The Western Fuel Co., Nanaimo, B. C., Can., and Thomas R. Stockett, the genial and efficient manager of the company, are to be congratulated on the agreement entered into between the company and its employees. This agreement is the culmination of the strike difficulties that have existed in Vancouver Island during the past 18 months.

The trouble arose from the attempt of the United Mine Workers of America to extend their organization and influence into British Columbia. Agitators were sent into the Island of Vancouver to arouse the interest of the miners in the Island and enroll them as members of the organization. These efforts met with indifferent success, owing primarily to the fact that the Vancouver miners were working under conditions with which they were generally satisfied.

According to the evidence that developed on the investigation of mining conditions in the Island, by the government, a general walkout that was in effect equivalent to a strike, was brought about by the strategy of inducing the miners to vote a "holiday," after which coercive measures were used to prevent the return to the mines of those men who were willing and desired to work.

In this case, as in a number of other similar instances, elsewhere, the broad principle was overlooked by the strike makers that, *Every man has a right to work without interference or intimidation by other workers of a different mind.* No argument is needed to emphasize or explain this *right of the individual.* It is the foundation principle of all industry. Any curtailment of the *right to labor* is contrary to the law of self-support and good government, and its advocacy by any individual or organization is evidence in itself of *lawlessness.*

The manner in which mining operations have been conducted in the Island during this period of disturbance is greatly to the credit of the management of the coal companies, not a little credit being also due the large majority of the men, for their loyalty to their employers. It can be truthfully said that few companies have done more than the Western Fuel Co. to improve the conditions in and around their mines, and to encourage the spirit of coöperation among the workers. These efforts on the part of the company have been fully appreciated by the majority of their employees, who resisted, to the extent of their power, the unjust interference of the few with the operation of the mines.

We give in another place the full text of the agreement of Mar. 6, 1914, which is to extend over a period of three years.

Coal Buying on a Large Scale

In the recent request for bids involving 640,000,000 lb. of coal per annum to supply the state of New York with fuel, a new and commendable precedent in coal purchasing has been established. Obviously, a deal of this magnitude will enable the bidder to compute his profit at the lowest conceivable margin, much to the benefit of the purchaser.

While this is, of course the predominating reason for this new departure, it will probably develop eventually that the scheme has other and even more important advantages. For instance, under the present system of coal buying, each institution acts on its own initiative without expert advice of any kind. In many instances, the medical officers at the state institutions are called upon to decide their own fuel problems, while in general the question is seldom or never handled by really competent men.

Under the new arrangement, the state will derive the benefit naturally to be expected from the best services available. A special commission, made up entirely of fuel experts, will study the different problems in all their ramifications and select the fuel best adapted to the requirements of the individual plants. It may even eventually develop that the economy in consumption this commission is able to effect will be of even greater importance than the amount saved in buying.

That the buying is to be done entirely on the B.t.u. basis will be construed as an important recommendation of this system by its advocates. However, it is possible that a deal of this character, offering such opportunities for favoritism, could only be handled in this manner. The specifications drawn up by the commission are essentially practical and contain but few points with which the responsible bidder could take issue. From a cursory examination of them, the most objectionable feature seems to lie in the proposed schedule of payments which provide for much longer delays than is prescribed by the rules of good business or that the operators in general would ordinarily consider. But since the obligations of a commonwealth such as New York are readily negotiable at a minimum discount, this feature is insignificant.

Stone-Dust Stoppings

In an inquiry published in the last issue of COAL AGE, March 28, p. 539, the question was raised as to the feasibility of building what might be called "stone-dust stoppings," consisting of two walls of slate or rock, with the intervening space filled with fine stone dust. The argument advanced in favor of this suggestion was that, in case of an explosion, and the destruction of the stopping by the force of the blast, the stone dust would be thrown into suspension in the air, at the moment and at the place most needed to arrest the explosive wave.

We believe that this suggestion is worthy of consideration. The efficacy of stone dust to stop the progress of an explosion in underground passageways has not as yet been thoroughly tested. Many experiments seem to indicate that this is an effective method of destroying the explosive condition of mine air. We believe that more attention should be given to the matter of applying this principle in coal mining.

At the present time, it is common practice, in many mining districts, to build road stoppings by erecting a double wall of slate and filling the intervening space with road dust. This dust, however, is largely contaminated with fine coal dust and is to that extent combustible and dangerous to be used for the filling of stoppings. The question to be decided is: Is stone dust sufficiently efficacious in arresting the explosive wave to warrant the expense of crushing and pulverizing slate and rock for this purpose? We would be glad to see this question thoroughly discussed by those who have had experience in the use of stone dust for this purpose.

Some Things Are Beyond Understanding

"Safety First" received a hard jolt recently when the miners employed at mines No. 19 and 20, of the J. R. Crowe Coal Co., near Pittsburgh, Kan., walked out and refused to work because R. A. Gray, general superintendent for the coal company, posted safety-first signs in and about the mines. They were placed on the tipple, in the engine and boiler rooms, at the pit-head, at the powder house and at different places in the mines, where there was the least bit of danger to be encountered. The pit cars were adorned with the signs, and the mottoes were conspicuous in the weighing office and on the screens—in fact, they were placed in every prominent position available in and about the mines.

Shortly after the signs had been posted, the mine committee for the United Mine Workers waited upon Superintendent Gray and asked that he remove the warnings. In his surprise, he refused their demand, and at once a strike was ordered and immediately put into effect at both mines The men gave no reason why the objection was raised further than to say they are able to take care of themselves without having danger signs facing them at every turn. Over 400 miners are engaged in the strike and the grievance has been referred to the executive board to be settled.

If anything could be done to dampen the ardor and smother all enthusiasm on the part of a mining company for "safety" in their operations, surely the Kansas miners have selected that course. Let us all hope that the miners of the Crowe company are in a class by themselves. We also trust that justice and retribution be delayed in their case until they have been brought to see the great harm they are working against the cause of organized labor in the mines of America.

Operators Are Not a Unit

The differential for machines is less in Illinois and Indiana than in Ohio, and this fact has made a difference in interest between the operators in those states. The Ohio operators may be expected to resist the Green Anti-Screen Bill to the bitter end, but the result is hardly likely to be more successful than the attack in Illinois on the practice of solid shooting.

The greatest difficulty operators in Illinois have to contend with is the multiplicity of separate scales existing in that state. This condition makes the Illinois owners anything but a unit.

There has been some talk that the Illinoisans were going to draft an equal scale from end to end of the state. We know for a fact that such action will not be sanctioned by some of the large operators in Illinois.

Wanted--a Leader

Probably never before in the history of the bituminous-coal industry was there such urgent need of a generalissimo of the army of operators. Grown complacent under the soothing belief that the miners cannot precipitate an industrial strife, because of depressed business conditions, the lack of cohesion, and uniformity of action in a national wage agreement was never before so evident.

Independence of initiative is the salient feature in all sections, and the miners are showing themselves quick to accept the possibilities of this chaotic situation by completing the disruption of what meagre semblance of organization still prevails between the contiguous states. Acting upon their own motto, "United we stand, divided we fall," the miners will first effect a dissolution of the producers' organization into its constituent elements and then by concentrating all the powerful resources of the U. M. W. of A. upon each unit in turn, a victory will be ultimately assured.

The Pittsburgh district has its John H. Jones and W. K. Field, Ohio, its Woodford, its Maurer and others, while Illinois boasts its Peabody, Scholz, Taylor, Moderwell and Moorshead, but where is the man who can weld these units into a whole?

The Situation at the Labor Conferences

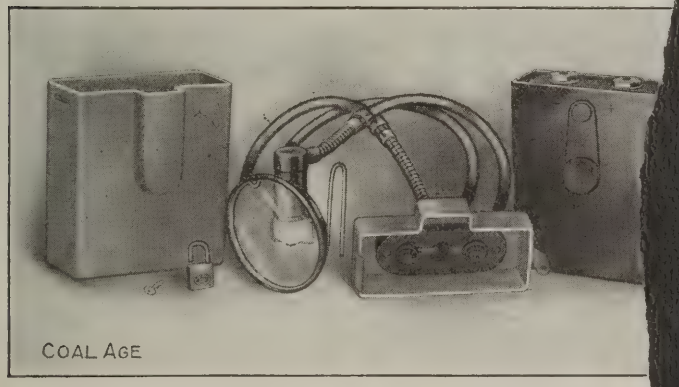
The overtures of the miners of the Pittsburgh district asking for a continuation of the previous scale were accepted at Pittsburgh, Mar. 30. Essentially this same plan was offered at the Chicago conference, but could not be accepted by any single state at that time. Immediately upon the adjournment of the Convention, the policy committee of the miners decided to offer it individually to the separate districts with the result that an agreement was effected on this basis in the Pittsburgh district.

Because of the complications arising as a result of the new mine-run law in Ohio, it will be impossible to arrange a new scale on the same basis as the one just expired. There are also serious difficulties in the way of an agreement being reached in Illinois, but indications point to an early settlement of the Indiana scale.

While no formal suspension of mining will take place in the Pittsburgh district, operations will necessarily be restricted, pending the liquidation of heavy stocks accumulated in anticipation of the more or less protracted suspension. The output of this district since the cessation of lake shipping last fall has averaged 70 per cent. of full rated capacity, whereas consumption during the past two or three months has probably not exceeded 50 per cent. normal. Thus in order to permit consumption to catch up with production, operations will probably be at about 50 per cent. until lake shipping opens up.

A Locked-Case Electric Safety Lamp for Use in Gaseous Mines

After securing the approval of the U. S. Bureau of Mines for the use of its lamps in gaseous mines, the Witherbee Igniter Co., manufacturer of the Wico lamp, proceeded at once on the attainment of its ultimate ambition, to produce an indestructible lamp.



SHOWING IMPROVED WICO ELECTRI

In the meantime, a demand had sprung up for a locked case construction which would prevent the connection being tampered with from the time the equipment left the lamp house until its return. Hence the Wico locked case electric safety lamp was made to combine this feature with the necessary protection for the battery. It may now be dropped from a height of 5 ft. on solid rock without danger of breaking the battery jar, and, in testing, the lamps have been dropped from a height of 20 ft. on frozen ground without injury.

It has been determined in practice that a charge of 5c. per day to the miners for the use of the lamp will not only keep the batteries charged, but purchase a new equipment at the end of the year. Most of the parts of the locked-case type will last many years.

The accompanying illustrations show how the hinge and hasp for the padlock are case-integral with the case and cover. The safety device which extinguishes the glowing filament in case of bulb breakage, makes the replacement of the standard Ediswan bulb easier than the bayonet-lock formerly used. Complete dissembling of the equipment can be accomplished in a few minutes. All parts are made interchangeable in accordance with the best American practice. The aluminum case is a remarkable example of metal casting. Battery efficiency has now been fully demonstrated in practice, both as to hours of service on a charge and retention of liquid electrolyte.

The locked-case Wico lamp may be seen in use at the government's experimental mine at Bruceton, Penn.

England Faces a Big Coal Strike

Supported by the Miners' Federation of Great Britain, 135,000 coal miners in the Yorkshire pits, in Yorkshire, have gone on strike, demanding the introduction of a minimum rate of wages; 150,000 more miners have declared their intention of striking this week if their demands are not granted immediately. The situation is serious and it is expected that there will be a long str[illegible] before an adjustment is effected.

Legal Department

Recent Judicial Decisions

By A. L. H. STREET*

North Dakota Coal Freight Rates—The North Dakota law of 1907, which prescribes maximum freight rates on interstate shipments of lignite coal, is found to be reasonable as to some of the railroads in the state and unreasonable as to others. (North Dakota Supreme Court, State vs. Northern Pacific Railway Co., 145 Northwestern Reporter, 135.)

Assignment of Mining Leases—A clause in a coal mining lease prohibiting assignment of the lessee's interest without the lessor's consent is waived by his acceptance of rent from the assignee. The lessee, however, remains liable on his express agreement to pay rent for the full time the lease shall run, unless the lessor accepts the assignee as substitute lessee. (West Virginia Supreme Court of Appeals, Kanawha-Gauley Coal & Coke Co. vs. Sharp, 80 Southwestern Reporter 781.)

Effect of West Virginia Mine Law—The West Virginia Mine Foreman Law does not excuse a mine operator from liability for injury to an employee, resulting from failure to use due care to provide reasonably safe appliances and places of work, except insofar as the duty is devolved upon the foreman by such law. A mine owner is liable for death of an employee who came in contact with an uninsulated wire carrying a heavy electric voltage, if the employee did not know of the existence of the danger and was killed while engaged in the line of his work. (West Virginia Supreme Court of Appeals, Humphreys vs. Raleigh Coal & Coke Co., 80 Southeastern Reporter 803.)

"Independent Contractor" and "Employee" Distinguished—A person who was engaged to move a water tank for a coal company at an agreed price was an independent contractor, and not an employee in the sense that the compan[illegible]ld be liable to him for injury while doing the wor[illegible]ough rule which requires an emplo[illegible]nen [illegible]asonably saf[illegible]on- [illegible]on- [illegible]om [illegible]es. [illegible]al [illegible]- [illegible] [illegible]e

cepted, although not measured nor paid for. Held, that the deceased miner was an employee of the company, so as to render it liable for any failure to use reasonable care to maintain his working place in safe condition; that it was negligence to fail to support the roof after notice that it was in a dangerous condition; and that the company cannot rely upon any negligence of a co-employee of the decedent, since the fellow-servant doctrine does not apply to an injury resulting from an employer's breach of a nondelegable duty. The court said: "The work of driving the entry beyond the end of the track was continued. After removal of the coal for a short distance beyond, a blast was fired in the overhanging slate, which resulted in leaving the débris to be removed; and at the time of the accident deceased was engaged in carrying pieces of this slate to, and loading them upon the car. It is a mistake to suppose, as counsel do, that the work deceased was doing, within the space about the car where he was killed, was either opening that place for work or making it safe. It should constantly be remembered that the work of the deceased within that space was simply to use it as a passageway to carry material to the car; and the decisions upon which counsel rely are inapplicable for that reason." (United States Circuit Court of Appeals, Sixth Circuit; Big Hill Coal Co. vs. Clutts; 208 Federal Reporter 524.)

Substitution of Leases—Damages for Breach by Lessee—When a new coal-mining lease is substituted for a pre-existing one, all liabilities accruing up to the time of the making of the new lease still remain governed by the original contract, in the absence of agreement to the contrary embodied in the substituted lease. In suing to declare forfeiture of a lease on account of the lessee's failure to pay royalties and to prosecute work with reasonable diligence, the lessor is entitled to recover damages sustained by him on account of the breach. (Alabama Supreme Court, Pollak vs. Stouts Mountain Coal & Coke Co., 62 Southern Reporter 531.)

Contributory Negligence of Injured Miner—A lignite coal miner, injured through fall of a mass of clay from the roof of the room where he was working, cannot recover against his employer where it appears that, although it was his duty to examine the roof and to remedy any discoverable defects, he failed to do so, and that his injury is directly attributable to such contributory negligence. (North Dakota Supreme Court, Jackson vs. Chase, 144 Northwestern Reporter 235.)

Proof of Agency—When one sued for the price of coal interposed a defense that plaintiff was estopped to recover because it had held the agent, from whom the purchase was made and against whom defendant had a personal counterclaim, out as owner of the coal, the burden was on defendant to establish that defense, and not on the plaintiff to show that defendant knew or ought to have known that the agent was acting as such. (Wisconsin Supreme Court, Pennsylvania Coal & Supply Co. vs. Schmidt, 144 Northwestern Reporter 283.)

Right to Recover Statutory Penalty Not Assignable—In recently deciding that, under the West Virginia statute, which prescribes a penalty of $500 for mining coal within 5 ft. of line of adjacent land, a claim for such a penalty is not assignable, the Supreme Court of Appeals of that state said: "Obviously the penalty given by the statute here in question is not intended as compensation for coal taken or damage to property. It may be incurred without the taking of any coal from the land of the party entitled to sue. The taking of any coal at all within 5 ft. of the division line, and out of land belonging to the taker himself, inflicts the penalty. . . . . The enactment of it seems to have been nothing more than an exercise of the police power of the state. . . . . It does not stand in lieu of the right of action for injury to the land by the mining of coal therefrom, or a right of action for the value of coal taken. . . . An assignee of such person is clearly not the person injured. . . . It does not say the person injured, or his assignee, may sue. It is a highly penal statute, and falls under the rule of strict construction. Such statutes do not include anything beyond their letter, even though within their spirit. . . . Assignability of such claims encourages litigation and strife. . . . . Public policy forbids the conversion of penalties into commodities or assets." (Wilson vs. Shrader, 79 Southeastern Reporter, 1082.)

Discussion By Readers

Widths of Opening and Pillar

I want to thank COAL AGE for the publication of my inquiry and the answer given in the issue, Feb. 28, p. 379. Following the suggestion made that some important data had been omitted in my last inquiry and for the information of readers who may further discuss this question, I desire to give the following items:

The coal of the upper seam is a hard bituminous variety and, like that in the lower seam, is unaffected by exposure to air. The seam is from 40 to 48 in. in thickness, and free from impurities; it is underlaid with a hard bottom of sandy shale and likewise overlaid with a hard sandy shale varying from 10 to 30 ft. in thickness. The entire cover overlying the upper seam ranges from 50 ft. at the outcrop workings to 1000 ft. in the mountain. This cover is composed mostly of shale, sandstone and thin seams of coal. Both coal seams pitch about 2 per cent. into the hill.

In the working of the lower seam, no mud partings or slips have occurred thus far, except in outcrop work and when passing under small streams under light cover.

All the coal in both seams is undercut with chain machines and blasted with Monobel powder. No gas has yet been found in the upper seam and only small quantities have appeared in the lower seam. The lower seam has made but little water and this follows up the working face at the dip. There is little or no water in the upper seam, which is practically dry. I shall be glad to see these conditions further discussed by readers who have had experience under similar conditions.

THOMAS C. MILLER, Engineer.

Benham, Ky.

Safety or Refuge Chambers in Mines

Letter No. 1—The article presented by Charlton Dixon, COAL AGE, Mar. 21, p. 498, drawing attention to the need of providing safety or refuge chambers in mines, should not be passed by lightly. I heartily indorse all that he has said in that article.

Going back and recalling past experience, we find that in the Cherry (Ill.) mine explosion, which occurred Nov. 13, 1909, twenty men saved themselves by withdrawing into an improvised refuge chamber from which they were rescued, a week later. This incident alone emphasizes the importance and practical use of providing such refuge holes, at convenient points in every mine.

If I am not mistaken, some of the mines, in European countries, have provided such safety chambers. The idea is not new, but Mr. Dixon deserves much credit for drawing attention to its importance and suggesting that the matter be taken up and thoroughly discussed. I earnestly hope that much good will come from such a discussion.

It is a matter of common observation that the large majority of the victims of mine explosions have not been killed outright by the force of the explosion, but have been overcome, later, by the afterdamp. In many cases, there is evidence that these men have lived for hours or even days after the explosion took place. In such case, who would deny that a refuge chamber located in the live workings, would have been the means of keeping the men alive until help could reach them.

In the campaign for "Safety First," is it not true that we are overlooking some of the most important points to be considered. Mine explosions are of sufficient frequency to demand the most careful consideration, and every possible preparation should be made to overcome their dread effects. We may say that fully 90 per cent. of the explosions of gas and dust in mines occur at or near the working face, in what are called the "live workings." Large mines are, as a rule, divided into districts that are more or less separate. Each district should have a refuge chamber. As far as practicable, the districts should be separated from each other by a continuous pillar of coal, where the room-and-pillar system is in use. In my opinion, refuge chambers should be provided for in the original layout of the mine. No mine plan should be complete without this provision. They are of as much importance as any other features of the mine.

I would suggest that a refuge chamber should be driven about 18 or 20 ft. wide and, say 70 ft. long, so as to accommodate at least 100 men. The chamber or room should be driven in solid coal, without cut-throughs connecting it with other openings.

A refuge chamber can be fitted up and furnished, according to the judgment of the men in charge; but, in any case, each refuge chamber should be reached from the surface by boreholes, through which air, water and food could be supplied to the men entombed therein. There should be casks for holding water, a sanitary closet and disinfectants; and it might be expedient to have on hand a case of first-aid remedies, and, possibly, one or more sets of breathing apparatus. This last named equipment, together with oxygen tanks, etc., will not be considered by many as essential.

The main feature of the refuge chamber should be to provide a place where the men can be kept alive until rescued. It is most important that the chamber be provided with substantial doors that can be closed and sealed, to prevent the entrance of any poisonous gases into the inclosure.

PENNSYLVANIA ENGINEER.

Pittsburgh, Penn.

The Certificate Law

Letter No. 24—The recent discussion in reference to the possible interchange of certificates of competency for mine foremen and firebosses has interested me much. The matter is under consideration, at the present time, with the board of examiners in this (Alberta) province.

I hold a mine manager's certificate of competency, granted me in Edinburgh (Scotland), in 1909. The new

mining law, in this province, that came into effect in August, 1913, reads as follows:

> The chief inspector of mines may sign and deliver a certificate, without examination, to any person holding a certificate from any other country, providing the board of examiners reports that the standard of training and examination required for the granting of such certificate is equivalent to that required for the granting of a corresponding certificate under this act.

I have made application to the examining board for a certificate of competency, to be granted under the law I have just cited and, at the present time, my application is under consideration by the board. It is my personal interest in this regard that has caused the discussion of this question to appeal to me very strongly.

ANDREW BARCLAY.

Bankhead, Alta., Canada.

Letter No. 25—It is quite generally admitted by mine workers that only practical men should be allowed to qualify for a mine manager's certificate. As I have been working in mines, from 10 years of age till now, I would naturally be expected to favor this view, which I do to a certain extent.

We must not forget, however, that one of the greatest boons known to mining was the work of a man who knew nothing of practical mine work. I refer to Sir Humphrey Davy, the inventor of the Davy safety lamp. It was Davy's knowledge of physics and chemistry that led him to this discovery so important in coal mining. It is quite possible that if the history of the development of the different types of safety lamps and other important features of mine equipment were known, it would be found that many of these were the work of men who knew little or nothing of mining. We are indebted to Galileo for much of our present knowledge of atmospheric conditions; to Torricelli, for the barometer; to Isaac Newton, for the knowledge of the laws of gravitation, and to many others whose knowledge of science has affected the practical work of mining.

I believe that a man who has qualified and received a certificate of competency in one state, should be likewise qualified to hold a similar position in another state. His study of mining has acquainted him with most of the difficulties he is likely to meet anywhere. A man who understands the nature and danger of coal dust in the mines of Pennsylvania, will be capable of treating this matter in Colorado. In my opinion, it is a mistake to think that only local men understand the dangers and are capable of working the coal successfully in their several districts. It is probable there are many men in other districts who would be able to mine the coal more successfully than many of the men already acquainted with the local conditions in a certain mine or district.

I would state, as an example, in support of this opinion, according to Robert Peel, only one-third of the coal is being taken from a 30-ft. seam in South Staffordshire, and this seam is one of the best coals in England. Local talent does not show to advantage in this case. If the report be true, competent mining men from other localities have expressed the opinion that, by the adoption of a suitable method of longwall working, practically 100 per cent. of the coal could be taken from this seam. In support of their view, they refer to other thick seams worked by the longwall system, on the Continent, where most all of the coal is recovered. It is only fair to allow, however, that the failure to extract a larger percentage of coal is quite often due to the desire to obtain quick returns on the investment.

I cannot agree with the writer of Letter No. 23 that the mining law of Illinois, requiring that all candidates in examination must be residents of the state, "is right because it protects its own citizens." In New Zealand, a coal digger from Scotland or England is not allowed to dig coal till he has been two years in the mines of that country. It is not, there, a question of ability, as the men debarred are men who have dug coal all their lives. In parts of Germany, a boy going into the mine must push cars and do other work before he is allowed to learn how to dig coal. In India, a boy must follow the same occupation as his father.

Such restraining laws are common in foreign countries; they do not protect; but, by diminishing the opportunities, work hardships and destroy the ambition of competent men. The stagnation produced in the industries, by such laws, is plainly evident. As an excuse for looking to this country for a manager, Lord Hamilton is reported to have said, "There is something paltry about the British system, which tends to interfere with the mental activity of employees and reduces them to mere automatons, sacrificing merit to seniority."

I would favor the issuing of certificates of competency by the Federal government, as I believe this would lead to the adoption of a more uniform system of examination in the several states. The examination could be made to cover every phase in coal mining, and I believe would eliminate, to some extent, at least, favoritism in the granting of certificates.

I do not think that certificates should be granted to men who have no knowledge of mine gases, permitting them to take charge of nongaseous mines. Suppose, for example, marsh gas (CH_4) has never been found in the mines in a certain district, and a mine foreman employed in one of those mines knows nothing of mine gases. How would such a man be able to deal safely with a mine fire, when he is liable, then, to meet with two dangerous gases, carbon dioxide (CO_2) and carbon monoxide (CO). The latter may even prove explosive, making the conditions even more dangerous. Under such conditions, the mine foreman must be able to act at once and intelligently. He cannot wait for the inspector to arrive.

Referring to uniform state examinations, there could be no objection to giving questions that have a special bearing on local conditions in any state, provided this did not exclude other important questions. It is not long ago that mine foremen had little idea of the size of pump necessary to deal with a given quantity of water, in a given time. This and other like instances show the necessity of the examination dealing with all classes of mine work.

Speaking of the Federal government issuing the certificates of competency, it would not be necessary for them to hold the examination, which could be held, as now, by the state examining board, in conformity with the general rules and regulations laid down by the Federal government. But the certificates issued by the Federal government, on the recommendation of the local examining board, would make the holder of such certificate eligible for the position in any state.

ROBERT MCCUNE.

Dawson, N. M.

Fan Ventilation

Being much interested in the question of the ventilation of mines, the inquiry of D. J. Hopkins, Jan. 24, p. 180, in reference to the installation of a second fan to increase the circulation of air in the mine, attracted my attention. I believe the plan suggested by Mr. Hopkins to be entirely practicable, providing the air shaft is large enough to carry the amount of air required.

Before we can fully decide on the feasibility of the proposed plan, it is important to know the size of the upcast and downcast shafts as well as the size of the main intake and return airways, in any proposition of this kind. I would suggest that if the sectional area of the airshaft is sufficiently great both of these fans could be installed at the top of the shaft so as to work in parallel. This plan, however, would require the splitting of the air current at the foot of the shaft, in order to provide a separate current for each side of the shaft. In preference to this, I would, if possible, place each fan over its own air shaft.

In my opinion, a second fan, operating in parallel with the first, is of great value for the purpose of increasing the circulation in a mine; but, in no case, would I install the second fan as a "booster." In the installation of mine fans, it is important never to figure the capacity of a fan too closely, as it may and frequently does, happen that gas feeders are met heavier than what are expected and a greater air volume is required to properly ventilate the mine.

In all mine ventilation, I favor the splitting of the air current wherever this can be done to advantage. The method provides purer air at the face of each district, or section of the mine, and the gases generated in the several districts are carried at once into the return airway, without passing through other sections of the mine. Also, the velocity of the air sweeping the working face is much lessened, thereby reducing the friction of the air current and exposing the workmen to less discomfort owing to the strong draft. There is, also, less danger of the flame of the lamp being blown through the gauze where safety lamps are used. As stated in COAL AGE, Vol. 2, p. 335, the mine resistance is always decreased by splitting, provided the total sectional area of all the splits is greater than the sectional area of the air shaft or main airway; otherwise, the splitting of the air current will increase the mine resistance. My experience leads me to recommend that the plan suggested by Mr. Hopkins should be adopted.

JOHN SUTTON,
Fireboss, Clinton Coal Co.
West Terre Haute, Ind.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

ADDITION OF DECIMALS

The addition of decimals differs in no respect from the process of addition previously explained. As before, figures of the same unit value must be written in the same column.

Rule—Write the decimal numbers to be added so that the decimal points of all the numbers will be in the same vertical line, and likewise the tenths, hundredths, thousandths, etc., in their respective columns. Then, beginning on the extreme right, add together the numbers standing in each consecutive column, proceeding as in the addition of whole numbers, writing the units figure of each sum in its respective column and carrying the tens figure, if any, to the next column on the left. When all the columns have been added, place a decimal point in the result under the decimal points of the numbers added.

The following examples will make the process clear:

0.314	0.468
0.40561	34.1095
0.3502	6.034
0.69	19.9823
0.0045	0.32
1.76431	60.9138

The right-hand columns will frequently contain only a few figures. As above, the addition of decimals will often produce a whole number and a decimal. The addition is always carried past the decimal point as though the latter did not exist, pointing off the figures in the sum, however, to correspond to the columns added.

SUBTRACTION OF DECIMALS

The process of subtracting one decimal number from another is the same as in the subtraction of one whole number from another.

Rule—As in whole numbers, write the lesser number under the greater, placing tenths under tenths, hundredths under hundredths, etc., annexing ciphers, if necessary, to make the decimal places equal in each number. Beginning on the right proceed as in the subtraction of whole numbers, and point off the result to correspond to the numbers subtracted.

Example—Subtract (a) 0.10475 from 0.293; and (b) 0.9706 from 1.04635.

Solution—

	(a)	(b)
	0.29300	1.04635
	0.10475	0.97060
	0.18825	0.07575

MULTIPLICATION OF DECIMALS

The process is identical with the multiplication of whole numbers, except for the matter of pointing off the product.

Rule—Ignoring, for the time, the decimal points, proceed as in the multiplication of whole numbers, disregarding any ciphers standing on the left. Finally, point off from the right of the product, as many decimal places as there are in both numbers, prefixing ciphers if required to complete the number.

The Coal Age Pocket Book

The following examples will illustrate the rule:

20.7654	.001764
3.42	.0256
415308	10584
830616	8820
622962	3528
71.017668	.0000451584

In the first of the above examples, there were four decimal places in the multiplicand and two in the multiplier, making it necessary to point off six places in the product. In the second example, there were ten places to be pointed off in the product, which contained but six figures, and it was therefore necessary to prefix four ciphers before placing the decimal point.

Multiplying by 10, 100, 1000, etc.—To multiply a whole number by 10, 100, 1000, etc., it is only necessary to annex as many ciphers to the number as there are ciphers in the multiplier. Thus,

$$1728 \times 100 = 172{,}800$$

To multiply a decimal number by 10, 100, 1000, etc., it is only necessary to move the decimal point as many places to the right as there are ciphers in the multiplier, annexing ciphers if necessary to complete the number. Thus,

$$0.4381 \times 1{,}000 = 438.1$$
$$0.004 \times 10{,}000 = 40$$
$$1.45 \times 100{,}000 = 145{,}000$$

DIVISION OF DECIMALS

The operation of division is the reverse of that of multiplication. The process is identical with the division of whole numbers, except for the pointing off of the quotient.

Rule—Ignoring, for the time, the decimal points, proceed as in the division of whole numbers, disregarding, as before, any ciphers standing on the left. Finally point off from the right of the quotient as many decimal places as those in the dividend exceed those in the divisor.

Example—Divide (a) 11.284 by 2.6; and (b) 35.1 by 0.156.

Solution—

(a) 2.6)11.284(4.34
104
88
78
104
104

(b) .156)35.100(225
312
390
312
780
780

When the divisor, as frequently occurs, contains more decimal places than the dividend it is necessary to annex ciphers to the dividend until it contains an equal number of decimal places and the quotient, to that point, will be a whole number, as shown on the right, above.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—What thickness of barrier pillar does the law of Pennsylvania require along a boundary line?

Ans.—The Pennsylvania anthracite-mine law compels the owners of adjoining coal properties to leave or cause to be left a pillar of coal, in each seam that is worked by them, along the line of an adjoining property. The pillar of coal so left shall be of such width that, taken in connection with the pillar to be left by the adjoining property, it will be a sufficient barrier for the safety of the men working in either mine, in case the other mine should be abandoned and allowed to fill with water. The law states that such width of pillar is to be determined by the engineers of the adjoining property owners, together with the inspector of the district.

Although the law does not specify the actual thickness or width of barrier pillar, the rule in common use in the anthracite region has been to add 5 ft. to 1 per cent. of the depth of the pillar below the natural drainage level, and multiply this sum by the thickness of the seam, in feet; the product is the required width of barrier pillar, in feet.

The bituminous-mine law of Pennsylvania (Art. 2, Sec. 2) requires that when the workings of a mine approach within 300 ft. of the boundary line between that and an adjoining mine, the operator or superintendent of the mine first mentioned shall make application to the inspector of the district for information as to the proximity of the workings of such adjoining mine or mines.

If said adjoining workings are within 300 ft. of the boundary line at their nearest approach thereto, the inspector must notify said operator or superintendent, whose duty and right it is to enter and survey the said adjoining workings, on the written authority of the inspector. Such survey must be placed on the mine map kept at the office for the use of the mine officials and the inspector, and for the inspection of any person working in said mine, as desired, but in the presence of the superintendent or mine foreman.

Ques.—How many cubic feet are there in a piece of coal $23 \times 19 \times 8$ ft.; and what is the weight of the coal if its specific gravity is 1.6?

Ans.—The cubical contents of this block of coal is $23 \times 19 \times 8 = 3496$ cu.ft. To find the weight of the coal, multiply the cubic contents by the weight of 1 cu.ft. of water (62.5 lb.) and that product by the specific gravity of the coal; thus $(3496 \times 62.5 \times 1.6) \div 2000 = 174.8$ tons.

Ques.—(a) Find the pressure per square inch on the tamping of a 3-in. drill hole tamped with 3 ft. of clay, when 6 lb. of gunpowder have been ignited in the hole. (b) Give the velocity of a wind from such a pressure when the energy of the charge has all been spent on the atmosphere, in a 6 by 8-ft. entry, neglecting resistance, the atmospheric pressure being 14.7 lb. per sq.in.

Ans.—We assume that the question refers to common black blasting powder instead of "gunpowder." The volume of the gaseous products of the explosion of black blasting powder, measured at a temperature of 32 deg. F. and a pressure of one atmosphere, equals 360 times the original volume of the powder. Since the solid products of the explosion form one-third of the original volume of the powder, the 360 volumes of gaseous products are confined, at the moment of explosion, in two-thirds of the space occupied by the original powder. But since the pressure of gases varies inversely as their volume, for a constant temperature, the pressure at the moment of explosion, due to the compression of the gases produced, is $360 \times {}^3/_2 \times 14.7 = 7938$ lb. per sq.in., measured at a temperature of 32 deg. F.

The pressure at the moment of explosion, however, is still further increased by the rise of temperature from 32 deg. F. to that caused by the combustion of the powder in the drill hole. If this combustion were instantaneous, the temperature produced would be somewhat above 6000 deg. F. The explosion of black powder, however, is never instantaneous; and, in the case of blasting powder, the grains of powder burn slowly, the ignition spreading from one grain to another and the heat being developed gradually. This action produces a gradually increasing temperature and pressure in the drill hole, until rupture takes place in the coal and the gases are permitted to escape into the atmosphere. Owing to these conditions, the temperature of the explosion of black blasting powder in a drill hole, rarely exceeds 2000 deg. Fahrenheit.

The pressure due to this temperature would then be per sq.in.

$$7938 \times \frac{460 + 2000}{460 + 32} = \frac{7938 \times 2460}{492} = \textit{say } 40{,}000 \textit{ lb.}$$

(b) It is absurd to ask for the velocity of wind produced in a 6 by 8-ft. entry by the explosion of a given weight of blasting powder in a drill hole, as there is no method by which this can be calculated; and, indeed, the results would vary greatly in fact and give no practical information.

It is possible, however, to estimate the theoretical velocity of the gases projected from a drill hole, under the pressure created by the explosion of the powder, the degree of accuracy depending on the correctness of the calculation of the pressure produced, which is then only approximately true at the initial point and moment of explosion.

A calculation based on the average composition of blasting powder, and the relative volumes of gases produced, shows that these gases may have a density 18 times that of hydrogen gas, at normal temperature and pressure. The theoretical velocity, due to a pressure of 40,000 lb. per sq.in., for this density of the gases, as calculated from the formula $v = \sqrt{2\,g\,h}$, is practically 60,000 ft. per sec., an almost inconceivable velocity.

Inquiries of General Interest

Path of Crankpin of an Engine Driver

I am sending a question to COAL AGE, in hopes that a correct answer can be given. There has been a considerable difference of opinion expressed, here, in reference to the answers obtained to this question. The person giving the problem states that the correct answer is 16.781+ ft. Although this question is not strictly in the line of other questions answered in COAL AGE, we would like to have the correct solution published, and believe this would be of interest to all, at least as a mental exercise. The question is as follows:

What distance does the crankpin on a locomotive wheel travel while the wheel makes one revolution running on the rail; assuming the wheel to be 5 ft. in diameter and the crankpin to be midway between the center and the tread of the wheel?

J. J. STONE.

Johnstown, Penn.

We are glad to give the solution to this question or any other that does not involve the use of higher mathematics. We believe every student of mining is benefited by the study of simple mathematics.

The path described by the crankpin of an engine driver is a curve known as a "prolate cycloid." It is the path described by any point within a circle when the circle rolls upon its circumference, on a plane surface, the plane of the circle or plane of revolution being at right angles to the surface on which it rolls.

Any point in the circumference of the circle will describe a path known as a "cycloid." The length of this path or the length of the cycloid, for a single revolution, is always four times the diameter of the circle. But, it is clear that when the circle makes one revolution, the center of the circle moves a distance equal to its circumference. The path described by the center of the circle is, therefore, a straight line parallel to the plane on which the circle rolls, and its length (πD) is equal to the circumference of the circle.

It is equally clear that the path described by any point lying between the circumference and the center of the circle must have a length less than $4\,D$ and greater than $\pi\,D$, or $3.1416\,D$. To determine the length of this path, or the length of a "prolate cycloid," by exact mathematical calculation, is a complicated process. It is, however, expressed very approximately by the following formula:

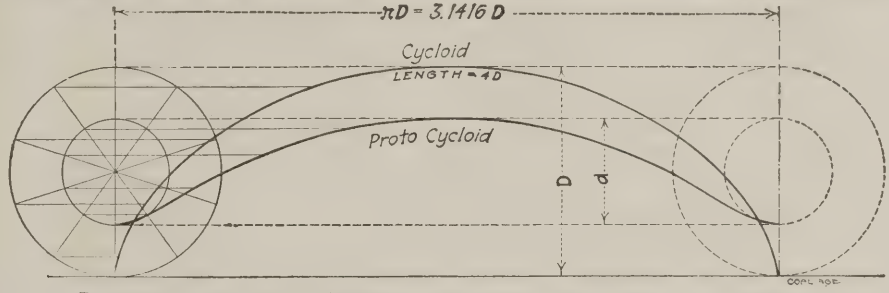
$$L = \pi D + 0.86\left(\frac{d}{D}\right)^2 D$$

in which L equals the length of the path; D, the diameter of the circle; d, the diameter of the crank circle, all in feet or all in inches. In the present case, $D = 5$ ft.; $d = 2.5$ ft.; and the length of the prolate cycloid described by the crank pin, in one revolution of this wheel, is approximately

$$L = 3.1416 \times 5 + 0.86\left(\frac{2.5}{5}\right)^2 5$$

$$= 5\,(3.1416 + 0.86 \times \tfrac{1}{4}) = 16.783\ ft.$$

The accompanying figure shows the cycloid described by a point in the circumference of a wheel whose diameter is D, and the prolate cycloid described by the crankpin, the diameter of the crankpin circle being d, which in the present case is one-half of the diameter of the wheel. The dotted circle shows the position of the wheel after making one complete revolution.



ILLUSTRATING THE CYCLOID AND PROLATE CYCLOID CURVES

Longwall, Packwall System

I beg to ask the readers and correspondents who have already given some valuable information concerning longwall-retreating methods, the following question:

Can the common packwall system of longwall mining with two or three sets of posts at the face, be made to successfully replace the room-and-pillar system, in a mine that has advanced about two miles. The coal is semi-bituminous and lies in a basin or syncline that is about 7 miles wide from north to south. The seam varies from 4 ft. to 4 ft. 6 in. in thickness, and the depth of cover from 300 ft. to 700 ft. at the middle of the basin. Above the coal is a blue rock from 4 ft. to 8 ft. thick, overlaid with a fine-grained sandrock and sandy shale that do not break over a long distance. The immediate bottom of the seam is a soft slate 9 in. thick, beneath which is a thin stratum of coal of the same thickness. Underneath that is a soft fireclay, which has a tendency to heave.

CONSTANT READER.

Windber, Penn.

[We shall be glad to have those interested and experienced in longwall work discuss this question of how a longwall face can be successfully started at the face of room-and-pillar workings that are fully developed. State the chief points to be considered before any attempt should be made to change the plan of working from the room-and-pillar system already developed, to the longwall method of the packwall system of mining. State what advantages may be expected to be gained by making this change.—ED.]

Coal and Coke News

Washington, D. C.

The Interstate Commerce Commission has handed down a decision in the case of Campbell's Creek Coal Co. vs. the Ann Arbor R.R. Co. in which it further defines the portion of the Interstate Commerce act relating to the furnishing of cars and switching connections, and holds that the portions of the act relating to these two topics must be considered together. It also contends that the application of main line rates to points on the Kanawha & West Virginia and the coal and coke railroads, while they were denied to the complainant company, was undue and unreasonable prejudice which should be corrected either by canceling the main line rates to points on the lines mentioned or by establishing the main line rates as jointly with the Campbell's Creek region.

The substance of the complaint which gave rise to this case is found in the fact that the Campbell's Creek R.R. is a common carrier engaged in interstate commerce. The railroad is entirely separate from the Campbell's Creek Coal Co. Neither company owns the stocks or bonds of the other, and they are managed and operated separately. The road is distinct from the plant facilities, namely, the mine cars and locomotives and the tracks ramifying through the mines and leading to the tipples of the coal company, all of which are owned by the Campbell's Creek Coal Co. Complainants have sought in vain from defendants, the Kanawha & Michigan and its connections, the establishment of through routes and joint rates for shipments of bituminous coal from points on the line of the Campbell's Creek R.R. to the various destinations mentioned in Kanawha & Michigan tariff I. C. C. 31 and supplement 15 thereto. The joint rates sought are those applying from points on the main line and branches of the Kanawha & Michigan Ry. and points on the line of the Kanawha & West Virginia R.R. Because of the refusal of these rates shippers on the Campbell's Creek R.R. are compelled to pay in addition to the main-line or Kanawha district rates, which apply from Dana, the local rate of the Campbells' Creek R.R. to Dana, which is 15 cents per ton.

A decision has also been handed down in the case of the Hughes Creek Coal Co. vs. the Kanawha & Michigan Ry. Co., and in the Kelly's Creek Colliery Co. vs. the same. In this decision it is held that the complainant's request for through routes and joint rates between stations on the Kanawha & Michigan Ry. and its branches and the points specified in the complaint in eastern and southeastern territory on the lines of the Chesapeake & Ohio and its connection should be granted, the rates charged to be not in excess of those now applying to these destinations for shipments from the mines on the Chesapeake & Ohio. The charge that since the Chesapeake & Ohio and the Kanawha & Michigan are practically one road it is unjustly discriminatory for them to deny the Kanawha & Michigan lines access to markets which have been made available for Chesapeake & Ohio mines is held not to have been established as the identity between the two roads is not regarded as having been proven. At present the coal from the mines on the Kanawha & Michigan has competitive rates—that is, rates which permit it to meet the competition from other fields—only to certain territory in the northwest where the competition is very strong. In Cincinnati it has a competitive rate only by one connection of the Kanawha & Michigan, the Baltimore & Ohio Southwestern, with a resulting limited number of deliveries. The coal from the Chesapeake & Ohio mines on the other hand has not only an extensive market in the northwest, including all deliveries in Cincinnati, but also competitive rates to the Atlantic Coast and to markets in the East and Southeast. When rates from the mines are spoken of what is meant is rates from the stations on the main line or branches of the defendant railroads from which the mines ship their coal.

The Committee on Lands of the Senate has reported the administration bill for the leasing of coal mines in Alaska in a different form from that in which it was referred to the Committee on Mines before that committee was discharged from consideration. In the new form the bill provides for the designation of certain reserve areas in Alaska which are to be mined under the direction of the President whenever necessary while in all other areas it is provided that the lands "shall be divided by the Secretary of the Interior into leasing blocks or tracts of forty acres each, or multiples thereof, and in such form as in the opinion of the Secretary will permit the most economical mining of the coal in such blocks, but in no case exceeding two thousand five hundred and sixty acres in any one leasing block or tract; and thereafter, subject to any prior valid existing rights, which said rights may be perfected under the laws in force at the time the same were initiated, the Secretary shall offer such blocks or tracts and the coal, lignite, and associated minerals therein for leasing, and shall award leases thereof through advertisement, competitive bidding, or such other methods as he may by general regulations adopt, to any person above the age of twenty-one years who is a citizen of the United States, or to any association of such persons, or to any corporation organized under the laws of the United States or of any State or Territory thereof."

HARRISBURG, PENN.

"The legislature might just as well place a state tax on hard-shell crabs and exempt soft-shell crabs as to tax anthracite coal and not bituminous," said Major Everett Warren, of Scranton, in the Dauphin County court, sitting in this city on Mar. 25, in the suit to test the constitutionality of the anthracite coal tax. "The taxes in this state must be uniform, and the legislature did not keep to the classification which it should have followed. By the same simile it might as well have taxed red-headed men only because it can tax men."

Attorneys for the state and for several cities and boroughs declared that the People's Coal Co., of Scranton has shown no grounds for relief in equity in bringing the suit to test the constitutionality of the tax. The Scranton company is understood to represent a number of other anthracite producers and the suit, which was filed in January, will probably go clear up to the highest court of the state, and, possibly, to the U. S. Supreme Court, for adjudication.

President Judge Kunkel, who has sat in a number of famous suits to test constitutionality, was on the bench and the People's Coal Co., was represented by Major Everett Warren, of Scranton, Ex-Judge F. W. Wheaton, of Wilkes-Barre, and Ralph Reimer, general counsel of the People's Coal Co. Deputy Attorney General Hargest took charge of the case for the state. Seated at the state's table were a number of attorneys, representing various cities and boroughs.

The plaintiffs offered an amendment to the bill in equity at the opening of the court, charging that in addition to the reasons advanced some time ago for declaring the law unconstitutional the law was local legislation and that, being such, it was illegal because it had not been advertised.

Speaking for the state, General Hargest declared that the company had failed to show in its bill any grounds for relief in equity. The law provides a way for a test without invoking the extraordinary powers of a court of equity, because there are laws which allow appeals from tax settlements by the state which are used every day and which have been employed to secure adjustment of cases involving millions of dollars. General Hargest attacked the averments that the law offended against the constitution of the United States and of the state because of loss as being not well taken. Taking up the contention that the law was a "makeshift" and that a portion of the income might be used for payment for surface damages, he said that such a statement was "scandalous" and that the plaintiff had no right to attack the state on such an assumption. As to the great and irreparable injury which it was averred the company would suffer if compelled to file reports and comply with the law by Feb. 1, he said, that the statement was absurd because the companies had complied with the law and had filed reports. He remarked that the plaintiff does not come into court with such clean hands as it should have in equity.

The deputy attorney general went through the bill and attacked each averment. On the amendments he said that if the tonnage tax was local legislation, then all anthracite laws were also local.

In answering the demurrer of the state to the suit Major Warren made the remark about the hard- and soft-shell crabs

to support his contention that the classification clause had been ignored. He argued that the Dauphin County Court can take jurisdiction in the case and asked what earthly difference it made whether the case was settled on the legal or equity side of the court. Equity, he asserted is the place to settle the integrity of the law and cited proceedings in valuation of coal lands in Lackawanna and Luzerne counties in support of his contention.

Taking up the answer of the state that there was impertinent matter in the bill, he denied it and said that if the Supreme Court could go into the history of the school code the bill could go into the history of the act, and if the state's highest court called the code "a subterfuge" in a dissenting opinion the present act might be styled a "makeshift" in a bill. Indications were given that the case may go to the United States courts by reference made by the counsel for the coal company that all but 8 per cent. of the anthracite is sold outside of the state.

The law, he said, added a tax to coal and did not relieve the land from local taxation; it has a defective title, and the penalty for failing to make a report he styled "a club." Throughout the argument the Major resented the attitude of the state and once said that the state was to blame for the delay in getting a hearing because of length of time taken to file its demurrer.

The main argument against the constitutionality of the act was that it violated the classification clause, the Major contending that it draws a hard and fast line between anthracite and bituminous. Taxation, he said, must be uniform and the coal produced in eight counties is to be taxed and that produced in twenty-eight others is exempted.

No decision is expected for a few days, probably weeks.

PENNSYLVANIA

Anthracite

Pottsville—The famous "barrier pillar case" one of the most important law suits ever appealed from the Schuylkill County court, was, on Mar. 23, decided in favor of Mine Inspector John Curran of the 18th district, who brought the suit to maintain the barrier pillar between the collieries of the Mill Creek Coal Co. and the Dodson Coal Co., at Morea. Inspector Curran feared that if the barrier was tampered with, subterranean bodies of water might break through it and drown hundreds of miners. He therefore got an injunction against the Mill Creek Coal Co. to prevent interference with the pillar. As this would prevent the mining of vast bodies of coal, the company appealed. The size of the barrier was finally fixed at 300 ft., the higher court sustaining this decision.

Wilkes-Barre—Charging that the Wilkes-Barre Anthracite Coal Co., is unlawfully removing coal from beneath private property on North Franklin and Union Sts., property owners in the Fourth Ward have filed eight separate suits against the company to restrain further mining under the tracts, and compensate the owners for the coal removed. Judge O'Boyle granted preliminary injunctions in all the cases.

Avoca—Two hundred men and boys, employed in the D & H. Co.'s Langcliffs colliery refused to go to work on Mar. 26 on account of not having received their proper pay, so they claim. Superintendent Lovering had a conference with the employees and made an effort to amicably adjust the matter, but without success. The men are still out, but hope for a settlement in a day or two.

Mt. Carmel—More than 1500 miners formed in line on the night of Mar. 28, and marched from the Methodist Episcopal Church to the tabernacle where Dr. H. W. Stough, the evangilist, is conducting services. Headed by State Mine Inspector Ben. I. Evans, the miners paraded over the streets carrying banners and American flags. It was "Miners Night" at the tabernacle. Evangelist Stough spoke at length upon the great dangers encountered by those who work underground for a living. Nearly 100 miners "hit the trail."

Mahanoy City—Twenty feet of a Maysville schoolyard were swallowed in a mine breach on Mar. 23. The depth of the hole is not known. The five schools in the building did not hold sessions the next day. Old workings of the Gilberton Colliery honey comb the section. If the surface shows further evidence of settling the building will be abandoned.

Kingston—John W. Wier, a brakeman employed by the Kingston Coal Co. who was in the cab of a small locomotive, that was completely engulfed in a mine cave on Mar. 23, escaped by jumping. The cab was demolished and the engine toppled over on one side. The locomotive was righted on a temporary track and it required the combined power of four other small engines to haul out of the cave.

Shenandoah—The body of George Isgate, 55 years old, who was buried alive in the caving in of old workings of the Thomas Colliery on Mar. 20, was recovered on Mar. 25, wedged in between coal, timber and slush 500 ft. below the surface. The second victim, John Decrish, an 18-year old youth, was found only five ft. away. Both bodies were badly mangled. The wife of Isgate, the mother of seven children, is in a critical condition and may die.

Treverton—The Pennsylvania Colliery, operated by the Susquehanna Coal Co., on Mar. 24, was the scene of a thrilling accident, when three miners were probably fatally injured, all having their skulls crushed by runaway cars. The loaded cars had been sent up a slope. The three men were awaiting the arrival of the empty cars at the bottom of the slope. As the cars reached the top, the side hooks, to which the rope and chain were attached pulled out, and both cars ran down the 900-ft. slope at terriffic speed. They remained on the tracks to the bottom, where they were demolished. The men were caught in the débris.

Bituminous

Monongahela—The Black Diamond mine of the Pittsburgh Coal Co., which was closed on Mar. 6, due to the burning of the river and railroad tipples, resumed operation last week. The tipple in use is a temporaory structure; the work on the permanent river and railroad tipples will be started at once, and pushed to completion.

Connellsville—Coke traffic was seriously interrupted during the past week by a strike of 6000 yard employees of the Monongahela division of the Pennsylvania R.R., who walked out early on the morning of Mar. 21, because the company had announced its intention of dropping one man from each of the yard crews. For several days it was impossible to move freight, but the company expects to have conditions at normal within a short time. The railroad brotherhoods have repudiated the action of the men in quitting work, and so far the strikers have been unable to enlist the support of the employees of other divisions. Brotherhood officials have sent word to men on other divisions who have been furloughed because of slack business to apply for the strikers' places.

Scottdale — The Valley works of the H. C. Frick Coke Co. was abandoned recently and wiped off the list as an operation. The coal has been exhausted and there is little possibility of the coking situation causing a condition that will entail firing the ovens at some future time to burn coal shipped from elsewhere. All the horses and mules have been shipped to other mines in the region. Many of them had never worked in any other mines. Mine Foreman Edward Quinn goes to Broad Ford it is said.

NEW YORK

Buffalo—The annual meeting of the Allegheny Operators' Association was held here on Mar. 26, at which President C. P. McCafferty and Secretary-Treasurer George E. Henry, of East Brady, were reëlected. A committee, consisting of E. C. Roberts, W. D. Ward and J. R. Brady, of Buffalo, and A. J. Watson and L. B. Lewis, of Pennsylvania, was appointed to meet the miners at East Brady after the close of the Central Pennsylvania meeting. The meeting was first set down for the 31st, but it was afterward learned that the other meeting would not adjourn in time.

KENTUCKY

Lexington—It has been announced that the annual meeting of the Kentucky Mining Institute and the state first-aid contest, which has become a regular feature of that meeting, will be held here May 8 and 9. The committee in charge of the first-aid work hopes to secure from the Bureau of Mines one of their explosive galleries for the purpose of demonstrating explosions of various sorts, both of coal dust and of blasting powders. An interesting program is being arranged, which will be made public in a few weeks.

Jenkins—General Manager Everett Drennen, of the Consolidated Coal Co., returned this week from Washington, where he was successful in obtaining the introduction by Representative Langley, of Kentucky, of a bill appropriating $50,000 for a Federal mine rescue station at Jenkins. Dr. Joseph A. Holmes, director of the Bureau of Mines, will give his support to the measure, the volume of the coal operations around Jenkins making the propriety of establishing such a station obvious.

OHIO

Gallapolis—Seven loaded coal barges of the Pittsburgh Coal Co., consigned for Louisville, were sunk near Gallapolis, Ohio, last week, causing a total loss, as no insurance was carried.

Columbus—J. M. Roan, Ohio safety superintendent, has given out a statement showing the benefits of his safety campaign during the past three months. For the first quarter of 1914 there were 25 fatal accidents in Ohio, as

compared with 32 for the corresponding quarter in 1913. The number of other accidents also showed a marked decrease. Many of the fatal accidents were due to the dangerous "draw slate" found in the eastern Ohio district. There was but one fatal accident in the Hocking Valley proper, one in Jackson district, one in Massillon district and one in Pomeroy Bend.

The wage situation in Ohio is in the most muddled condition in years. Neither the operators nor the miners are sure of their positions, and almost everyone anticipated the suspension of operations on Apr. 1. In fact, most of the operators had made active preparations for closing down for from 30 to 90 days time. Coal for fuel purposes had been stored and the mines generally cleaned up.

The mine-run law will not become effective until May 15 or 20, when the time limit for filing a referendum petition is over. Thus there is 45 days yet to consider the matter and to take any action desired to test the constitutionality of the new law.

Summing up the situation, Ohio operators to a man stand for a wage agreement which will not increase the cost of mining coal. They do not believe that the announced rate of $71^{46}/_{100}$c. per ton on the mine-run basis will be equitable as this is expected to increase the cost of mining from 3½ to 5c. a ton in Ohio fields.

Everyone is "up in the air" so to speak and there is much confuson over the issues at stake.

INDIANA

Petersburg—E. E. Kelsey has been appointed receiver for the J. M. C. Coal Co., which operates the mines at Massey, seven miles south of this city.

Jeffersonville—The larger towboats on the Ohio River have left their tows of empty barges, which they were bringing from New Orleans, and are being rushed to this point where 150 barges loaded with coal are waiting to be taken south, having been brought here by the smaller boats of the upper Ohio. On the recent rise of water 200,000 tons have been brought from Pittsburgh where the river has now fallen too low for further shipment.

Terre Haute—The United Mine Workers of District 11, which includes all the Indiana fields, except the Block mines, met here Thursday, Apr. 2, to consider the wage scale to be submitted later to the Operators' State Association in a joint conference. The Indiana miners will continue work for the present.

ILLINOIS

Springfield—Employers of labor and mine owners have had all doubts removed as to the validity of the Illinois compensation act by a recent decision of the Supreme Court, which sustains the act, both as passed in 1911 and 1912. Up to this time many operators refused to enter their acceptance of the act, doubting its validity.

Springfield—The operators in the 3rd District have elected an executive committee and have appointed Daniel Clark Commissioner for their own organization, which in the past has been a part of the Illinois Coal Operators' Association. It is understood that they have passed a vote, expressing a desire to join the 5th and 9th District Operators' Association, and will have a full representation at the joint scale meeting between the operators and miners at Peoria this week.

Owing to the differences existing in the coal operators' circulars in the State of Illinois, it is likely that the 4th and 8th Districts will join with the 3rd District in an attempt to organize a Central Illinois Operators' Association, composing the above districts and also the 5th and 9th Districts.

MISSOURI

St. Louis—The operators of the 5th and 9th Districts, at their meeting in St. Louis on Saturday afternoon, Mar. 28, took no definite action relative to resuming operations pending the adjustment of the scale in Peoria the latter part of the week. It is understood, however, that practically all of the operators will offer the miners the opportunity of going to work on Apr. 2, and it will be up to the miners then either to go to work under the agreement which expires in Mar. 31 or remain out until a new agreement is signed up, which will be practically along the same lines as the agreement of the past two years. It is also understood that the matter of the 3rd District joining the 5th and 9th District Operators Association was taken under advisement.

KANSAS

Lansing—Warden J. D. Botkin, of the state penitentiary here, will recommend at the April session of the prison board of corrections that the prison mine be sold to a private corporation and that the 300 convicts now employed in the mine be given other work. Of the 817 prisoners in the penitentiary, fully one-third are suffering from tuberculosis, according to the prison physician. Mr. Botkin takes the attitude that the spread of the disease was caused by unfavorable conditions in the mine, not because mining itself is unhealthful, but because of the caliber of the miners in this case.

Pittsburg—A strike, the basis for which caused wide discussion in mining circles of Kansas, tied up mines Nos. 19 and 20 of the J. R. Crowe Coal Co., in this field, for twenty-four hours during the past week, before the trouble was adjusted and the miners returned to work. The walkout took place after "safety first" and "danger" signs had been posted at conspicuous places in the mines, at the instance of General Superintendent R. A. Gray, of the Crowe Coal Co., As soon as the placards were posted, union delegates demanded that they be torn down. Mr. Gray refused and the miners walked out. An investigation was held and brought out the fact that the miners feared that the posting of the signs would in some way interfere with compensation in case of injury. It was explained, however, that the mere placing of placards in and around mines would in no way effect the provisions or workings of the Kansas workmen's compensation law. When reassured on this point, the miners returned to work. The Crowe Coal Co. then carried out its plans to placard all of its mines with the signs, while other mining companies which had watched the situation with interest also started work along the same lines.

LOUISIANA

Buxton—A dust explosion in Mine No. 12, near here, resulted in the death of two men, and much damage to the property.

WASHINGTON

Seattle—Surplus coal lands on the Colville Indian Reservation in the State of Washington are to be classified and appraised by a commission, the appointment of which has recently been announced by Secretary Lane. The commission is composed of Bart Moore, ex-mayor of Waco, Tex., chairman; Theodore Bowdeau, of Washington State, and J. R. Sovereign, of Keller, Wash. This work was authorized by Congress.

FOREIGN NEWS

Toronto, Can.—The annual report of the Mines Branch of the Department of Public Works of Alberta for 1913, shows that the 289 coal mines in operation in that province produced 4,306,346 tons of coal, of which 2,374,401 tons were bituminous, 1,763,225 tons lignite, and 168,720 tons anthracite. The increase over the production of 1912 was 859,997 tons. About one million tons were exported to other provinces and the United States. Coke production amounted to 65,167 tons, for which 104,012 tons of coal were used. The increase of output during the past eight years has been approximately 500 per cent.

PERSONALS

Joseph Angelo, international organizer for the United Mine Workers of America, has been sentenced to four years' imprisonment for his part in the Nanaimo coal strike riots of last August.

Dr. S. R. Cates, owner of coal lands near Lubbock, Tex., will lease the land in the near future to operators. The find has attracted much attention because of the fact that two railroads run into Lubbock.

Alfred Burger, formerly superintendent for the George M. Jones Co., at Corning, Ohio, has been transferred to Bellaire, Ohio, as superintendent of the Pultney & Webb mines, also operated by the George M. Jones Co.

H. L. Forstbauer, secretary of the Lorain Coal & Dock Co., of Columbus, Ohio, resigned his position, effective Apr. 1. No successor has been appointed by the directors of the company. Mr. Forstbauer will move to Cleveland.

J. L. McNatt, a coal operator of Aurora, Mo., has been appointed commissioner of the Missouri mining exhibit at San Francisco in 1915. A $42,000 building will house Missouri exhibits at the exposition. Moving pictures of Missouri's industries, including mining, will be made and shown at the exposition.

Secretary B. F. Nigh, of the Michigan-Ohio-Indiana Coal Association, who has headquarters in Columbus, has filed a complaint, comprising 1500 words, with the Interstate Commerce Commission, protesting against charging for spotting of cars, as proposed by railroads. It is urged that the charge for spotting will place an unnecessary hardship upon coal shippers and dealers. The protest is made at the suggestion of the commission which invited an expression of opinion.

Rufeno Rodriguez, a Mexican boy who saved the lives of 165 coal miners at Lehigh, Okla., on Feb. 22, 1912, when the mine caught fire, will receive a Carnegie medal for his heroism. The boy, who was employed at the mine, ran to every section in which men were employed, warning them of the impending danger. All escaped without injury. While Rodriguez was one of several who learned of the fire, he was the only one who exhibited the courage to spread the news. Following the fire, he was placed in the School of Mines of Oklahoma at Wilburton by the United Mine Workers of America, District No. 21, and has received an education there. Decision to give him a medal was made following a report by a district inspector.

OBITUARY

Thomas M. Mitchell, aged 56, committed suicide recently, at his home in Corinth Township, near Marion, Ill. He became wealthy through sales of coal lands in Williamson County to several eastern capitalists.

Philip Kolb, vice-president of the Kolb Coal Co., died at the Deaconess Hospital in St. Louis on Mar. 27, following an operation. He was a resident of Mascoutah, Ill., and had been engaged in the mining business for twenty years, having active charge of the Kolb Coal Co.'s several properties. He is survived by a widow, a son, and a daughter.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.

of Coal Age, published weekly at New York, N. Y., required by the Act of August 24, 1912.
Editor, Floyd W. Parsons, New York, N. Y.
Business Manager, William Le Baron, New York, N. Y.
Publisher, Hill Publishing Company, New York, N. Y.
Owner, Hill Publishing Co., 505 Pearl St., New York, N. Y.
Owners of 1% or more of Stock Issued.
John A. Hill, 505 Pearl St., New York, N. Y.
Fred R. Low, 505 Pearl St., New York, N. Y.
John McGhie, 505 Pearl St., New York, N. Y.
Fred S. Weatherby, 1600 Beacon St., Boston, Mass.
Frederick A. Halsey, 356 W. 120th St., New York, N. Y.
G. Eugene Sly, 50 Union Sq., New York, N. Y.
Frederick W. Gross, 215 E. 11th St., Erie, Pa.
Alfred E. Kornfeld, 114 E. 71st St., New York, N. Y.
Emma B. Hill, 80 Munn Ave., E. Orange, N. J.

The balance of the stock issued (less than 1% each) is owned by 69 employees, 3 ex-employees, and 14 others who are wives, daughters or relatives of employees.

Known bondholders, mortgagees, and other security holders holding 1 per cent. or more of total amount of bonds, mortgages or other securities. Mortgage on building held by Dime Savings Bank, Brooklyn, N. Y.

C. W. Dibble, Vice-President,
HILL PUBLISHING COMPANY.

Sworn to and subscribed before me this 24th day of March, 1914.

RICHARD L. MURPHY,
Notary Public.
(My commission expires March 30, 1915)

CONSTRUCTION NEWS

Youngstown, Ohio—Youngstown Sheet & Tube Co. will soon begin construction on a $300,000 coke plant, on the site of the old American Bridge Co.'s plant.

Baltimore, Md.—The Baltimore & Ohio R.R. has perfected plans for the installation of telescopic chutes at its new $1,000,000 coal pier at Curtis Bay. The chutes will greatly reduce the breakage of coal, it is claimed.

Central City, Ky.—The numerous coal operators in this section are interested in a project to build a large central power plant on Green river, near here, and to construct an electric interurban line as well, from Central City to Greenville and Drakesboro. Dr. W. H. Netherland, of Louisville, is largely interested, and the General Electric Co., of New York, has sent representatives to look into the matter.

Chattanooga, Tenn.—It is understood that the Durham Coal & Iron Co. has authorized the immediate construction here of byproduct coke ovens, which will be built in blocks of 30 and 60, with a view to adding blocks as required. The present plant will consume about 800 tons of slack coal a day, producing about 5,000,000 cu.ft. of gas. The first block of ovens will cost about $1,000,000. C. E. James, promotor of the Hales Bar power dam, is interested largely.

Whitesburg, Ky.—It is reported that the Illinois Central Railroad Co. has purchased the right-of-way of the new Cincinnati, Licking Valley & Virginia, for which a survey was made last year through Morgan, Magoffin, Johnson, Floyd and Knott counties, and terminating in Letcher county, and will construct the line, in order to give it a road into the coal fields of Eastern Kentucky and also a way into Cincinnati. The road will be about 250 miles in length, two-thirds of which will be through rich coal and timber lands. The Illinois Central is not now a factor in the Eastern Kentucky field.

NEW INCORPORATIONS

Toledo, Ohio—The Home Fuel & Supply Co. has been incorporated with a capital of $10,000 to deal in coal, among other things. The incorporators are D. B. Frisbie, R. W. Taylor, W. J. Kelly, J. D. Rhoades and A. A. Fair.

Barberton, Ohio—Papers have been filed with the secretary of state, reducing the capital stock of the Columbia Fuel Co. from $100,000 to $25,000.

Cedar Grove, W. Va.—Hackett Coal & Coke Co., of this place, has been incorporated for the purpose of mining coal, the capital stock of $75,000. The incorporators are Samuel Hackett, Floyd Hackett, Gertrude Hackett and H. C. Tompkins, of Cedar Grove, W. Va., and J. Edward Settle, of Fayetteville, W. Va.

Harrisburg, Penn.—The first railroad to be chartered since the public service company law went into effect on Jan. 1, requiring certificate of convenience from the Public Service Commission, is the Easton & Western R.R. to construct and operate a railroad four and a half miles long from Easton to Hope's Lock. The capital is $50,000 and the incorporators: George F. Baer, Reading; R. W. DeForest, W. G. Besler and T. B. Koons, New York; E. J. Fox, W. E. Chipman and Horace Leher, Easton. Mr. Baer is president.

Palmer, W. Va.—A charter has been issued to the Old Lick Run Coal & Coke Co. The authorized capitalization is $500,000, and the incorporators are J. A. Ballinger, Mullica Hill, N. J.; L. O. Krupp, Plymouth, Penn.; Burton L. Hill, Wilkes-Barre, Penn.; William T. Turner and M. C. Goddard, Philadelphia, Penn.

INDUSTRIAL NEWS

Paducah, Ky.—The new steam coal tariff of the Illinois Central R.R. Co., affecting the Western Kentucky district and points getting their coal from there, has been issued, effective Apr. 1, increasing the rate on coal to Paducah 5c., to Louisville 5c. and to Memphis 10 cents.

Columbus, Ohio—Application has been made by the Norfolk & Western R.R. for permission to issue $10,000,000 in equipment trust certificates for the purpose of buying additional coal cars for the line. The application was made to the Ohio Public Utilities Commission.

Smithfield, Penn.—A new Coke company is being formed to take over 140 acres of coal in Springfield township, and $150,000 is being subscribed by Smithfield and Uniontown capitalists, headed by H. R. Sackett, of this place. It is expected that the deal for the purchase of the coal will go through in a short time. If the company is organized, the coal will be coked at the Sackett works at Emma siding, along the B. & O. railroad. The Sackett coal is about exhausted.

Frankfort, Ky.—The Illinois Central Railroad Co. has filed with the Kentucky Railroad Commission an application to be freed from the operation of the long and short haul clause of the railroad law to the extent of making a 60c. rate on coal from Nortonville, Isley, Carbondale and St. Charles, Ky., to Hopkinsville, without lowering the rate to Princeton and other intermediate points. The reduction is desired in order to enable the company to compete with L. & N. coal to points between Nortonville and Hopkinsville, between which points a 50-c. rate is in effect. The Hopkinsville Business Men's Association is with the railroad in its request.

Coal Trade Reviews

General Review

Opening prices in anthracite create the customary spring rush, but some doubt prevails over the future. Tension in the soft-coal market entirely relieved by the abrupt change in the labor situation. Demand down to lowest minimum and operations heavily curtailed pending the opening of Lake navigation.

The new coal year is opening up actively on anthracite. There is a heavy movement in the coastwise trade, mines are working up to full capacity, and there is an urgent demand from buyers anxious to acquire all the tonnage possible at the minimum circular of the year. It is a customary April market, but there is a feeling in some quarters that the trade will experience a decided recession by midsummer.

The partial settlement of the bituminous wage scale finds the market flat, with new business down to an irreducible minimum. The movement is almost entirely on contract, spot sales are seldom heard of, and consumers on all sides are showing a notable lack of interest. It is believed that many buyers have been discounting the possibility of only a short suspension for some time by using up accumulated stocks. Contracting for the new period is behind the average, due probably to the insertion of clauses providing for advances proportionate with any increase in the wage scale.

With the adoption of the old scale in the Pittsburgh district, what small business there was, has practically all disappeared. Production has been running considerably ahead of consumption throughout the winter, and it is estimated that only about 50 per cent. operations will be the rule until lake navigation opens. It is claimed by some that consumption is steadily decreasing, and there is considerable coal reported on demurrage at outlying points.

Indications of an early agreement in adjoining states has brought business to a standstill in Ohio, in spite of the fact that there is every indication of serious trouble there. Mines have been working up to nearly full capacity, and there is an enormous tonnage on hand in different parts of the state. An unexpected heavy loading at the Hampton Roads piers has reduced the stocks on track down to about normal; the indications are that the March dumpings have exceeded those for either of the two preceding months of the year.

Considerable uncertainty prevails in the Middlewestern situation. However, the expiration of the old wage scale found prices unchanged from those prevailing for the past several weeks. There has been less anxiety shown over the situation than ever before just preceding a wage agreement. Little or no consignment coal is coming forward, showing that there is no disposition whatever to speculate on the possibility of a protracted suspension. Interest so far is centering entirely on contracts for the new year, but there is little business being done even in this department.

EASTERN MARKET

BOSTON

Hampton Roads coals dull outside of contract business. "Market cargoes" apear at distributing points and concessions are offered to move them. New contracts slowly being closed on the same lines as usual. Water freights dull with practically no inquiry. Anthracite cargoes begin to arrive on April billing.

Bituminous—The Pocahontas and New River market is barren of any new features. Aside from deliveries on contract there is practically no movement at all to this territory. Spot sales are seldom heard and on all sides there is a notable lack of interest. A few cargoes are waiting orders at Boston and Providence and the distributors are finding consumers extremely reluctant to take on supplies at current prices. Moderate concessions have been made to move such lots but the response is anything but favorable. Even the Georges Creek shippers are meeting with difficulty in disposing of cargoes.

An additional amount of contract business has been taken by Hampton Roads shippers for the season of 1914-1915; it is being negotiated on about the same lines as last year and through the customary channels. No effort is spared to secure such business on the part of rival shippers but the $2.85 basis has so far been reasonably well maintained.

The Pennsylvania grades are slow with mining at only what the market will readily absorb. At tidewater they are hardly a factor just now when there is so much pressure to sell Georges Creek, Pocahontas and New River. No shipper takes the chance of sending cargoes of Pennsylvania coal forward on the market; the operators are even shy of sending coal to the loading ports except on firm orders.

Water freights are extremely dull, 70c. being the rate on large tonnage, Hampton Roads to Boston with plenty of space offering. What spot business develops is being taken by shippers who control their own steam colliers.

Anthracite—April cargoes have already begun to arrive, particularly at the more distant points, which helps relieve the dealers whose stocks were getting very low. There seems to be a great plenty of April coal for the requisitions on hand, and predictions are being freely made that by the latter part of May the hard-coal trade will be as slow as the bituminous is now. Circular prices are in general the same as last year except as in the case of broken where the Pennsylvania state tax will this year be charged throughout on all shipments.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.90	2.92@3.02	
New York*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.63@3.78
Providence†				3.68@3.83

*F.o.b. †On cars.

NEW YORK

The tentative clearing up of the labor situation has eliminated any uncertainties in the soft-coal trade and the market is down to the lowest point for some time. Usual spring activity prevails in anthracite.

Bituminous—The local soft-coal market continues dull and flat. There was some last-minute demand from consumers who finally decided to stock up in anticipation of a suspension, while most of the operating companies also accumulated limited surpluses, sufficient to take care of current business. This resulted in full-time operations at the mines during the closing days of March, but there was no anxiety observable in the market at any time. Further evidence of depressed conditions is observed in the fact that there was a total absence of the customary speculative business, which ordinarily precedes a wage conference.

The future of the market is full of uncertainties. It was generally conceded that a more or less protracted suspension was desirable in order to clean up the surplus coal, and as indications now are that operations will not be seriously interrupted, a long drawn-out dull period seems inevitable. On the other hand, there are some conservative members of the trade who are of the opinion that the possibility of only a short suspension has already been anticipated by many of the large consumers who cut off current shipments before the first of the month and began using reserve stock. If this be the case, there will not be such a large surplus as was anticipated, and the trade should straighten out more rapidly than was expected.

Contracts are still being negotiated on the same basis as last year, or better, but the business is coming forward slowly. All negotiations of this character embody a clause providing for any increase in the wage scale; this uncertainty, together with the general slowing up in business, and the growing belief that the operators may eventually be compelled to recede from the new high-price level of last year were some of the influences causing the buyers to delay. Little spot business is being negotiated, but the market remains quotable on the same basis as last week, as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—The opening of the new coal year finds anthracite experiencing the customary spring activity, all the more important buyers endeavoring to accumulate as large stocks as possible at the minimum price of the year, which prevails throughout this month. The activity is, of course, centering particularly about the prepared grades. These are all in strong demand, and even under full-time operations the companies will not be able to fill all requisitions on hand for the current month. Pea size is in good supply, while buckwheat and rice are rather short and in strong demand. The cheaper grades of barely are in excess supply.

Apr. 1 being a holiday, production for the week was not up to full rated capacity. We quote the new opening circular prices, and the spot market locally on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.60	$4.60	$4.55	$4.55
Egg	4.85	4.85	4.80	4.75@4.80
Stove	4.85	4.85	4.80	4.80
Chestnut	5.10	5.10	5.05	5.05
Pea	3.55	3.45@3.55	3.50	3.35@3.50
Buckwheat	2.80	2.75@2.80	2.50@2.75	2.50@2.80
Rice	2.30	2.30@2.35	2.00@2.30	2.00@2.30
Barley	1.80	1.75@1.80	1.70	1.45@1.70

PHILADELPHIA

Auspicious opening of anthracite trade for current year. Domestic trade good, but steam sizes falling off. No new developments in the bituminous trade. Demand and prices unchanged.

Anthracite—The first of April witnessed the inception of the anthracite trade for the season of 1914 and 1915. Large numbers of orders are being received, and it is felt that there will be no difficulty in taking care of the production for the next few months. While the call is mostly for egg and stove, considerable chestnut is also being moved, and it cannot be said that there is any size that will not be in active demand throughout the month.

Quite a fleet of barges left this port late last week, and during the current week, bound for the New England coast. Most of this coal will go to Boston and vicinity, where it is stated that the dealers are well cleaned out of all sizes. The far Eastern territory, at ports still closed by ice, a fertile field is anticipated as soon as navigation is open; it is understood that the dealers at these points are practically without any supplies, being compeled to eke out what stocks they have with carload lots from the open ports.

The bottom seems to have dropped out of the market for the small sizes. Mild weather is undoubtedly a factor that has much to do with this, coupled with the fact that the mines are operating unrestricted, throwing additional tonnages of the small sizes on the market. Pea coal is selling anywhere from 15 to 25c. off circular by the individual operators, but the large companies do not seem disposed to meet this figure.

Bituminous—Prices and demand show no material change from last week, with low-grade coals bringing 90c. to $1 at the mines, and the better varieties $1.25 to $1.35. It is evident that the possible trouble in the mining regions has had no appreciable effect on the consumers as yet, and a protracted suspension is apparently not anticipated.

BALTIMORE

Steam coals in better demand in the spot market, largely on sample orders. Slack demand slowing up. Prices steady in the face of threatened labor trouble in the bituminous districts. Contracts engage attention.

The spot market for steam coals shows added strength in demand. In the call for Pennsylvania fuels there are few sales below $1.05 even on the lowest grades. The high-water mark for best fuels is now around $1.35 to $1.40, which is better than for some time past. West Virginia steam coals, in the face of the comparatively poor demand generally, remained quite firm around 95c. to $1.05. The gas product is the weakest feature still and sales were recorded around 85c. Slack demand has slumped again and sales at from 70 to 80c. are noted. That the threat of a strike or suspension in the union fields is not agitating the trade as in some former years is shown by the fact that the price list is quite steady.

Contracting still continues to draw the attention of the trade. There was considerable of purchasing in small lots, apparently for testing purposes. A feature this year is the number of changes being made by consumers in the class of fuels used. This is particularly true of the strictly local situation, this city having been a heavy consumer of a specialized coal. The rapid exhaustion of certain big veins and the rise in price has caused a number of users to try other fuels. This has created much interest to the trade.

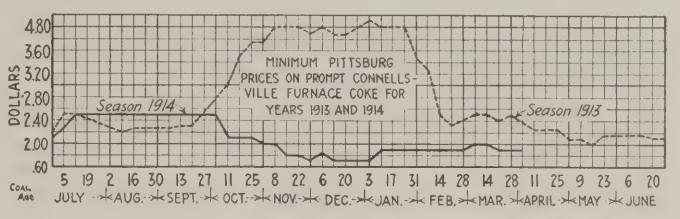
Car supply is still worrying the trade. In many instances there are reports of long delays of coal loaded and badly needed for sample purposes on contracts.

CENTRAL STATES

PITTSBURGH, PENN.

Signing of the agreement in the Pittsburgh District will necessitate heavily curtailed operations pending opening of Lake shipping. Coke very dull in sympathy with iron and steel.

Bituminous—There is hardly any coal market as the whole situation has been upset by the reaching of an agreement. The mines of the Pittsburgh district have been operating fairly full, but some of them have maintained operation only by sacrificing prices, and while the regular quotation on mine-run is $1.30 there have been sales down to $1.10. Such cutting is not the result of competitive conditions within the district, but is largely forced by the competition of other districts which have somewhat similar freight rates to various distributing centers. Pittsburgh district sellers insist that they know of much coal being sold from other districts netting $1 a ton or less at mines. The regular circular prices, which are largely nominal, are as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.



Prospects for at least the early part of the Lake shipping season are poor. It is well known that there are large stocks in the Northwest. The ore market has not opened, there being no inquiry for ore and no prices have been fixed for the season, although frequently prices are named before Jan. 1. The ore movement prior to July 1 promises to be light, and coal movement, which is normally a return haul for ore, must be light also.

Connellsville Coke—The coke market is quiet, reflecting the dullness in the iron and steel trade. A few consumers who were expected to cover for April or second-quarter by this time are holding off in consequence of iron trade conditions. Operators are no longer making a serious effort to secure more than $2 for furnace coke for April or second-quarter, but are altogether indisposed to cut prices. We quote: Prompt furnace, $1.90@2; contract furnace, $2; prompt foundry, $2.40@2.60; contract foundry, $2.40@2.60 per ton at mine.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ending Mar. 21 at 364,080 tons, an increase of 10,675 tons, and shipments at 369,530 tons, a decrease of 7515 tons. Shipments appear to have exceeded production by 5450 tons, against an excess the preceding week of 23,640 tons.

BUFFALO

All branches of coal trade dull except soft slack. Anthracite will pick up early this month, orders being quite liberal. Labor uncertainty continues.

Bituminous—A ready market obtains for slack at a high price. As a result, the buyer is insisting on a supply of this grade, whether on contract or single order while the seller is trying to substitute something else. The result is that most companies are turning down orders in all directions and seeing their mine-run and sizes going begging. There is practically no consumer who really needs any coal except for special use. There has been quite an amount of coal here on track unsold lately which jobbers have been quick to take advantage of.

It will be sometime, whatever happens, before there is anything like a brisk trade again. The consumer as a rule has more coal than he knows what to do with and often will not consider more at any price. There is a claim that even the consumption is running down, especially on account of the failure of iron to pick up. Contracts are well kept up as a rule and there are a good many new ones making, though hardly at prices as high as those of a year ago.

Bituminous remains at $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, with the latter about the only one in demand. Allegheny Valley coal is about 25c. lower, except slack, which sells on a par with Pittsburgh.

Coke—The coke trade continues unchanged, though some ovens are asking an advance of 5c. It will take another week to find whether the higher price holds. General quotations remain on the basis of $4.50 for 72-hr. Connellsville foundry.

Anthracite—There is a good demand for April delivery, with some dealers asking for a car or more on the first of the month, showing that the season has proved colder than they reckoned on and they are in urgent need of more coal, especially of sizes smaller than egg. There is no surplus here yet, but some is expected soon. The warm weather has hastened the apparent time of lake opening, but beyond the 17 cargoes already loaded it is not expected that anything will be done in the lake trade till the season is open.

TORONTO, CAN.

Stocks large and some demurrage coal reported but trade moderately steady in anticipation of possible labor trouble.

Trade has been steady for some weeks although with a falling off latterly in the demand for domestic coal, owing to the setting in of milder weather. The yards are well stocked especially with bituminous, some dealers laying in extra supplies in anticipation of possible labor troubles at the mines. Owing to stocks being in excess of present market requirements there are some 30 cars now held in demurrage. Prices show little change but there is some disposition to shade in bituminous. Quotations stand as follows: Retail anthracite egg, stove and nut, $8.25; pea, $6.75. Bituminous, steam, $5.25; screenings, $4.35; domestic lump, $6; cannel, $7.50. Wholesale f.o.b. cars, three-quarter lump, $3.75@3.85; screenings, $2.90@3.

TOLEDO

Market dullest in the recollection of the oldest operators and dealers. Few contracts. Large quantities of track coal on hand.

The consensus of opinion among the local trade is that Ohio will yet see a strike. In contrast to conditions in the adjoining states, Ohio is confronted with the new mine-run law and operators see no hope of an immediate settlement. This sentiment, however, has had no effect on the market, as buying was never so completely at a standstill as it is now. Contracts for coal are few and far between.

There are great quantities of track coal in Toledo and even the smaller markets in this vicinity report the same condition. One of the roads entering here reported the arrival of 82 cars with no possible market. Prices are so inconsistent that the market is not quotable. Everything is in a waiting condition.

COLUMBUS

Ohio trade in a state of confusion owing to the uncertainty of the future. Some increased demand for stocking purposes and there is apparently sufficient fuel for 60 days. Prices well maintained.

The coal trade is still upset because of the failure of the miners and operators to agree upon a wage scale at the Chicago conference. Uncertainty as to what will take place in the future has caused great conservatism along all lines and "watchful waiting" has become the motto. There was some increase in the demand from steam users during the week but this was not sufficient to cause any great change in market conditions.

Mines in Ohio have been operated close to their full capacity especially in the Pomeroy Bend and eastern Ohio fields. In the Hocking Valley the output is estimated at about 80 per cent of normal and it is still lower in the strictly domestic fields. Large steam users who have not stocked up are relying on their ability to secure West Virginia tonnage in sufficient quantities to keep their plants going. But there is a lot of coal being stored at every point.

The outlook for the lake trade is not bright and that fact is having its effect on the wage negotiations. There is a considerable tonnage on the docks of the upper lake ports and it is doubtful if there will be much lake movement earlier than June 1 even if the wage agreement is signed up. Companies controling their own docks may ship before that date in limited quantities.

The domestic trade is fast waning. Dealers have sufficient stocks to carry them up to the stocking season and they are loath to increase supplies at this time. There is still a small demand for the fancy grades for domestic purposes.

One of the features of the trade is the fact that consumers generally refused to be stampeded over the danger of a prolonged strike. They believe that the trouble will be settled in time for them to make their yearly contracts. Very few contracts are being made at this time although some are being renewed on the same basis as a year ago.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@1.35	.....	$1.50@1.40	$1.40@1.35
¾ inch	1.30@1.25	$1.20@1.15	1.35@1.30	1.30@1.25
Nut	1.25@1.20	.....	1.30@1.25	1.25@1.20
Mine-run	1.15@1.10	1.10@1.05	1.15@1.10	1.15@1.10
Nut, pea and slack	0.85@0.80	.....	0.90@0.85	0.75@0.70
Coarse slack	0.75@0.70	1.00@0.95	0.80@0.75	0.65@0.60

DETROIT

Market dull and flat despite the uncertainties in the labor situation. Heavy stocks carried over at the upper lake ports. Anthracite opening up briskly.

Bituminous—The local market still continues weak with slack coal the most active. The uncertainty in labor circles is having an important bearing upon the situation; particularly is this noticeable in the Ohio field where the outlook is more acute. But aside from these uncertainties the market is dull and flat with considerable coal still on track. Heavy stocks are reported at the upper lake ports so that much coal will be diverted from this trade to the detriment of the general business.

Anthracite—The activity which marked the winding up of the coal year in anthracite, served to clean up supplies, and the spring business is opening up briskly. The dealers' bins have been practically cleaned up, and with the maximum discount of the year in effect this month, strenuous efforts will be made to accumulate as large supply as possible at the April figures.

Coke—With a number of the local foundaries closed down indefinitely, the coke market has suffered a severe recession. There have been some shipments refused, with the result that coke is now standing on track accumulating demurrage. Prices are consequently depressed, Connellsville foundry being quoted at $3, Semet Solvay, $3.25, and gas house, $2.75, all f.o.b. ovens.

HAMPTON ROADS

Movement from Hampton Roads improving. Week's shipping fairly heavy with some increase in demand both coastwise and foreign.

Dumpings for the week have been good. The government has taken considerable coal which has been on hand waiting for colliers and this with a fair movement both foreign and coastwise has cut the accumulation in the railroad yards to about normal. In addition to cargo vessels in port during the week there has been a fair number of bunker ships calling here. Several shipments of New River and Pocahontas have moved to the Southern ports and there has also been one or two consignments of high volatile moving South. In addition to coastwise business there has been some large shipments to the following foreign ports: Brindisi, Valparaizo, Canal Zone, Kingston, Havana ,Montevideo, Coronel and Port Spain.

Outside of the coastwise business the inidcations are that the Italian market will take the largest amount of coal moving from Hampton Roads during the current month and while nothing positive can be said at this time it is believed that heavy shipments will also be made to Italy next month While suppliers in general during March have complained of poor movement, railroad figures to date indicate that dumpings for March will run considerably heavier than for either January or February.

LOUISVILLE

Mild weather here has reduced the domestic demand materially, and operators find it difficult to place coal. No stocking movement has begun, and the market is generally quiet.

In spite of the strike talk, retailers in this section have shown no inclination to take advantage of the low prices prevailing to lay in spring and summer stocks and at the same time protect themselves against a shortage later in the season. Moderating weather, with general high temperatures, has resulted in a light domestic demand, and most of the retailers, in consequence, are out of the market, although none of them have much in the way of supplies.

Operators in Kentucky are rather hoping for a strike lasting for 30 to 60 days, in order to reap the benefit of the strengthening effect which it would have on the market. There is no prospect of labor trouble in eastern Kentucky, and in the event of strikes elsewhere, that section would be in a fine position to benefit therefrom.

The steam market in Louisville is fairly strong, largely in consequence of the light production of screenings, rather than because of an active demand. Free offerings of low-grade screenings occasionally give the impression of large supplies, but it does not seem that this is justified. Prices for the better grades are fairly steady around 80 and 85c., with the second grades from 15 to 25c. lower. First-class block hangs at $1.50, with a slow demand.

SOUTHERN AND MIDDLE-WESTERN

NEW ORLEANS

Passing of late cold wave ends domestic season in New Orleans. Further price concessions not expected. Harbor demand light.

Steadied up by the unusual demand for domestic grades during the late cold spell, prices did not reach as low a level as predicted. Further concessions are considered unlikely and in fact the tendency is toward strength as present prices were reached before the heavy consumption of the season-end. As there is no further probability of cold weather here, domestic demand has flattened out entirely. Yards are being cleaned up for new stock.

To add to the general inactivity, shipping has been light for the past week and there has been little demand from the waterfront. No further contracts will be made until the discount season opens. The early opening of the Panama Canal promises to make changes which will affect the demand here. The fact that this will become the starting point of new steamship routes will be an important factor in the amount of coal taken at this port. At present many of the ships leaving here take only as much coal as is necessary to get them to a supply of Pocahontas.

INDIANAPOLIS

Mines active as the end of the wage-contract period approaches. The buying mainly for storage by the large steam users and factories. Uncertainty about suspension interfered somewhat with making of contracts next year.

As Apr. 1 approached and no indication that the operators and miners in the central competitive field would reach a wage agreement, there was a little more coal buying by the big consumers, the railroads and public utilities and this kept the mines busy. The weather has been milder, cutting down the demand for domestic grades, and most consumers think they have bought their last coal for this season. The factory demand has been making gains, probably due mostly to stocking up, to tide over any suspension of work at the mines. There has been little reason for shading of prices, though some of this is reported.

There is difference of opinion among operators as to whether the storage has been as large as in former wage-agreement years. Some mines have not been able to keep up with orders while others could have taken on more; the latter are mostly of the opinion that the amount of storing has not been up to the average. The belief is general that there will be no suspension, whether or not an agreement is reached by Apr. 1, and this has curtailed the storage buying to some extent. It is said there has been less accumulating of coal at the mines or elsewhere, but there is considerable surplus carried in cars.

The retail trade in this city is closing the winter season at the same level of prices as at the beginning.

CHICAGO

Despite the suspension no anxiety is shown among consumers. A little more than normal buying aided in taking up coal that was approaching demurrage. No material increase in prices.

Retailers of domestic coal are in about the same position as steam-coal dealers, being well enough stocked with the ordinary grades to counteract the effects of a short mine suspension. Normal conditions prevail in the anthracite market which is not effected by the situation in bituminous. With the weather warm and consumption light the buying has been slow and dealers are awaiting the Apr. 1 discount.

Contracting has been the principal feature of the smokeless-coal market, the all-rail business being heavier than last year, with about two-thirds of the prospective business already disposed of. Considerable spot coal was marketed in Chicago during the week. Contract shipments have been about completed by the producers. There seems to be no tendency to speculate on the prospects of a mine suspension by larger shipments to Chicago.

Franklin County operators filled all of their orders during the week and are in a good position to take advantage of a flurry in the event of a strike scare. Their coal is being marketed at $1.50 as the high price and running down to $1.20. The Carterville trade is in a similar position, with a good deal of coal being sold in the spot market. The highest price for domestic sizes is $1.50 with a shading down to $1.15. The steam trade was the feature of the Springfield market with a fair demand for mine-run and steam lump and an improving market for screenings. The Indiana operators are keeping to their own districts and not attempting to ship to Chicago, which is already overcrowded. Prices are being readjusted in the coke market, the byproduct coming in for a reduction of 50c. with the arrival of the discount period.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07@2.17	$2.40@2.55	$2.12@2.27	
Steam lump	1.97		1.97	
Egg		2.40@2.55		$4.70
Mine-run	1.87	2.20@2.25	1.87	3.30
Screenings	1.67@1.77	1.90@2.05	1.67@1.77	

Coke—Connellsville and Wise County, $5 and $5.25; by-product, egg, stove and nut, $4.50; gas house, $4.25.

ST. LOUIS

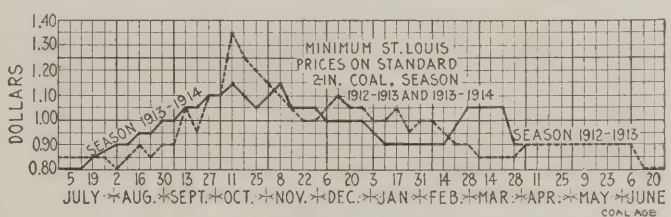
Month opens with trade dull and stagnant. Prices low with little coal moving. Anthracite the only active branch.

The last week in the month saw practically no coal moving. The railroads had stored some coal previously, and some steam plants also but the tonnage has been insignificant as compared with previous years. Even screenings, which under normal conditions, are in good demand, were heavy. The opinion prevails in some quarters that there is still a chance for the operators and miners to get together in Illinois. Prices remain the same as for several weeks, and in many instances some coals were lower; regular summer conditions prevailed with demurrage coal on the east side.

The only life in the St. Louis market was occasioned by the future sales of anthracite, for April, May and June, which seem to be good. There is some smokeless being sold, but no coke. Up until the last few days the retail demand for coal was fair. The retailers during the past season had nothing to complain about, business being about normal and prices away below what was expected.

The market at the closing of the month was:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump				$0.90 @ 1.00	$1.15
3-in. lump			$1.35		
6-in. lump	$1.35 @ 1.50		1.50	1.15 @ 1.25	1.35
Lump and egg	1.85 @ 2.15	2.25			1.15
No. 1 nut	1.30 @ 1.45				
Screenings	0.85 @ 0.90			0.65 @ 0.70	0.75 @ 0.80
Mine-run	1.10 @ 1.20			0.80 @ 0.85	
No. 1 washed nut	1.50 @ 1.60	2.25	1.50		
No. 2 washed nut	1.25 @ 1.35		1.25		
No. 3 washed nut	1.25 @ 1.30				
No. 4 washed nut	1.25 @ 1.30				
No. 5 washed nut	0.80 @ 0.85				



KANSAS CITY

Mines working at about summer schedule and business unsatisfactory.

Conditions in the Kansas and Missouri field are unsatisfactory at present, with little prospect for any improvement in demand. A cold wave predicted during the past week failed to make its appearance. This development means probably that no more cold weather is likely in this section. Operators are down practically to a summer basis, working about half time in most cases. Domestic demand is light, and business confined mostly to contracts.

PORTLAND, ORE.

Winter season practically over and coal dealers find business rather quiet. Short spell of cold weather.

Winter is over here, except for an occasional cool spell, but the temperature did not fall sufficiently low to cause any great rush for supplies. Business is quiet, so coal dealers report, and as for the future the demand will come practically altogether from industrial concerns, or regular consumers. Issaquah coal is now offered here to the retail trade at $7.50 per ton delivered to any place within the main part of the city. This coal comes from the new Issaquah mine in Washington, in the vicinity of Seattle, and will probably mean quite a factor in the local retail trade.

The amount of coal imported here the past winter from Australia did not exceed a couple of thousand tons and hence this fuel did not figure much in this market.

PRODUCTION AND TRANSPORTATION STATISTICS

BITUMINOUS COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during January of the last four years:

Anthracite	1911	1912	1913	1914
Baltimore & Ohio[1]	105,415	175,185	195,667	137,270
Chesapeake & Ohio[1]	2,010	3,155	378	1,043
Erie[3]	621,198	674,168	673,614	791,070
Pennsylvania[1 3]	1,101,192	1,040,535	1,014,259	915,027
Virginia[2 1]	41	....	89	....
Total 5 roads	1,829,856	1,893,043	1,884,007	1,844,410
Bituminous				
Baltimore & Ohio[1]	2,508,698	2,573,468	3,187,956	3,097,640
Buffalo, Roch. & P.[1 2]	654,077	716,888	774,052	817,259
Buffalo & Susq.[1 2]	147,123	145,562	143,814	147,581
Chesapeake & Ohio[1]	1,506,686	1,316,621	1,263,892	1,644,152
Erie[3]	16,536	47,313	60,373	9,980
Hunt. & Br'd T. M.[1 2]	108,481	99,612	150,149	105,739
New York Central	764,306	761,810	886,742	835,458
Norfolk & Western[1 2]	1,545,955	1,687,948	2,069,874	1,853,198
Pennsylvania[1 3]	3,621,472	3,581,365	4,210,196	4,117,514
Pitts. & Lake Erie[1 2]	712,443	916,993	1,033,330	830,804
Pitts. Shaw. & North[1 2]	136,983	163,901	228,426	287,474
Virginia[1 2]	217,878	306,766	453,886	407,109
Western Maryland	278,413	208,901	241,021	257,940
Total 13 roads	12,219,051	12,527,148	14,703,711	14,411,848
Coke				
Baltimore & Ohio[1]	271,217	329,556	109,620	274,955
Buffalo, Roch. & P.[1 2]	38,363	38,548	57,831	28,780
Buffalo & Susq.[1 2]	27,562	28,796	28,153	33,495
Chesapeake & Ohio[1]	22,014	17,440	30,764	34,256
New York Central	6,132	7,920	7,548	.....
Norfolk & Western[1 2]	159,301	131,640	148,251	114,776
Pennsylvania[1 3]	847,140	940,931	1,288,514	853,412
Pitts. & Lake Erie[1 2]	375,755	498,308	668,392	404,148
Pitts. Shaw & North[1 2]	2,034	1,437	3,212	.....
Virginian	389	.....	.....	.....
Western Maryland	8,382	7,072	6,643	8,271
Total 10 roads	1,758,289	2,001,648	2,348,928	1,752,093

[1] Includes coal from connecting lines.
[2] Includes company's coal.
[3] Does not include company's coal hauled free.

Note:—The Southern Railway hauled 345,899 short tons of bituminous coal during December, 1913, and 4,215,614 short tons during the 12 months.

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for February and the two months of 1913 and 1914, in short tons:

	February		Two Months	
	1914	1913	1914	1913
Anthracite	705,020	988,036	1,620,047	2,002,295
Bituminous	3,556,665	3,857,304	7,674,179	8,067,500
Coke	819,486	1,220,360	1,672,898	2,508,874
Total	6,081,171	6,065,700	10,967,124	12,578,669

U. S. STEEL'S COAL PRODUCTION

The United States Steel Corporation during 1913 mined 6,705,381 tons of coal as against 5,905,153 tons in 1912; this is exclusive of that used in making coke. Coke manufactured in beehive ovens in 1913 totaled 11,062,138 tons as compared with 11,554,840 tons in 1912. Production of byproduct coke in 1913 amounted to 5,601,342 tons as compared with 5,164,547 tons, making the gross production of both beehive and byproduct coke in 1913 at 16,663,480 tons as compared with 16,719,387 tons in 1912.

BALTIMORE & OHIO

The following is statement of coal and coke tonnage moved over this system and affiliated lines during February and the first two months of this year and last year:

	February		Two Months	
	1914	1913	1914	1913
Coal	2,385,343	2,550,417	5,303,077	5,553,821
Coke	265,380	371,355	540,335	810,531
Total	2,650,623	2,921,772	5,843,412	6,364,352

FOREIGN MARKETS

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follows; complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

An American consul reports that firms in his district have been using wood as fuel, but the price is rising rapidly and there are prospects for the sale of coal. Copy of the complete report, giving further details and the names of the firms to be addressed regarding this matter, can be obtained from the Bureau of Foreign and Domestic Commerce.—**No. 12,750.**

BELGIUM

Belgium imports and exports for the first two months of this year and last year were as follows:

	Imports		Exports	
	1914	1913	1914	1913
Coal	1,454,386	1,462,908	867,671	815,120
Coke	163,851	222,362	213,176	173,123
Briquettes	80,127	75,694	121,053	81,466

FRANCE

French imports and exports for January of this year and last year were as follows:

	Imports		Exports	
	1914 Tons	1913 Tons	1914 Tons	1913 Tons
Coal	1,521,551	1,351,300	70,677	95,287
Coke	202,274	286,400	11,076	20,842
Briquettes	105,021	78,800	12,750	9,311

British Exports—The following is a comparative statement of British exports for February and the two months of the last three years, in long tons:

	February		2 Months		
	1913	1914	1912	1913	1914
Anthracite	187,057	250,217	447,199	485,365	520,088
Steam	4,046,314	4,186,768	7,941,579	8,464,307	8,418,149
Gas	875,335	883,070	1,730,471	1,776,699	1,768,783
Household	323,350	280,174	264,903	293,587	257,362
Other sorts	323,350	280,174	552,007	620,277	526,265
Total	5,569,917	5,725,877	10,936,159	11,640,235	11,520,647
Coke	98,755	94,595	222,040	205,850	218,851
Manufactured fuel	154,253	154,136	310,183	350,992	324,081
Grand total	5,822,925	5,974,608	11,468,382	12,197,077	12,063,579
Bunker coal	1,539,410	1,615,132		3,297,089	3,346,144

Havana, Cuba—Practically all coal used by Cuba is furnished by the United States, in contrast to other Latin American republics that get the bulk of their supply in England or Australia, depending on the side of the continent on which they are located. Cuba used 123,897 tons of anthracite last year and 2,076,375 tons of bituminous coal. Of the 11,645 tons of coke consumed, the greater portion was furnished by Great Britain.

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Mar. 27.

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	86¼	85¾	85¾	86¼	84½
American Coal Products Pref.	104	104	104	106	104
Colorado Fuel & Iron	34⅜	32	32½	34½	28½
Colorado Fuel & Iron Pref.	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com.	48	47	48	....	....
Island Creek Coal Pref.	87½	86½	86½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	21⅝	20½	21	23¾	17⅞
Pittsburgh Coal Pref.	93	91	91	93½	86
Pond Creek	18½	17	17	....	....
Reading	167½	164⅝	165	172½	161¼
Reading 1st Pref.	89	89	89	89	87½
Reading 2nd Pref.	....	....	90	93	90
Virginia Iron, Coal & Coke	50	50	50	52	40

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	..	98½	99	Mar. '14	91½	99
Colo. F. & I. gen. 6s	106¼	110	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	79	Sale	78	79	76½	82
Cons. Ind. Coal Me. 1st 5s	..	73	73	73	73	79
Cons. Coal 1st and ref. 5s	89½	92	89	89	89	89
Gr. Riv. Coal & C. 1st g 6s	91	..	99¼	Feb. '14	99¾	99¼
K. & H. C. & C. 1st s f g 5s		..	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	93	93¼	93¼	Mar. '14	93¾	93¾
St. L. Rky. Mt. & Pac. 1st 5s	87¾	..	88	88	84	88
Tenn. Coal gen. 5s	79	32½	80¼	Mar. '14	77	82
Birm. Div. 1st consol. 6s	100	103	103⅛	103⅛	97⅛	103⅛
Tenn. Div. 1st g 6s	102	103	101½	Mar. '14	101½	103
Cah. C. M. Co. 1st g 6s	102	103	102½	Mar. '14	101	102½
Utah Fuel 1st g 5s	101¼	Sale	101¼	101¼	101¼	101¼
Victor Fuel 1st s f 5s	..	78	80	May '13	..	..
Va. I. Coal & Coke 1st g 5s	92	93½	92½	92½	92½	95

Delaware, Lackawanna & Western Coal—Regular quarterly dividend of 2½%, payable Apr. 15, to holders of record, Apr. 1.

Lehigh Valley Coal Sales Co.—Regularly quarterly dividend of 2½%, payable Apr. 18, to holders of record, Apr. 9.

Pittsburgh Coal Co.—Regular quarterly on the preferred of 1¼%, payable Apr. 25, to holders of record, Apr. 15.

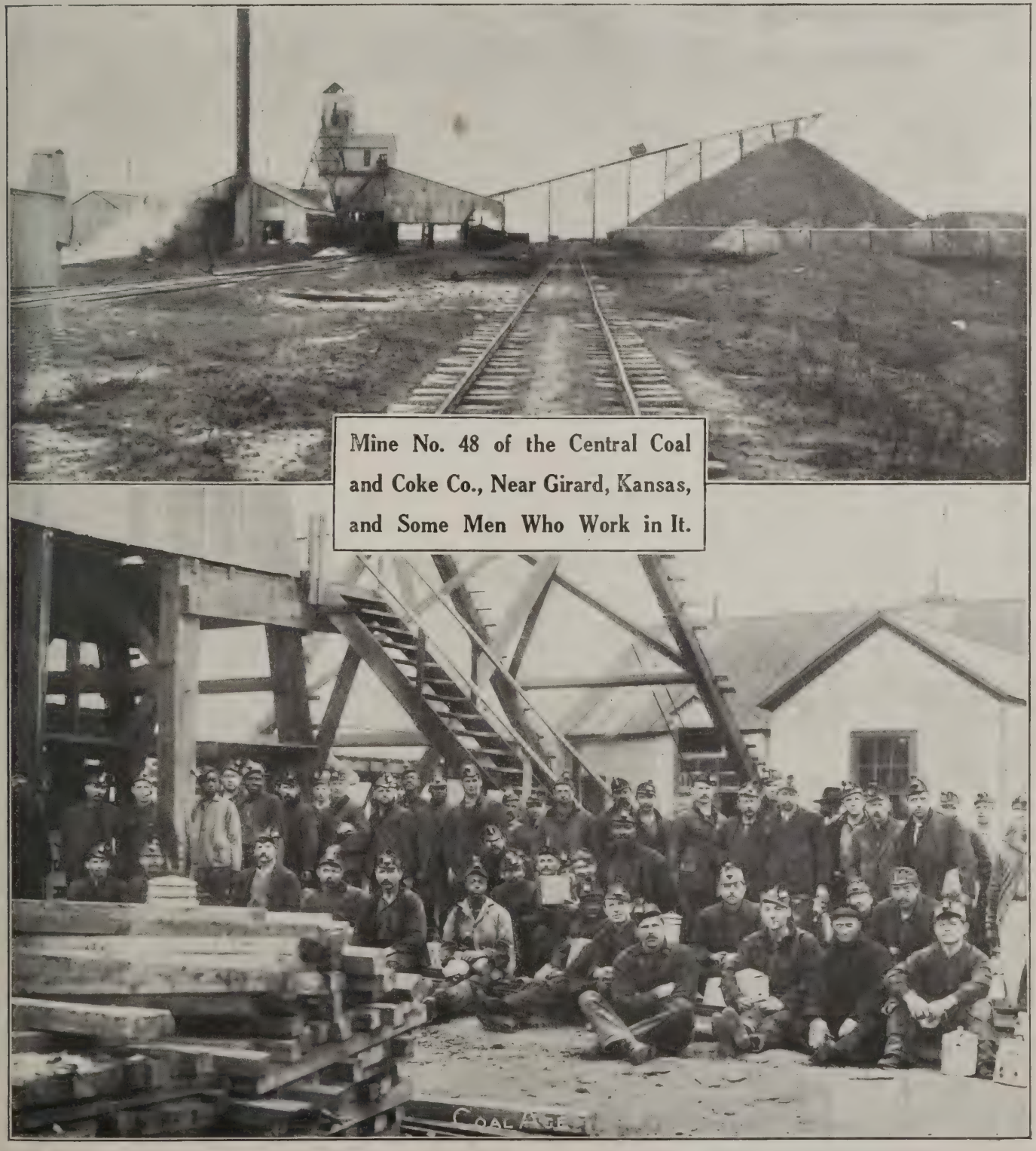
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

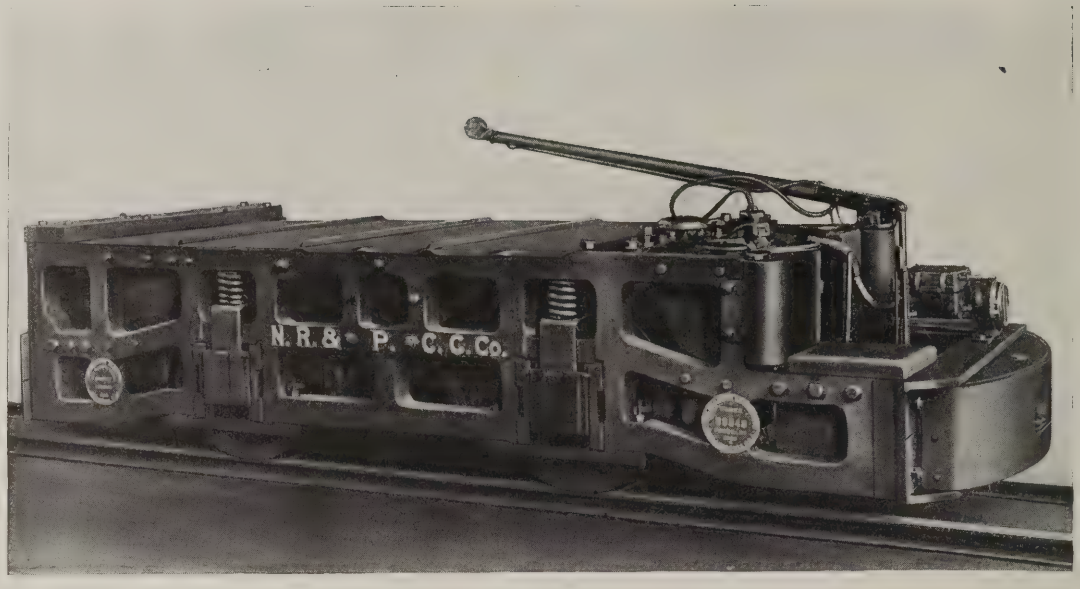
Volume 5, No. 15
Issued Every Saturday
Hill Publishing Company

NEW YORK, APRIL 11, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Mine No. 48 of the Central Coal and Coke Co., Near Girard, Kansas, and Some Men Who Work in It.



Barsteel Heavy Haulage Locomotive

4 Features of Baldwin-Westinghouse Barsteel Electric Mine Locomotives That Assure Maximum Tonnage with Least Expense

The Cast Steel Bar Frame which gives great strength with least weight; permits easy access to, and excellent ventilation for the motors.

The Vauclain Removable Gib which greatly facilitates the removal of journal boxes and permits inspection or replacement of all wearing parts with a small cost of time and labor.

The Oil and Waste Lubricating System for the motors, with specially designed bearings for long life in service, which has been adopted as a standard after years of investigation.

The Commutating-Pole Motors which insure sparkless commutation at all loads. As a result, the commutator and brushes are long lived and require little attention, brush renewals are seldom required, and carbon and copper dust inside the motor is practically eliminated.

These features are but few of many which have been incorporated in Baldwin-Westinghouse **Barsteel** Electric mine locomotives in order to give the user the greatest possible service. You can obtain them only when you specify Baldwin-Westinghouse.

Address either company for full information.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 APRIL 11, 1914 NUMBER 15

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 597

Which? Poem by Berton Braley.

IDEAS AND SUGGESTIONS: *Pages* 598-599

*Small Timber-Framing Plant—A Simple Philosophy of Life—*Blacksmith Stand.

*THE I. & S. C. M. CO.'S PLANT, AT ISSAQUAH, WASH.: *Pages* 600-603

Description of an unusually effective installation for handling and treating the low-grade Pacific Coast fuels. The coal is carefully sized and both hand-picked and washed. L. S. Richards. COAL AGE, Vol. 5.

THE AIR FACTOR IN MINE EXPLOSIONS: *Pages* 603-604

Quotes the statements of the British Explosion in Mines Committee, contained in their recent report, to show the necessity of determining those factors affecting the rate of combustion of coal dust in suspension in mine air, since it is the rate of combustion that determines explosion of the dust. John Verner. COAL AGE, Vol. 5.

*LONGWALL MINING IN KANSAS: *Pages* 605-606

The lower seam in the mineral field south of Pittsburgh has been practically exhausted. The operators are preparing to mine the upper seam by the longwall method. The writer describes some of the conditions encountered and gives, in part, the scale agreed on in this connection. Barry Scobee. COAL AGE, Vol. 5.

DEVELOPMENT IN COAL-LOADING DOCKS: *Page* 606

*A TRIANGULATION SURVEY OF THE FAIRMONT REGION: *Pages* 607-610

A description of one of the largest surveying projects ever undertaken in the coal industry. It involved precise control of a territory 90 lineal miles in length and comprised an area of 250 square miles. A description of both field and office methods employed. A. W. Hesse. COAL AGE, Vol. 5.

*WIRE ROPEWAYS FOR COAL TRANSPORT: *Pages* 611-612

The wire ropeway often is found more adaptable to mining operations than the railway. It is not usually subject to the formation and configuration of the land, and it is both simple of construction and inexpensive of operation. COAL AGE, Vol. 5.

HIGH RECORDS IN ILLINOIS: *Page* 613

*THE CLAM-SHELL MINE CAR: *Pages* 613-614

WEST VIRGINIA MINERS OUTDIG CANAL LABORERS: *Page* 614

*SUBSTRUCTURE OF WOODEN WATER TANK: *Page* 614

WHO'S WHO IN COAL MINING: *Page* 615

Brief sketches of the lives of F. W. Whiteside, chief engineer of the Victor-American Fuel Co., Denver, Colo., and H. M. Kanarr, chief engineer of the Rochester & Pittsburgh Coal & Iron Co., Punxsutawney, Penn.

THE LABOR SITUATION IN OHIO: *Page* 616

EDITORIALS: *Pages* 617-618

The Present Industrial Idleness—A Smell Is a Smell—Chickens as Gas Detectors—Don't Destroy Your Records—Schools—The Union and the Republic.

*ALTERNATING-CURRENT COAL CUTTER: *Page* 619

SALINE COUNTY MINE-SAFETY ASSOCIATION: *Pages* 619-620

REFERENDUM OF UNITED MINE WORKERS: *Page* 620

DISCUSSION BY READERS: *Pages* 621-623

Straightforwardness in Mine Inspection—The Certificate Law. Letter No. 26—Working Coal Under Watery Strata. Letter No. 6—Standardization of Mine Track Gages.

STUDY COURSE IN COAL MINING: *Page* 623

INQUIRIES OF GENERAL INTEREST: *Page* 624

Study Question, The Circle.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 625

COAL AND COKE NEWS: *Pages* 626-629

COAL TRADE REVIEWS: *Pages* 630-634

ADVERTISING INDEX: *Page* 26

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

Advertising Is Specialized For You

The Weekly Ad-Talk Page

Advertising puts before you the worthwhile commercial news.

You should therefore be interested in advertising of all kinds and of all kinds of propositions.

But when it comes to your particular business—you are interested only in things which will help you secure better results in your field.

And therein lies the especial value of the selling section of your technical paper—it puts before you the merits of only such propositions as apply directly to your field.

You do not expect fiction or general news in the reading pages—you subscribe for the technical paper solely for the purpose of improving yourself, of gaining knowledge that will mean greater success and profit—and the reading pages are therefore restricted to only that kind of article that will help you in your line of work.

The Selling Section is governed by the same policy.

When you want this information or that information, when you want to find the arguments presented by the different manufacturers, you do not want to see piano announcements or automobile advertisments.

And so in the selling section of COAL AGE you will find the business news of only such apparatus and articles as can be used to good advantage in the coal mining field.

The Selling Section, in fact, is part of your business; it is a business tool which can be used with telling effect.

Sometimes you may be puzzled; your present methods of accomplishing certain results may not be entirely satisfactory to you; the equipment may be wrong—look to the Selling Section of COAL AGE.

It will give you the necessary suggestions on how to secure better results than you are getting, how to solve your puzzling equipment problem; and not only that, but it will tell you where to buy the material necessary to accomplish the desired results.

Remember these three things:

(1) Only good goods can be continuously advertised.

(2) Only reliable products lend themselves to the reason-why kind of copy that is required nowadays to make advertising successful.

(3) Only advertisements of products or machinery which can be used in your business find entrance into the Selling Section of COAL AGE.

COAL AGE

Vol. 5 NEW YORK, APRIL 11, 1914 No. 15

Which?

By Berton Braley

Written expressly for Coal Age.

Shall it be Peace or War? Reason—or Force?
Which is the course?
Shall doubt, dislike,
Avarice, blindness—grow to Wrath and Strife?
Shall weeks and months be rife
With all the bitter conflict of a strike,
Or shall the Masters and the Men, grown wise,
Have done with prejudice and craft and lies,
And seek the way of patience and of Peace,
That Labor wars may cease?

We are so weary of the constant fight,
So sick of labor struggles in the land,
So burdened with the wastage and the blight
Wrought by the minds that WILL NOT understand,
That we cry out to Capital, "Be sane,
Not grim, relentless, with a heart of greed,
But open-minded, willing to concede,
To compromise—and save a world of pain."
And so we pray to Labor, none the less,
"Let us be through with selfish stubbornness,
Which means so much of hardship and distress,
Let us have peace—the peace we've hungered for,
We are so tired of War!"

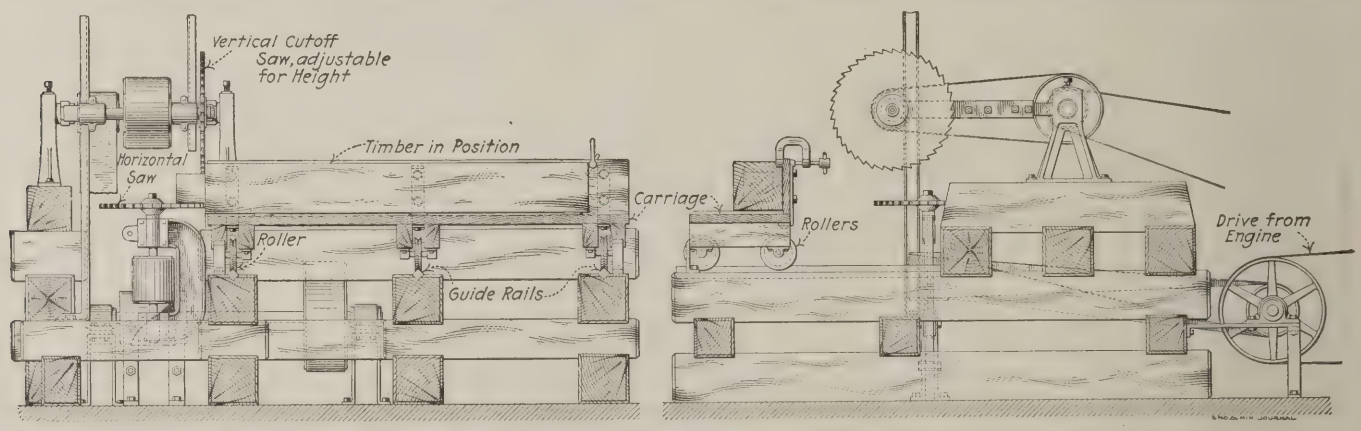
What is the answer, brethern; shall the mines
Lie idle and the country lack for coal
While want and destitution stand for signs
Of sternest struggle—or shall men control
Their battle spirit and with mutual trust,
Seek only to be just?
Shall it be Peace or War?

Ideas and Suggestions

Small Timber-Framing Plant

By Frank M. Leland*

About two years ago, we found ourselves in the position of a great many medium-sized mines. We needed a large quantity of square sets and had been doing the same as most mines of this size, viz., cutting trees, hauling them in full length and dumping them in our timber yard, paying for them by the linear foot. We kept five or six timber framers working under a shed and they would go out and select timbers to suit, saw them off with a two-man crosscut saw, roll them under the shed, hew one side flat with a broadax and then get out a little gage, mark off the ends and proceed in the usual manner to saw them part way in and frame the ends as required.



The Home-Made Framer, Showing Bed, Carriage and Jaws

By the time they had ground up their tools and filed their saws, filled their pipes and lighted them, gone into the boiler room in winter to warm their fingers and performed a few other functions that every mine manager is familiar with, these hand-framed timbers had cost us a great deal of money. Up to two years ago, we had not required so many and we did not notice the expense so much, but when I found that we required a great many timbers, I began looking around for machinery.

The first thing we considered was a regular timber framing machine, but found on getting prices that one would cost from $2500 to $3000, weigh about 9000 lb., and require a 50-hp. engine and boiler to drive it and then it would only cut the tenons on the ends.

I figured the cost of a building and all the machinery erected, and found it would approximate about $7000, which, for the work we had to do, was too large an investment. So I thought I would buy a slabber and a swinging cut-off saw and rolling the timbers to the cut-off saw, cut them in lengths to suit, and slab them on one side in order to get a starter for hand work. I purchased the slabber, complete with saw and the swinging cut-off saw for $420. We erected it at the smelting plant and cut off and slabbed a lot of timbers, but it proved a disappointment; the timber framers rather resented our taking their work away from them and in the usual well known manner, they made the finished timbers cost about as much as before.

I then began to figure how I could take the machinery and frame the timbers; the drawing illustrates how we did it. I built a frame of 8x8-in. timbers and laid the cut-off saw frame horizontal instead of vertical. I rustled up an old vertical 7x10-in. engine and connected is as shown, using channel irons with slotted holes so that the saw frame would move up and down, cutting any depth desired, or could be lowered clear down and used to square the timbers.

I then rigged up another saw running horizontally. This does not cut at the same time as the vertical saw, hence only power enough is required to drive one saw at a time. The design is not beautiful, it was made without drawings, and figured out as we went along. The guide rails under the table are made from 1½-in. square iron set edgeways; the rollers we turned out of some old matte pans; the pulleys and shafting, we picked up around the place. The machine is strictly homemade, but it is good and strong and it runs perfectly.

Method of Operation

The posts are first sawed on the slabber, they are next squared on the ends by running through the machine, say one hundred of them, the saw is then raised up so as to cut just 2 in. deep. The horizontal saw remains stationary, the stick is shoved through and the cut made on top, the carriage is then shoved on the horizontal saw and a slice taken out of the bottom; it is then pulled back and rolled over one quarter and the operation repeated; it requires four cuts to finish the end.

I have repeatedly timed it and find that it averages 3½ min. to frame both ends of an 8x8-in. post. The slabbing saw takes logs up to 8 ft. in length and when we received it, we made a set of dogs and some perforated plates to hold pins, and bought an inserted tooth saw to replace the thin saw which came with it; it is surpris-

*Mr. Leland whote this article when president of the Empire Copper Co., Mackay, Idaho. He is now general manager of the Balaklala Copper Co., Coram, Calif.

ing how fast we can rattle out the timbers. When we started, all we hoped to make was square-set timbers, but we found that by getting logs 8 ft. long, we could make our lumber for just about one-half its cost when purchased from the saw mills. We found also that we could saw 2x4-in. stuff for ladders, 4x6-in. for flooring for the square sets, in fact, almost anything up to 8 ft. long, and we find that 2x12-in. by 8-ft. lumber is just as good for chutes, etc., as is 16-ft.

We rigged a little wedge saw to use up the scraps and find that our wedges cost us 3/8c., whereas, made by hand, they cost us 6c. We also make ladder rounds 2½ in. square by 16 in. long, ripping them on the small mill. We find many advantages which we did not think of at the start. The principal one is the fact that from every timber we get four slabs, two of which are generally good for lagging and in almost every case we get enough lagging from the timber to pay for the timber itself, since we would have to use 2-in. plank, if we did not have this lagging. Furthermore, the boiler being purposely left naked, warms up one end of the shop and for the other we use live steam in coils of pipe; the fuel costs nothing, since we burn the saw dust. This is quite an item, as it ordinarily takes from 300 to 400 lb. of coal daily to keep the shop warm.

Finally, these machine-framed timbers can be erected in the mine at a lower cost for labor than the hand-framed, since they are all true and fit exactly.—*The Engineering and Mining Journal.*

A Simple Philosophy of Life

Written in a scrawly hand on a piece of paper, since grown grimy, the following lines grace the inside of a closet door:

> In the adage good and old,
> We forevermore are told
> That it's better far to give than to receive.
> So the boost that always lends
> Helpful thoughts to troubled friends
> Is that bread cast on the water we retrieve.

The stanza gains significance with additional facts. The closet just mentioned is a fixture in the hoisting-engine room of a large coal-mining operation. Its contents range from cotton waste and brightly polished oil cans to a change of clothing and a dinner pail. The only man having access to the lock is the hoisting engineer, who, for obvious reasons, we will call "Smith"— and thereby hangs the pith of that which follows.

Smith has admitted, modestly to be sure, that he is the propounder of the above verse.

It bears a positive relation to Smith's attitude toward his daily work. He expresses his simple philosophy of life in the language of action. If you watch him operate the hoist, you will note the pleasure on his face as he throws his levers with the precision of a faultless mechanism. His answer to a fellow workman is always of the kind which promotes harmony. He has learned the knack of self-effacement.

A glance at Smith and you can discern a mixture of the milk of human kindness and a thoughtful determination that would guard safely any confidence you might impose in him. Being more or less a child of fancy, he has cultivated the habit of introspection and therefore tries to see himself as others see him.

Smith's daily work includes business flavored with action, a friendly boost or perhaps a josh. And his work has found him out, for his employers recognize him as a leading spirit.

In a word, Smith firmly believes that appearances dominate feelings; to be happy one must *smile.*

If "nothing succeeds like success," how doubly true it is that nothing fails like failure. Most of us take our views of life from the atmosphere in which we live, but all of us are endowed with ambition.

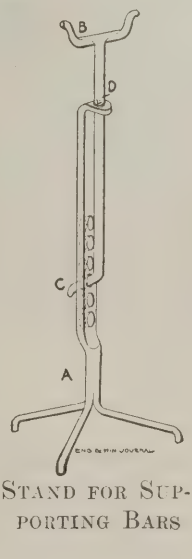
Neither success nor failure are dealt out with a single turn of fortune's wheel. The success we all crave is the result of untiring effort, and the only foundation on which it will thrive is kindness to our fellows.

From an ambitious viewpoint kindness is a paying investment. Don't knock, boost, and your boost will find you out.

In one sense Smith is a gifted man, and though we are not all of his temperament, we can at least apply his remedy for a discouraged spirit. It is equaled by none. Try it—*Smile and be happy.*

Blacksmith Stand

The rest illustrated is of simple design and inexpensive to make; it will be found useful for holding up light work in the machine shop or smithy (*American Machinist,* Jan. 29, 1914). It consists of a standard *A,* which has three feet, and of a rest *B.* The rest is adjusted to the desired height by putting its lower end *C* through one of the holes in *A.* These holes are bored or punched about 1½ in. apart, and should be made at an angle, as shown by the dotted lines, so as to insure a safe hold of the shank when weight is placed upon the rest *B.* The hole in the head of the standard marked *D* through which the shank of the rest slides up and down, must be made large enough to allow for the movement of the shank when the point *C* is being taken out, or being put through any of the holes in the standard *A.*



Stand for Supporting Bars

Owing to the improved methods, seams of coal have been worked in Britain at a depth of 3000 ft., and in one mine in Lancashire, 3700 ft., which means a natural temperature of over 90. The method of ventilation has been improved, and Sir W. E. Garforth believes those who are now studying will perfect in years to come a small fan for each coal face, in order that the miners may obtain an increased velocity of air —utilizing the fan in much the same way we all use fans on a hot summer's day.

A new system of signaling has been instituted at the Windsor colliery, in South Wales. They are endeavoring to abolish all electric signaling, and have devised a scheme of signaling with blast hooters, which have been put on every main-haulage engine on the east side of the colliery. The hooters are attached to a compressed-air column, and this is said to operate successfully. The pulling of a wire which runs along the roadway gives the signal to the engineman. It is said there is absolutely no danger of sparking with the new system.

The I. & S. C. M. Co.'s Plant at Issaquah, Wash.

By L. S. Richards*

SYNOPSIS—Description of an unusually effective installation for handling and treating the low-grade Pacific Coast fuels. The coal is carefully sized and both hand picked and washed. A new method of screening, termed a "flexible hanger shaking screen" was installed; although common to the anthracite fields this is the initial installation of this apparatus on the Pacific Coast.

The Issaquah & Superior Coal Mining Co., of Seattle, have recently completed a plant at Issaquah, Wash., for the preparation of lignite coal which is of especial interest because it is the most modern and complete of its kind on the Pacific Coast. The design of the entire plant was made and the machinery furnished by the Link-Belt Co., of Chicago, and the plant was erected and put in operation under the supervision of their engineers.



General View of Tipple and Washery

Tipple Arrangement

The coal is received from the mine in two-ton cars, being handled from the mouth of the drift in trains of 30 or 40 cars by an electric locomotive over a covered trestle about 700 ft. long. The cars are passed singly by gravity, over a track scale to a power-driven revolving tipple, a car stop being located between the scale and the tipple which enables the operator to regulate the cars going into it.

The revolving tipple consists of a structural-steel framework carrying a pair of rails for receiving the cars. This framework is supported at the ends by cast-steel rings which are carried by a pair of roller shafts on which the tipple revolves. The power for operating is received through one of these shafts, which is constantly revolving. The working of the tipple is controlled by means of a lever system through which the operator lifts the rings slightly out of contact with the driving rollers upon the completion of a revolution. This lever system is so arranged that the tipple is automatically stopped without the slightest jar.

The empty is forced through the tipple by the oncoming car and passes, by gravity, to a kickback which reverses its direction and switches it to the empty track, where it is stopped by a track brake. Here it is picked up by an inclined car haul and elevated to a height sufficient to allow it to pass by gravity back to the mouth of the drift.

Screens and Picking Table

The tipple discharges the coal into a hopper so arranged that the coal is eased down into it with practically no fall. This hopper is provided with a flop gate so that when rock is dumped it can be passed to the rock bin, located directly below it. The coal is fed uniformly from this hopper by a reciprocating feeder to a pair of shaking screens, the upper screen having 4-in. round perforations and the lower 2½ in. These screens separate the coal into 4-in. lump, 2½x4-in. egg, and 2½-in. slack.

The lump and egg coal are separated only for convenience in picking, each passing to an independent picking table, of which there are two. These tables discharge onto one loading boom which delivers the coal to the railroad cars. The tables are of the flat-top apron type and are of ample width so that the coal is spread out thinly, although the apron moves at only 50 ft. per min. The pans form a perfect circle around the head wheel which permits of the discharge chute being set high up to eliminate the fall of the coal at this point without allowing any leakage of the fine coal, since the chute may be set close to the pans.

The loading boom is of the corrugated apron type, which offers a maximum resistance to the sliding of the coal. It is provided with small diameter wheels at the discharge end, thus minimizing the drop of the coal into the car. The raising and lowering of the loading boom is accomplished by a worm-gear winch, power-driven and controlled by a set of bevel friction gears.

The rock and refuse, which are picked from the lump

*Engineer, with the Link-Belt Co., Chicago, Ill.



Draining and Sizing Screens for Washed Coal



Interior of Washery, Showing Link-Belt Jigs

and egg coal, are passed, by means of chutes, to a double-strand flight conveyor, located below the picking floor which discharges into the rock bin. The pieces of coal which have rock or clay attached to them are passed by the pickers to a single-strand flight conveyor alongside the rock conveyor. This delivers it to a spring relief crusher, which crushes it to 2½ in. and under.

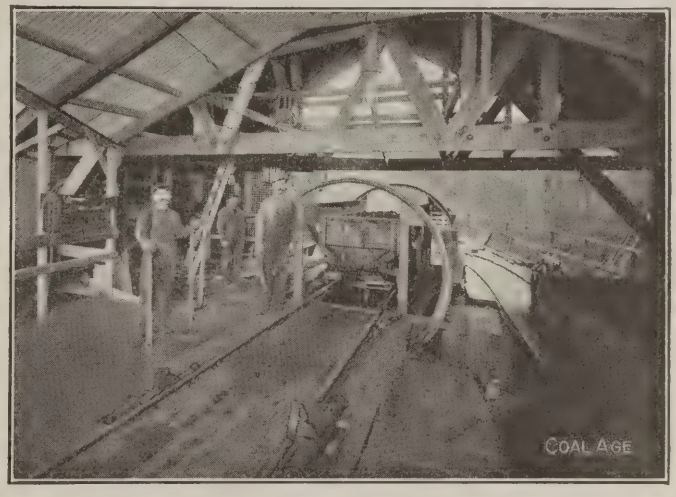
A Flexible Hanger Shaking Screen

The slack coal through 2½ in. from the lower shaking screen passes to a gravity-discharge conveyor which distributes it over a 500-ton raw-coal storage bin. This conveyor is arranged so that the return run passes underneath the bin and the coal is reclaimed by being fed into this run through slide gates, and elevated to a 100-ton raw-coal bin in the washery. The coal and rock from the crusher are also fed into this run of the conveyor and carried to the washery. The slack coal in discharging into the washery bin, passes over a flexible hanger shaking screen with ¾-in. round perforations from which it is delivered to two compartments, one for ¾-in. slack and one for ¾x2½-in. nut, each of 50 tons capacity.

This flexible hanger shaking screen is somewhat of a novelty in this part of the country, although extensively used in the anthracite fields of Pennsylvania. The sides are of 3x6-in. pine timbers and the connecting-rods 3x6-in. ash, rigidly attached to the side timbers. These connecting-rods are dressed down in the middle portion to a section of about 3x3 in. The hangers are 1x6-in. ash boards rigidly attached to the screen and to the supporting timbers. The screen is run at a more rapid rate than the ordinary shaking screen, and this together with the sharp action given by the spring in the hangers and connecting-rods, makes this apparatus most efficient in screening fine coal. It is more effective, and there is less breakage than with a revolving screen.

System of Washing

The coal is fed from the bottom of these bins through vertical slide gates to the washing jigs, the slack going to a Link-Belt three-compartment Foust jig, and the nut to a Shannon jig. The washed coal from each of these jigs passes to an independent settling tank and from there into a Luhrig type elevator. The nut coal is delivered



Revolving Tipple and Car Stop

to a shaking screen with ¾-in. round perforations where it is resized and sprayed with fresh water and delivered to a single-strand flight conveyor. This conveyor distributes it to the washed-coal bins. The undersize coal, together with the spray water from this screen is sluiced to the Foust jigs where it is rewashed with the slack coal. The washed slack from the Luhrig elevator discharges onto a pair of shaking screens where it is sprayed with fresh water and graded into pea through ¾ in. and over



Egg- and Lump-Coal Picking Tables



Distributing Conveyors for Washed Fine Coal

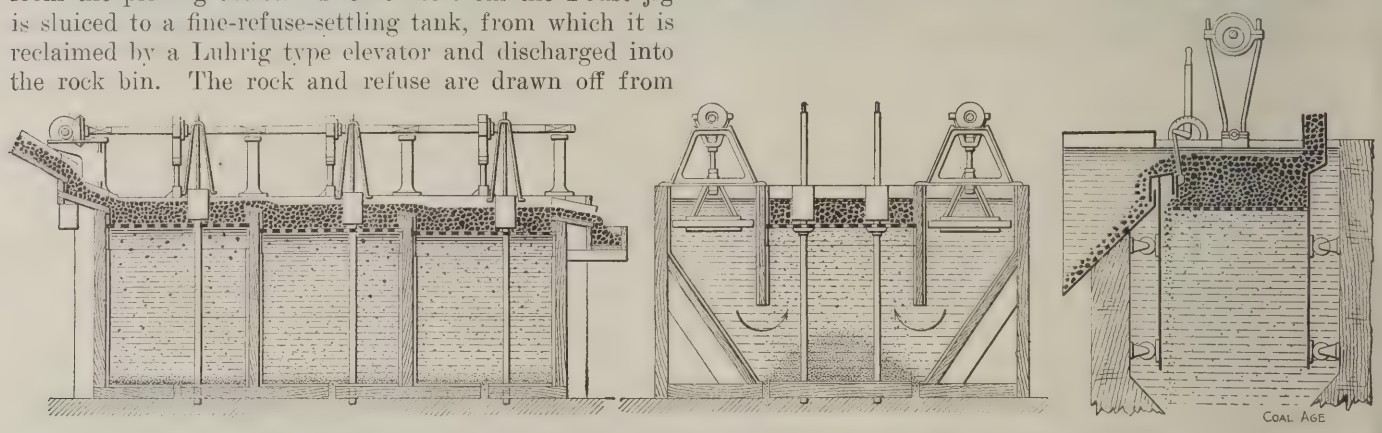
¼ in. and buckwheat through ¼ in. and over ⅛ in. The buckwheat is distributed to the bins by means of gates in the shaking screen and the pea coal passes to a single-strand flight conveyor which distributes it to the bins. These washed-coal shaking screens are all of the flexible hanger type, as described above.

The refuse from the Shannon jig passes into a Luhrig type elevator and is discharged into the rock conveyor from the picking tables. The refuse from the Foust jig is sluiced to a fine-refuse-settling tank, from which it is reclaimed by a Luhrig type elevator and discharged into the rock bin. The rock and refuse are drawn off from the rock bin through two undercut gates in the bottom and loaded into a gable-bottom refuse car of two tons capacity. This car is hauled up an inclined trestle by a wire rope operated by a friction drum and by means of a special tripping device it is dumped at any desired point along the trestle.

The washed-coal bins are provided with horizontal slide gates and hinged chutes for delivering coal to the railroad cars. The chutes are so arranged that when not in use they may be drawn up into a horizontal position and clear of the drip from the gates. The overflow water from all the tanks passes to a pump box from which it is drawn by a double-suction centrifugal pump supplying water to the jigs. The fresh water is supplied by a two-stage centrifugal pump from a near-by creek.

Machinery Equipment

The machinery is driven by 220-volt, three-phase, 60-cycle induction motors, there being ten all together throughout the plant. The power is supplied by the Puget Sound Electric Co. from their plant about 15 miles distant; it comes in over high-tension lines, and is



Two Types of Jigs (Foust and Shannon) Used in Washing Coal

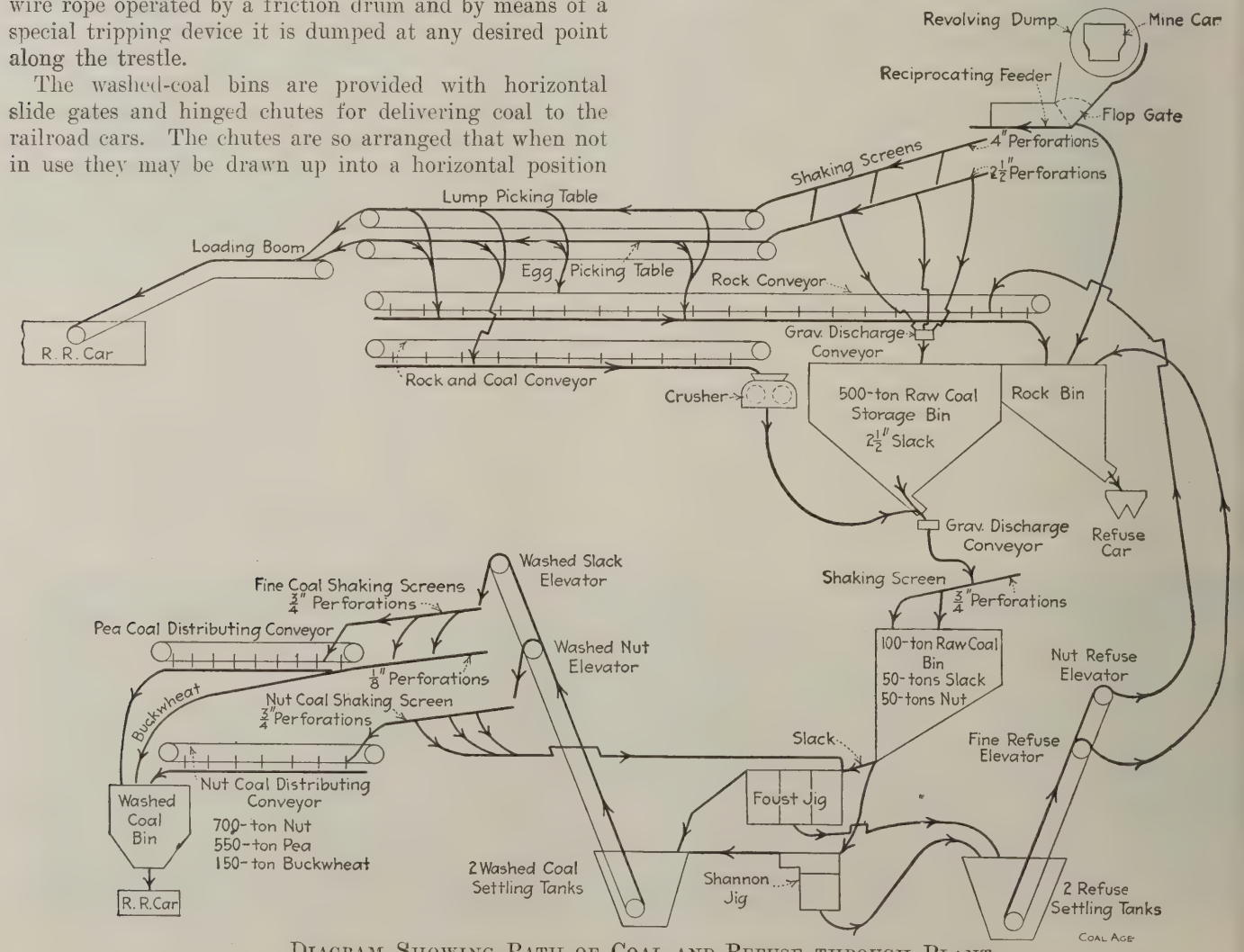


Diagram Showing Path of Coal and Refuse through Plant

transformed at the plant. The machinery supports, tanks, bins and building structure are of No. 1 Washington fir throughout, and the utmost care has been taken in framing to make a thoroughly workmanlike job. The roofing and siding are galvanized corrugated iron.

The coal is loaded out on two tracks, the lump and nut on one, and the pea and buckwheat on the other. There is also an arrangement of conveyors whereby nut can be stored in the pea-coal bins if desired and loaded out on the pea track. The nut-coal storage capacity is 700 tons, the pea coal 550, and the buckwheat 150 tons. The lump coal is loaded direct to the cars as previously explained. The plant will handle cars from the mine at the rate of 200 tons per hour, and the washery will handle the 2½-in. slack at the rate of 90 tons per hour.

This plant has now been in operation about four months and Issaquah has already become famous for the high-grade quality of the prepared coal which it is supplying to the trade. The plant has more than fulfilled the highest expectations of the engineers in charge and promises to revolutionize the coal industry on the Pacific Coast in some respects.

The Air Factor in Mine Explosions

By John Verner*

SYNOPSIS—Quotes the statements of the British Explosions in Mines committee, contained in their recent report, to show the necessity of determining those factors affecting the rate of combustion of coal dust in suspension in mine air, since it is the rate of combustion that determines explosion of the dust. The compression and disturbance of the mine air do not necessarily cause explosion of dust in contact with flame. The counter current a strong factor. Two experiments suggested, to be made in the Experimental Mine, at Bruceton.

The following important statement appears in the fourth report of the British Explosions in Mines committee:

> In the combustion of gaseous mixtures, there is no well defined border line between inflammation and explosion, the two terms being employed merely to indicate differences in the rapidity of combustion. But in the burning of mixtures of coal dust and air, it appears possible, and indeed necessary, to draw a line of distinction between inflammation and explosive combustion.
>
> Briefly, our view is that during an inflammation of coal dust (at all events, that of bituminous coals) the flame is propagated, largely, by the burning of gases distilled from the dust; whereas, during explosive combustion, the portion of each dust particle that aids in propagating the flame is burned as a whole, both the volatile matter and the fixed carbon being consumed.

In view of this statement, it becomes a very important matter to find the factor that determines the *rate* of combustion and to discover the process by which explosive combustion is produced. The position of the British committee, in this respect, is not clearly defined. The report states further:

> When inflammation occurs and the flame proceeds along the gallery, the expansion of the gaseous products of combustion causes a movement of a column of air which is pushed forward in front of the flame. The opposition to this movement may be approximately calculated, for a smooth gallery, since it depends on the inertia of the air to be moved, or the velocity of the air pushed forward and the size of the tube. But in the roadway of a mine this opposition may be enormously increased by the irregularities and obstructions, which cause waves and eddies in the air. A cloud of dust so compressed burns with greater rapidity than in still air. The effect on the advancing flame is thus cumulative.

Compression and Disturbance of Air Do Not Determine Explosion

This would permit the conclusion that the greater the compression and disturbance of the mine air, in the presence of flame that may come in contact with the raised dust, the more probable the occurrence of an explosion. But this does not seem to be the case, judging from the facts. The recent explosion in the Dawson mine, New Mexico, Oct. 22, 1913, was caused by the firing of a single shot. The occurrence of this great disaster, in which some 261 lives were sacrificed, shows that the dust was readily inflammable. For a long time prior to the explosion, all the shots prepared in this mine each day were fired at one time by electricity, after the men had left the mine, and no explosion resulted under this system. The practice of firing all the shots simultaneously has also been in use in some of the Utah mines for years; and, up to the present time, the results have been entirely satisfactory. The same appears to be true of the Oklahoma mines, where simultaneous firing has been the practice for some time.

It is admitted that explosions may occur under this method of simultaneous firing; but the fact that they have not occurred where this supposedly highly dangerous practice has been adopted, indicates forcibly that widespread concussion, causing a general suspension of the dust in the air, in every part of the mine, and the general compression of the dust-laden air, and giving ample opportunity for the contact of flame with the raised dust, are factors not sufficient of themselves to cause the explosive combustion of the dust.

Since the rate of combustion, other conditions being the same, depends on the amount of available air supply, explosive combustion, by which the several dust particles aiding in propagating the flame must be burned as a whole, requires a larger air supply than mere inflammation, which requires but a partial combustion of the dust particles. The report of the British committee states: "The expansion of the gaseous products of combustion causes a movement of a column of air, which is pushed forward in front of the flame." This is true, but it is also evident that the complete combustion of the dust, considered by the committee as necessary to cause explosive effects, cannot be obtained by driving the air and fuel supply continuously ahead and away from the flame.

Effect of the Counter Current

My view is that explosive combustion of coal dust in a mine is produced initially and reproduced during the explosion's progress with the aid of a more or less pow-

*Late mine inspector, Chariton, Iowa.

erful dust-laden air draft that is especially active along the mine floor, moving in a direction opposite to the advance of the explosion. Evidence of the probable existence of this draft or "counter current," as I have termed it, in previous articles, in Coal Age, may be readily found in the comment of the British committee on the effects of the sudden rise of pressure caused by explosive combustion in the Altofts gallery. "This sudden rise of pressure," the committee says, "about 50 ft. from the open end of the gallery, sends an impulse back toward the closed end where the pressure was previously comparatively low. That is to say, the impulse is traveling in an opposite direction to that of the inflammation."

A cursory analysis of the cause and effect of this reverse "impulse" shows that the low-pressure area near the closed end of the gallery and the contraction of the gaseous products of combustion determined the direction of movement; and the suddenly increased pressure was due to the resulting explosive combustion; while the dissipation of pressure in the workings toward the closed end of the gallery created another low-pressure zone, which, in turn, caused the rearward movement of the dust-laden air that had been driven ahead of the flame and compressed by the expansive force. The pressure curves prepared from the manometer records taken in the Altofts experiments and given in Coal Age, Jan. 31, p. 207, show clearly that the sudden rise of pressure was followed by a correspondingly sudden decline, permitting the conclusion that the greater and quicker the reverse impulse sets in, the greater its magnitude and force.

In view of this fact, it is my opinion that as soon as the subsidence or contraction period begins after each explosive combustion stage, a dust-laden air draft starts to move toward the flame (this draft, naturally, being strongest along the bottom of the entry, and continues to move in an opposite direction to that of the flame, thus providing air and fuel for its propagation, until explosive combustion again takes place, when the draft movement is momentarily stopped, only to begin again as soon as the resultant fall of pressure occurs.

The Air Factor vs. Dust Factor

The recent discussion in Coal Age, Vol. 3, p. 3, *et seq.*, regarding Reducing Ventilation When Firing, shows the existence of a belief among mining men that the presence of strong draft is a material aid in starting a dust explosion. On the other hand, it is asserted that even an unusually strong air current directed against the flame of a blownout shot has little or no influence in the enlargement and propagation of the flame. Some hold the view that the presence of the dust is the all-important factor, while others believe that the amount of available air supply, rather than the available dust, measures the magnitude of an explosion.

These conflicting views regarding the value and influence of the air and dust factors in mine explosions, show the necessity of definitely determining, as far as may be possible, which side of the controversy is right. This is all the more essential, because the establishment of the true facts in the case will undoubtedly hasten the final solution of the dust-explosion problem. In order that progress in this direction may be made and knowing that Doctor Holmes, of the Federal Bureau of Mines, invites suggestions that may prove helpful, I take the liberty of offering the following as an experimental test to be made in the Bruceton mine.

A Suggestion for the Bureau of Mines

In order to determine whether or not extensive inflammation and explosive combustion of suspended dust can occur under conditions restricting the power of the "reverse impulse" to induce a strong draft of dust-laden air in an opposite direction to that of the flame, I would suggest that means, similar to those used at Altofts and described in the Fourth Report of the British Explosions in Mines committee, be adopted, in the Bruceton mine, to produce the simultaneous suspension of coal dust along the entire length of the main entry, from its mouth to the face; and that two strong doors, made as nearly air tight as possible and well braced, be located in the air course, inby of and near the junction of the diagonal entry and the air course. Shale dust should then be spread along the sides and on the floor of the air course from these doors to the face of the entry. All the crosscuts, but the one at the face, are to be stopped.

Just prior to making this experiment, the doors mentioned should be closed and locked in such a manner that considerable force will be required to open them, either in an outward or inward direction. In addition to the coal dust placed on the swinging shelves in the main entry, dust is to be spread on the floor and side shelves and in front of the cannon. The cannon is then to be placed at the mouth of the main entry, its muzzle pointing into the mine. The powder charge may be the usual one, 2½ to 3 lb. of powder. The firing of the cannot must be simultaneous with the upsetting of the dust-laden swinging shelves along the entry.

Should this test be made and extensive inflammation or explosive combustion not be produced, I would suggest that another experiment be then made, under the same conditions, except that a stout door be erected at the mouth of the entry and that the cannon be placed just inside of the closed door and fired into the mine, as before. Should this test, also, fail to cause an explosion, that fact would demonstrate quite conclusively, to my mind, that a large dust cloud may be subjected to concussion, compression and the impact of flame without explosive combustion resulting therefrom. The absence of draft facilities will, I believe, prevent the comparatively unrestricted dust-carrying air movement in an opposite direction to that of the flame that supplies the air and fuel necessary to enlarge, renew, and extend inflammation.

Should these tests result in explosions, that fact will not affect their value in any way, for it has been demonstrated at the different experimental stations, that a change in the conditions surrounding the making of tests brings a change in the results; and it may reasonably be expected that, in any event, the suggested experiments, made under unusual and untried conditions, will bring out new facts and useful information.

It has been rightly said that the process by which explosive combustion of the dust is effected must be definitely known, in order to determine what means should be adopted for the prevention and limitation of explosions. The correct answer to the question, How does coal dust explode, has been sought for many years, but has not, as yet, been found. I believe there is more than a possibility that this answer may be supplied by making the experiments suggested above.

Longwall Mining in Kansas

By Barry Scobee*

SYNOPSIS—The lower seam in the Mineral field, south of Pittsburgh, has been practically exhausted. The operators are preparing to mine the upper seam by the longwall method. The writer describes some of the conditions encountered, and gives, in part, the scale agreed on in this connection.

Several important coal operators and the officials of District No. 14, U. M. W. A., recently agreed on a wage scale and terms for mining by the longwall method. This is something new in the district and even yet opinion is divided as to whether the room-and-pillar process would not be better. The longwall method, however, is recommended more substantially.



A New Mine, Clemens No. 4, North of Pittsburg, Kan.



Another Recent Development, Mine No. 19 of Western Coal and Mining Co.

The wage agreement was reached at Mineral, a town of 1500 people on the western edge of the coal field. This is an old field and practically all of the deep mines have been exhausted. The formerly important Missouri, Kansas and Texas shaft No. 8 is an example. The men have been quitting all winter, as they worked out their rooms.

There is, however, a shallower seam than the one these mines have taken out. It lies at an average depth of about 60 ft., while the old seam is nearly 200 ft. down. The upper seam is between 26 and 30 in. thick and is known to be six or seven miles wide. The length is a matter of speculation. The coal has no faults, is of good quality, and thus far, untouched. The current opinion is that it will profit the owners as much as the deep seam; and that it will be "the making of Mineral" if it is worked, for the town has been losing population by the miners going to the field north of Pittsburg.

J. H. Hibbens, of Parsons, representing the Missouri, Kansas & Texas; John Mayer, of Kansas City, a big operator in the district; William Barrett, on behalf of the operators; and George Richardson, arbitrator for the operators, met with the district officials and spent several days in arranging the plans. These men represented parties who are interested in the Mineral field; and Mr. Mayer and the Missouri, Kansas & Texas have idle machinery now which they will use when the top seam is opened. The miners also have homes in Mineral which they must leave if it is not opened, so that everything is favorable. Mr. Mayer has stated that he will open the top seam in the immediate future.

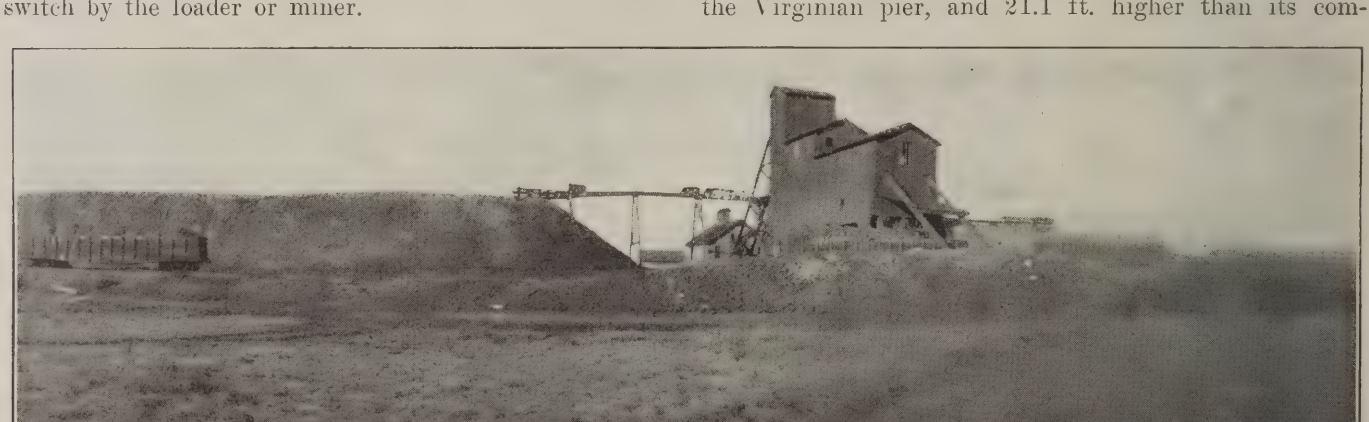
This field, owing to the lower seam being worked out, is being deserted. The towns of Arma, Edison, Ringo, Franklin and Capaldo have sprung up in the field north

*809 N. Walnut St., Pittsburg, Kan.

of Pittsburg and absorbed miners leaving the south end. Within the past year or less the following mines have been opened in the north end: Wear, 1; Central Coal & Coke Co., 2; Western Fuel & Mining Co., 2; Sheridan Coal Mining Co., 2; Clemens, 2; and Pittsburg-Cherokee Coal Mining Co., 1. These mines are about 200 ft. deep and the coal is 36 to 40 in. thick. Most of the mines are dry and shotfiring accidents are common.

Following is the scale, in part, as arranged in the conference, for longwall mining, or, at least, for taking out the upper seam:

Loading price is 60c. a ton of 2000 lb., the coal to be free from all slate, dirt, bone, sulphur, blackjack and other impurities, and to be delivered to the working switch by the loader or miner.



An Old Kansas Mine of Missouri, Kansas and Texas Co., near Mineral, Kan.

The cutting price is 30c. per ton of coal undercut and loaded, and it will be divided 16c. to runner and 14c. to helper.

The following prices for brushing apply: For roadway 4 ft. 6 in. above the rail, per yd. $1.56. Higher brushing in proportion. Where bottom-room brushing in rooms is required, it is to be paid for at the rate of 30c. per yd. for first 6 in., and 4c. for each additional inch.

Development in Coal-Loading Docks

An increase of about 20 per cent. in the tonnage of American railways furnished by the products of mines during the last five years has required the provision of elaborate terminals of special designs to handle the various classes of this low-grade traffic. Only six coal unloading plants classed as mechanical were in operation in Atlantic ports up to 1910, all of these being in New York harbor. One of the six was a belt-conveyor outfit, hoisting the coal from a track hopper to a height sufficient to allow it to be dumped into boats. The other five were all car-dumping machines located at a proper height to dump directly into boats, the road cars being pulled up in most cases by a barney. The remaining 50 docks located at the four Atlantic ports which load bituminous coal on ocean-going vessels were of the gravity type, the road cars being pushed or pulled to the top of a trestle on the pier from which the coal is dumped into boats.

In spite of the fact that more coal from the West Virginia fields is hauled to the Northwest since the acquisition of the Hocking Valley by the Chesapeake & Ohio, and in the face of increased competition for the West Virginia seaboard coal traffic, which followed the completion of the Virginian and the Carolina, Clinchfield & Ohio, the Norfolk & Western has more than doubled its traffic in bituminous coal during the last five years, and the tonnage delivered to vessels at this company's terminal at Lambert's Point in the Norfolk harbor during 1913 was more than 46 per cent. of the total tonnage handled in this harbor. This heavy traffic made advisable the construction of a new loading dock which is not as long as several of those already in service in the New York harbor, but it has more spouts than any of the gravity or simpler mechanical devices and the same number as the combination dock of the Virginian. It is 22.3 ft. higher than the Virginian pier, and 21.1 ft. higher than its companion gravity pier No. 3, at Lambert's Point, which formerly had the maximum capacity and the greatest height on the seaboard. The self-propelled pier cars are similar to those used on the Virginian docks, and have some common features with those used on the Canadian Pacific unloading dock at Fort William, but are of much greater capacity than either of the other designs.

By the replacing of one of the old gravity docks with this new combination mechanical gravity plant, the total rated capacity of the Norfolk & Western terminal was increased from 3150 tons per hour to 7875 tons per hour. The maximum capacity of a coal-loading dock must be greatly in excess of the average output on account of the necessity for loading large cargoes rapidly in order not to delay the vessels. In general, the output of the coal piers on the Atlantic coast averages about 30 per cent. of their maximum capacities, but the new pier at Norfolk could have loaded all the coal shipped from Lambert's Point in 1913 by working at its maximum rated capacity for only 13 hours per week. While the rating of 90 tons per minute for this pier is unusually high, it has been shown during the three months that the new pier has been in operation that it is not only capable of developing this capacity, but it has actually exceeded the rate for one dumper already, and probably will considerably exceed the total rate when both dumpers are put in service. —*Railway Gazette.*

Seams liable to spontaneous ignition should be worked by a method which facilitates the stopping-off of a district so that when a fire occurs the portion affected may be shut off without interfering with the rest of the mine. The panel system of working is best suited to such a seam.

A Triangulation Survey of the Fairmont Region

By A. W. Hesse*

SYNOPSIS—A description of one of the largest surveying projects ever undertaken in the coal industry. It involved precise control of a territory 90 lineal miles in length and comprising an area of 250 square miles. A description of both field and office methods employed.

In mapping immense tracts of land, before any of the ordinary surveys with transit and tape are made, it is necessary to secure control of the territory by primary, and perhaps secondary, triangulation surveys, if a high degree of accuracy is desired.

All the work of the United States Geological Survey is based on this system in obtaining the data for the construction of the geological and topographical maps and folios. In order to get the proper relation of points in various parts of the United States, astronomy is employed and determinations of latitude and longitude, in relation to Greenwich, are made at these points. Then they are connected by the primary triangulation survey. The astronomic determinations, being very accurately made, serve as a check on the primary triangulation survey made between these points. Then the secondary survey stations are located at shorter distances apart within the primary survey triangles, and are checked on the latter. The transit and tape surveys are then checked on the more accurate points of the secondary triangulation survey stations without running over excessive distances. Not much over two miles should be run without being "tied in."

Methods of Triangulating

This is the system employed in the fabrication of the surveys of the Consolidation Coal Co., mentioned in my article in Coal Age of Feb. 21, 1914, except that the astronomic determinations were omitted and the U. S. G. S. stations were used for checking the coal company's surveys.

Triangulation consists in surveying by triangles, the side of one forming the side of an adjacent triangle, as shown by *A* in the accompanying Fig. 1, in which the side *BC*, of the triangle *ABC*, is also the side of the triangle *BCD* and the side *CD*, of the triangle *BCD*, is also the side of the adjacent triangle *CDE*. Therefore, if the side of a triangle and the interior angles are known, the other two sides can be computed.

The first step then is to locate the points forming the adjoining triangles, so that clear sights can be obtained from one to the other. Next a base line is established, serving as a side of a triangle at each end of the system (and if the survey is long, an interior or intermediate base line), so located that they can be accurately measured. Then, in the accompanying figure, assuming *AB* and *DE* are measured and the interior angles known, when the other sides are calculated there will obviously be one common to each origin somewhere between, which will determine whether the work has been performed correctly. Or when the side *DE* is calculated, starting from *AB*, the result must be the same as obtained by actual measurement.

The maps shown in Figs. 2 and 3 are the triangulation survey made in the Fairmont Region for the Fairmont Coal Co. These surveys were started back in 1901 by H. V. Hesse, then chief engineer of the Fairmont Coal Co., and it was under his supervision that the bulk of the work was completed. Extensions to the main survey were made from time to time until the whole territory was controlled in 1909.

The properties now covered by this work are owned or controlled by the Consolidation Coal Co. In straight lines, the surveys extend over a distance of 90 miles, covering an area of about 250 square miles and requiring about 230 hubs or stations. These stations usually consist of a short bar or heavy rail, driven into the ground about three feet and the top center-punched. As each station was established it was described in reference to nearby trees or other available objects of the most substantial nature.

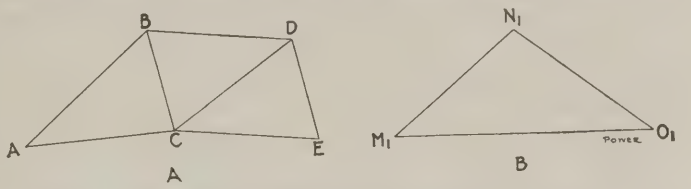


Fig. 1. Showing Series of Connected Triangles

The true meridian formed the basis of all the courses or bearings of this system and was established at Mine 56, near Watson. When this had been carried to the Government stations, it was checked against the bearings of the sides forming the angle at each station.

Base Lines

Measurements of the base lines were made while the transit readings of the angles were being taken. The first two base lines measured are located at Beechwood and Ehlen, about 25 miles apart. The description of the measurement of one base practically describes all of the six lines measured.

The first step in the determination of the length of a base line is to standardize the tape; that is, find at what temperature and pull it is U. S. standard measure. The tape manufacturer can furnish this information or it can be compared with the steel tape duly certified by the Bureau of Weights and Measures, at Washington. The tape used on this work was standard at eight pounds pull and 62 deg. F., and was 300 ft. long.

There are certain variable factors which also enter into the measurement of a base. These are errors, due to difference in temperature and pull and difference in sags caused by the variation in pulls. Consequently, corrections must be made for the same.

In Merriman and Brooks' "Handbook for Surveyors," page 87, are shown the formulas we used, which are as follows:

*Assistant chief engineer, the Consolidation Coal Co., Fairmont, W. Va.

$$temperature = +e(T - t)l$$

$$pull = +s(P - p)l$$

$$sag = -\tfrac{1}{24}\left(\frac{wl}{nP}\right)^2 l$$

e = Coefficient of expansion;
s = Coefficient of stretch;
p = Standard pull;
P = Pull of measurement;
t = Standard temperature;
T = Temperature of measurement;
n = Number of equal spaces in l;
w = Weight in pounds per lineal foot of tape;
l = Observed distance;
L = Mean adjusted distance;

Knowing the standard pull for the tape, the coefficient of expansion is determined by marking off accurately about 200 ft. on the floor of a large room, at the same time noting the temperature. This latter is then raised or lowered and the distance again measured and the operation repeated several times, the pull always being the same in each case. The change of length in each measurement is accurately observed and divided by the 200 ft.; this result is then divided by the difference in temperatures, in degrees, of the two readings. The result gives the coefficient of expansion. The several results are, of course, averaged and the mean adopted. The value obtained for the tape used was $e = 0.0000063$.

The next factor required, for use in the correction for pull, is the coefficient of stretch. This is necessary since the tape is used under different tension and the relative change in length for one pound pull must be determined. The operation is the same as that described for the coefficient of expansion, except in this case the temperature is maintained the same while the tension is varied. Then the coefficient of stretch is the difference in lengths divided by the total length, and that result divided by the difference in tension in pounds. In the coal company's determinations these pulls varied from 8 to 12; 8 to 16; 8 to 20; 12 to 16; 12 to 20, and 16 to 20 lb. The average result of these operations gave as the coefficient of stretch, $s = 0.000013645$.

Field Work

As previously mentioned, the base line formed one side of a triangle, the stations being substantial hubs. The base line was first laid out in divisions of about the length of the tape, in this case 300 ft., and stout stakes set at such division points. These were all on line between the ends of the base. On each division stake was placed a sheet of tin on which a fine mark was made at right angles to the line of measurement. After the stakes were set, elevations were obtained on the tops, and more stakes were set dividing each division into equal subdivisions of 50 ft. This usually made n, in the given formula, equal to six. The subdivision stakes were likewise placed on line and small nails driven into the tops to keep the tape in position while measuring.

The Ehlen base line consisted of four divisions, each of which contained six subdivisions, except the fourth, which contained five of 49 ft. each. The entire line was measured five times; six measurements were made of each division three times and eight measurements of each division made twice, making a total number of 136 measurements, of which 120 were used in calculating the line. The accompanying field notes will illustrate how these readings were taken and recorded for one division.

MEASUREMENT OF EHLEN BASE

12-11-01

Party { Kinkley, Smort, Jones, Hames } Division IV n = 5 3 p.m.

Pull	Temp.	Distance	
8 lb.	50°	245-12.45 = 243.963	
10 lb.	49½°	245-12.62 = 243.948	
12 lb.	49¼°	245-12.50 = 243.958	Day clear
8 lb.	48¾°	245-12.38 = 243.968	
10 lb.	49°	245-12.58 = 243.952	No wind
12 lb.	49°	245-12.60 = 243.950	

Spring balances were used at each end of the tape, one end of which was held stationary over the stake while the other was pulled until the proper strain was obtained when the reading was taken. In the above case, the 245-ft. graduation was a fraction more than 12 in. over the division length, the difference being read by an engineer's scale, graduated to fiftieths of an inch, making it possible to read to hundredths.

In a book, kept specially for the purpose, these measurements were rearranged and each division worked out by itself, as shown by the accompanying notes.

EHLEN BASE—DIVISION IV ADJUSTMENT OF FIELD NOTES

Temp T F	Pull P Lb.	Observed Distance	Corrections Temp. (Feet)	Corrections Pull (Feet)	Corrections Sag (Feet)	Adjusted Distance
50°	8	243.963	—0.0184	.....	—0.0332	243.911
49½	10	.948	0.0192	+0.0067	0.0213	.924
49¼	12	.958	0.0196	0.0133	0.0148	.927
48¾	8	.968	0.0218	.....	0.0332	.913
49	10	.952	0.0200	0.0067	0.0213	.917
49	12	.950	0.0200	0.0133	0.0148	.929
42¾	8	.969	0.0296	.....	0.0332	.906
44¼	10	.952	0.0273	0.0067	0.0213	.917
45¼	12	.938	0.0257	0.0133	0.0148	.911
45½	8	.963	0.0254	.....	0.0332	.904
45¾	10	.951	0.0249	0.0067	0.0213	.912
47	12	.935	—0.0230	0.0133	0.0148	.911
70½	8	.924	+0.0127	.....	0.0332	.904
69½	10	.908	0.0115	0.0067	0.0213	.905
69¾	12	.902	0.0119	0.0133	0.0148	.912
69½	8	.931	0.0115	.....	0.0332	.909
70	10	.915	0.0123	0.0067	0.0213	.913
70¾	12	.898	0.0134	0.0133	0.0148	.910
74	8	.929	0.0184	.....	0.0332	.914
73½	12	.898	0.0177	0.0133	0.0148	.914
74	16	.881	0.0184	0.0266	0.0083	.918
73¼	8	.930	0.0173	.....	0.0332	.914
73¼	12	.898	0.0173	0.0133	0.0148	.914
72¾	16	.879	0.0165	0.0266	0.0083	.914
73¼	8	.931	0.0173	.....	0.0332	.915
73½	12	.901	0.0181	0.0133	0.0148	.918
73½	16	.881	0.0177	0.0266	0.0083	.917
73	8	.933	0.0169	.....	0.0332	.917
73¼	12	.900	0.0173	0.0133	0.0148	.916
73¼	16	243.881	0.0173	0.0266	0.0083	243.917

Mean observed distance = = 243.926
n = 5 h = 0.377 ft.
Mean adjusted distance = 243.9141
Final horizontal distance = 243.9138

These notes give some idea of the variations in measurements caused by a difference in temperature and pull. It will be noted that the average of the observed distances is 243.926 ft. Taking this as l and substituting in the formulas for corrections heretofore given, they reduce to

$$correction\ for\ temperature = +0.0015367\ (T - 62)$$

$$correction\ for\ pull = +0.0033284\ (P - 8)$$

$$correction\ for\ sag = -\frac{2.12595}{P^2}$$

Where the pull equals 8 lb., the correction for pull reduces to zero and the algebraic sum of the corrections and observed distance gives the adjusted distance. After all the adjusted distances were worked out, the average of the results was taken as the final adjusted distance, in this case being 243.9141 ft. The difference in elevation between the hubs of this division was $h = 0.377$ ft. Therefore, taking the square root of the difference of the squares of the mean adjusted distance and the difference of elevation, we get the final horizontal distance, 243.9138

ft. ($\sqrt{L^2 - h^2}$). Thus each division of the base was worked up and the sum of the distances gave the final length of the base line.

All of these calculations were worked out by naturals in duplicate to avoid the slightest possible error. Copying and recopying were always checked and marks indicating that results were correct had to show this fact.

Angle Observations

The observations of the angles of all the triangles are illustrated at B in the accompanying Fig. 1 and in the notes. In the triangle $M_1O_1N_1$, the readings on angle O_1 are here given:

Aug. 26, 1901 — Party { Molt, Jones, Charles, Johnson, German.
9 a.m. — Cool & Hazy

$\angle M_1O_1N_1$

A	1° 04′ 15″	Telescope Direct	
1	30° 05′ 30″	29° 01′ 15″	Average 29° 01′ 18.75″
2	59° 06′ 50″	29° 01′ 20″	
3	88° 08′ 15″	29° 01′ 25″	
4	117° 09′ 30″	29° 01′ 15″	
A	90° 14′ 15″	Telescope Reversed	
1	119° 15′ 30″	29° 01′ 15″	Average 29° 01′ 18.75″
2	148° 17′ 00″	29° 01′ 30″	
3	177° 18′ 10″	29° 01′ 10″	
4	206° 19′ 30″	29° 01′ 20″	

$\angle N_1O_1M_1$

A	360° 22′ 15″	Telescope Direct	
1	331° 21′ 00″	29° 01′ 15″	Average 29° 01′ 20″
2	302° 19′ 45″	29° 01′ 15″	
3	273° 18′ 25″	29° 01′ 20″	
4	244° 16′ 55″	29° 01′ 30″	
A	270° 30′ 30″	Telescope Reversed	
1	241° 29′ 30″	29° 01′ 10″	Average 29° 01′ 15″
2	212° 28′ 00″	29° 01′ 20″	
3	183° 16′ 45″	29° 01′ 15″	
4	334° 15′ 30″	29° 01′ 15″	

Mean 29° 01′ 18.13″. Weight 2

In these readings each series was read on the A vernier, while in most cases later the B vernier was read when the telescope was reversed, thus eliminating errors due to angular distance between the verniers and to any eccentricity of the graduated limb.

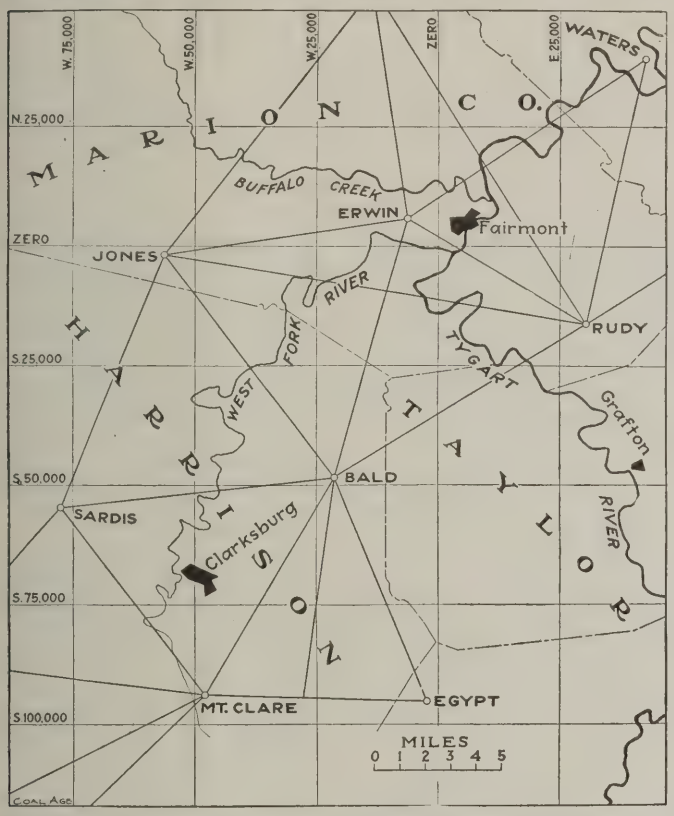


Fig. 2. Primary Triangulation Survey; Fairmont-Clarksburg Region

The instrument used had vernier graduations to read 20 sec. direct, making it possible to estimate to 5 sec. When readings were started the vernier was set by naked eye to the starting point, then read with a magnifying glass and recorded. These readings are shown opposite A, as found in each particular case. In the first two series, the backsight was taken on M_1 and the angle turned to N_1, where the vernier was clamped. After the reading was taken the spindle was unclamped and the backsight again taken on M_1 without resetting to the original starting point, but each angle being added to the one previously read, thus making cumulative readings. Subtracting A from each of the following readings and dividing by the number opposite to the left, gives the reading recorded on the right. In the first two series A is subtracted from the readings which follow, while in the last two each reading is subtracted from A and divided by the number opposite.

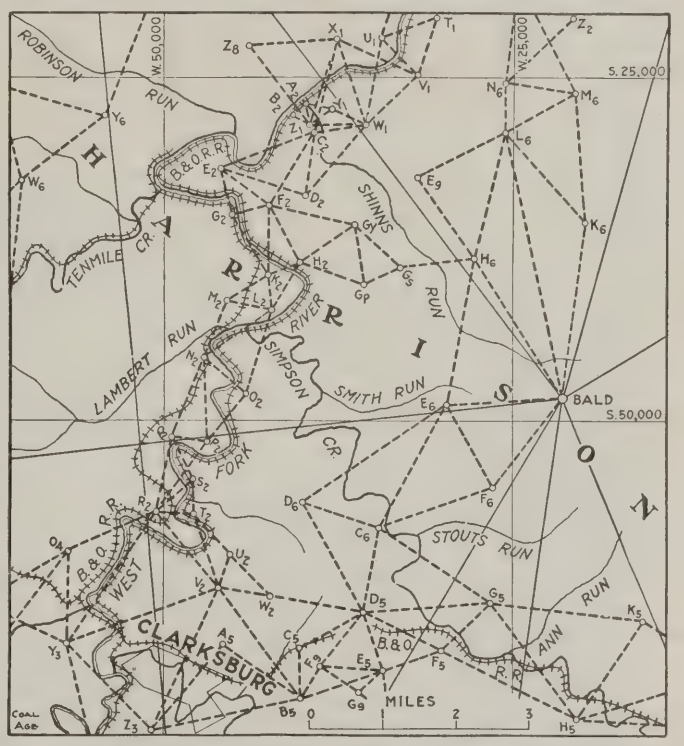


Fig. 3. Showing Triangulation Survey in Vicinity of Clarksburg, W. Va.

The "mean" result is the average of the four average results to the right. The weight 2 designates the condition under which the readings were taken. Weights were used from 1 to 5, inclusive. Number 1 represented excellent conditions, while number 5 represented the worst. These weights were used in distributing the error of closure when the triangle was adjusted. This may be shown by the triangle in which the angle O_1 formed a part:

	$M_1 - N_1 - O_1$			Corrected
$M_1\ N_1\ O_1$	128° 39′ 39.06″	+ 1.74″	=	128° 39′ 40.80″
$N_1\ O_1\ M_1$	29° 01′ 18.13″	+ 1.16″	=	29° 01′ 19.29″
$O_1\ M_1\ N_1$	22° 18′ 58.75	+ 1.16″	=	22° 18′ 59.91″
	179° 59′ 55.94″	+ 4.06″	=	180° 00′ 00.00″

Here, the error of closure was —4.06 sec., and the weight on the angles N_1, O_1 and M_1 were 3, 2 and 2, respectively. Therefore, N_1 took three-sevenths of the error, while O_1 and M_1 each took two-sevenths of the error to make the sum of the angles equal 180 deg. In only the most extenuating cases were errors of closure

allowed to stand, which exceeded 5 sec., this being the set limit.

After the adjustment of the angles came the calculation of the distances or sides of the triangles. The well known trigonometric formula: "The sides of a triangle are proportionate to the sines of the angles opposite," was used. Thus in the given triangle $M_1N_1O_1$, say the side M_1N_1 had been previously calculated, then:

$$\frac{sine \angle O_1}{sine \angle N_1} = \frac{M_1N_1}{M_1O_1}$$

which, by transposition, becomes

$$M_1O_1 = \frac{M_1N_1}{sine \angle O_1} \times sine \angle M_1$$

Also

$$N_1O_1 = \frac{M_1N_1}{sine \angle O} \times sine \angle M_1$$

Then one division serves for both equations. These calculations were performed by naturals, the sines of the angles being carried to ten decimal places in order to determine the ninth. In the division of M_1N_1 by the sine of $\angle O_1$, the result was carried to five places to determine the fourth, and likewise, the results of the multiplications were adopted to four decimal places.

Computing the Distances

In the calculations of the sides of these triangles, the base line at Beechwood formed the side of the first triangle at that end and the base line at Ehlen formed the side of the first triangle at that end. Then somewhere between there was one side which had to be calculated from adjoining triangles. When the work from each way met, the difference between the calculated lengths amounted to 24 ten-thousandths of a foot (0.0024 ft.). Thus the surveys were checked all through the system.

The next step consisted in obtaining courses between the various stations. As previously stated, the true meridian had been established near Watson and transferred to a side of one of the triangles from which all the other sides were calculated by means of angles between the sides. One method was by addition and the other by subtraction, and the results checked one against the other. Thus, say the azimuth of the side M_1N_1 of the triangle $M_1N_1O_1$ is:

	Addition		Subtraction	
	M_1N_1 = 129° 13′ 50.05″	Reverse	129° 13′ 50.05″ =	M_1N_1
Add	M_1 = 22° 18′ 59.91″	Get	309° 13′ 50.05″ =	N_1M_1
		Subtract	128° 39′ 40.80″ =	N_1
Reverse	M_1O_1 = 151° 32′ 49.96″			
And get	O_1M_1 = 331° 32′ 49.96″	Reverse	180° 34′ 09.25″ =	N_1O_1
Add	O_1 = 29° 01′ 19.29″	Get	360° 34′ 09.25″ =	O_1N_1
		Subtract	29° 01′ 19.29″ =	O_1
Reverse	O_1N_1 = 360° 34′ 09.25″			
Get	N_1O_1 = 180° 34′ 09.25″	Reverse	331° 32′ 49.96″ =	O_1M_1
Add	N_1 = 128° 39′ 40.80″	Get	151° 32′ 49.96″ =	M_1O_1
		Subtract	22° 18′ 59.91″ =	M_1
Reverse	N_1M_1 = 309° 13′ 50.05″			
Get	M_1N_1 = 129° 13′ 50.05″		129° 13′ 50.05″ =	M_1N_1

After the azimuths and distances of the side of each triangle were calculated, the quadrants or courses were easily obtained from the azimuths and the latitude and longitude differences were computed by naturals. In these calculations also, were the sines and cosines carried out to nine decimal places. Having obtained these differences, the zero point of the coördinate system was placed at Mine No. 56, near Watson, and total latitudes and departures were worked up for all the stations from this point.

The values on each station were checked by working in both directions around the triangle. For instance, in the triangles ABC and BCD, previously given, the point A being taken as zero, say B is north 2000 ft. and east 1000 ft. from A, therefore C must be south 1950 ft., and east 1000 ft. from B by calculation from the course and distance between them, if C is north 50 and east 2000 from A. Likewise, d must receive values from b and c that coincide, and all the way through the system, the values on the stations received from the different points must check. At some places, quadrilaterals were used and the same line would be calculated from different sources.

Latitudes and Departures

After all the coördinate values were placed in the record book, together with the other data of the survey, such as azimuths, quadrants, etc., shown on a regular traverse sheet (see Coal Age, Feb. 21, 1914), the elevations on the stations were calculated from the vertical angles taken between stations and the previously calculated distances. The sights on the rod were taken on the top and the correction made for the 8-ft. difference Set-ups were made on each station, thus checking one reading and calculation against the other.

Say from A to B the reading was plus 2° 50′, rod 8 ft., and the reading from B to A was minus 2° 19′, rod 8 ft., and the distance between the points 1000 ft. The height of instrument at A was 4 ft. and at B it was 3.50 ft. Then from A to B we get plus 49.05 — 8 ft. (rod) plus 4 ft. (instrument) equal to plus 45.05 ft. From B to A, we get minus 40.43 ft. minus 8 ft. plus 3.50 ft. equal to minus 44.93 ft. In places where it was difficult to get these verticals to correspond, precise levels were run to the stations and checked back on the bench mark. The elevations on the triangulation stations served as checks on the elevations carried by transit and tape surveys. The calculation of vertical distances was performed by means of naturals and logarithms carried to seven decimal places.

This triangulation survey now forms the framework of all other surveys in the field. The results and benefits derived from this work have already proven invaluable in many ways.

The Consumption of Water in Anthracite Mines

The desert of Sahara, where they occasionally kill and cut open a camel in order to get the water which it contains, is not the only place where water is a valuable salable commodity. Right at our doors, in the anthracite mines of Pennsylvania, the operators pay out nearly $600,000 a year for pure, fresh water. This is necessary, after pumping over 1,000,000,000 tons, or approximately 300,000,000,000 gal. of water a year out of the mines.

Mine water is plentifully charged with sulphur, and the disastrous effect of the sulphur upon iron necessitates the frequent renewal of the hundreds of miles of pipe in the mines. A pipe line laid new early in April has been known to be ruined by July.

One company bought 1,316,369,963 gal. of water last year for which it paid $109,494.76, and consumed nearly 100,000,000 gal. at one colliery. The total quantity of fresh water bought by the anthracite coal operators last year is calculated to be 7,115,573,324 gal. and the cost $591,863.56.

Wire Ropeways for Coal Transport

SYNOPSIS—The wire ropeway often is found more adaptable to mining operations than the railway. It is not usually subject to the formation and configuration of the land; and it is both simple of construction and inexpensive of operation.

It is not always possible to arrange matters so that the railway siding is immediately adjacent to the most convenient loading point of a colliery, and in some cases the question of transport between a colliery and the main line railroad, or shipping point, becomes a matter of serious difficulty. It is of interest therefore to examine the alternative method of transmission by wire ropeways, which has been developed to a very considerable extent in Germany and elsewhere, and we are indebted to Messrs. A. W. Mackensen, of Schoeningen, for details of some of the plants of this type which they have constructed.



FIG. 1. WIRE ROPEWAYS. NOTE THE PROTECTION BRIDGE ERECTED OVER THE ROAD CROSSING TO INSURE PUBLIC SAFETY

ADVANTAGES

It is claimed that with modern methods of construction the results obtained with suitably erected wire ropeways are so favorable that, nowadays, if two points are to be connected, the wire ropeway may be as readily taken into consideration as an ordinary railway. The most important advantage of a wire ropeway, as compared with a railway, is that the former is dependent neither upon the configuration or formation of the ground over which it has to pass. It can cross roads and other obstructions at the required height without being a hindrance to the traffic below, as cables can be suspended from points 1000 yd. or more apart, deep valleys and rivers can be negotiated. A wire ropeway is also suitable for a steep mountain side. Moreover, a railway often has to be laid in curves, owing to the natural formation of the ground or to the necessity of avoiding private property, public roads, etc., while the difficulty of making a straight wire ropeway for any of these reasons is much less. Consequently, the wire ropeway is often shorter than the equivalent railway, leading not only to a lower cost but less operating expense. The latter point is also secured by the fact that the wire ropeway works entirely automatically except at the end stations, and even there the loading and unloading of the cars can be accomplished with a very small amount of labor because of the easy handling of the cars and the small loads carried in each unit. The wire ropeway is not influenced by weather as its working cannot be interrupted by snow, frost, floods, etc., and the construction or moving of such a line does not involve much time or expense. In case of difference of level, a saving of power can often be effected by balancing the

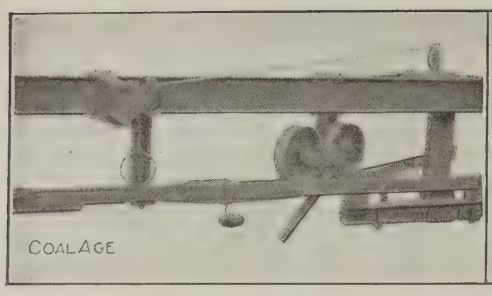


FIG. 2. THE MACKENSEN SYSTEM OF SIMPLIFIED SPECIAL SWITCH

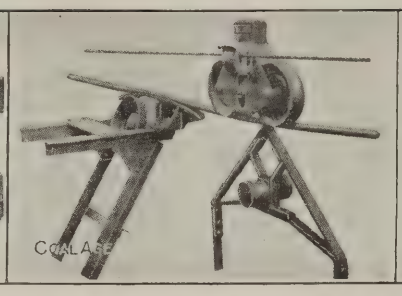


FIG. 3. A SPECIAL SAFETY CROSSING SYSTEM

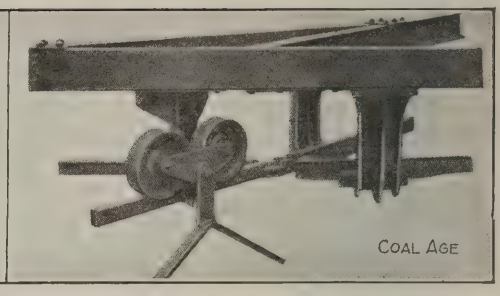


FIG. 4. A ROPEWAY CAR PASSING A SUPPORT

weight of the cars moving in one direction against that of those moving in the opposite direction on the return journey. As the wire ropeway can make such a good showing as compared with railways, it is evident that it is even more advantageously employed as compared with horse haulage.

DISADVANTAGES

A wire ropeway cannot, however, be compared with machines which are manufactured on a large scale and are then put on the spot where they have to work, because every ropeway must be planned differently in each individual case in order to suit the special conditions. The single parts cannot, as a rule, be calculated theoretically but can only properly be estimated on the basis of experience. The cars and other accessories must be able



FIG. 5. A PORTION OF A WIRE ROPEWAY ABOUT FIVE MILES LONG

to stand rough handling, and not only must the wire ropeway be free from danger of breaking at any point but it should also be kept permanently in good condition.

CONSTRUCTION FEATURES

The carrying ropes are generally of a closed construction and if only light loads are to be carried, or if the cost of construction is to be as low as possible, round wires are used. For traction ropes, cables of a special construction are adopted which go round large pulleys at the end stations and are always kept in tension by means of weights. If very heavy loads are to be conveyed, the weight is duplicated so as to be carried by four or more wheels, that is to say, by suspending a load from two single carriages, or by means of a special double trolley in which two single trolleys are combined by a connecting beam. An automatic coupling device is constructed on the principle that the clamps which hold the traction rope on both sides are pressed together by the weight of the car in such a manner that the frictional power is several times the weight carried. As a means of transmission, a wedge is used, which moves the clamps exactly parallel to themselves so that, as the rope is never pressed obliquely at any time, it attains its longest possible life. The pressing power can be exactly calculated and is maintained from the moment when the rope is gripped by the clamps until it is released. The proper working is not upset by wear on the rope or clamps, and a car can change from one line to another even if the traction ropes have differing diameters. It is not necessary to detach the car from the traction rope in taking curves as the cars will take these automatically.

The tilting of the cars at the station is usually accomplished by hand, but it is also easy to provide automatic unloading. This is specially useful for the purpose of building up heaps of material such as clinkers, coal, etc.

ILLUSTRATIONS

Fig. 5 shows a portion of a wire ropeway about five miles long, for transporting coal and clay. The capacity per hour is 140 cars of coal, containing 21 cu.ft., and 60 cars of clay of 14 cu.ft. Fig. 1 shows another wire ropeway for transporting coal and taking back mining timber, the feature of the photograph being a protection bridge erected over a road crossing and showing the simplicity with which safety to the public is secured. Figs. 2, 3 and 4 show, respectively, the Mackensen system of simplified special switch, a special safety crossing system, and a ropeway car passing a support. A good many other examples could be given of the application of the wire-ropeway system for coal transport, but, these are sufficient to show the importance of its various applications.

Immigration and Emigration

The Department of Labor reports the arrival and departure of aliens in the United States for the year ended June 30, 1913, and for the six months ended Jan. 1, 1914, as follows:

	Year			Six Months		
	Arrivals	Departures	Net*	Arrivals	Departures	Net*
July	78,101	24,673	+ 53,428	138,244	26,434	+111,810
August	82,377	25,725	+ 56,652	126,180	23,242	+102,938
Sept	105,611	23,728	+ 81,883	136,247	19,241	+117,006
October	108,300	27,153	+ 81,147	134,140	26,998	+107,142
Nov	94,739	41,444	+ 53,295	104,671	27,632	+ 77,039
Dec	76,315	45,048	+ 31,267	95,387	30,243	+ 65,144
Jan	46,441	29,730	+ 16,711	44,708	34,216	+ 10,492
Feb	59,156	15,253	+ 43,903	.....	.....	.....
March	96,958	15,044	+ 81,914	.....	.....	.....
April	136,371	18,331	+118,040	.....	.....	.....
May	137,262	19,131	+118,131	.....	.....	.....
June	176,261	22,930	+153,331	.....	.....	.....
Total	1,197,892	308,190	+889,702	779,577	188,006	+591,571

* Indicates the net change in population from alien immigration and emigration movement.

High Records in Illinois

The mines of the Superior Coal Co., located at Gillespie and Benld, produced on Monday, Mar. 9, 1914, 13,431 tons of coal, as follows:

	Tons
Mine No. 1	4393
Mine No. 2	4430
Mine No. 3	4608

There was no special preparation for this record hoist, as the same mines hoisted 12,288 tons on the Saturday preceding, and made an average hoist for that week of 12,277 tons per day. Mine No. 3 hoisted in four hours, Monday afternoon, 2525 tons; which would, at the same rate, produce over 5000 tons in an eight-hour shift. The best single-day's hoist, made at No. 3, is 4748 tons.

The mines of the Superior Coal Co. ranked, in the Coal Report of Illinois, for the year ended June 30, 1913, as follows: No. 3 was second in the state, producing 837,834 tons, employing 675 men, working 216 days and making an average daily hoist of 3879 tons.

No. 2 was third, producing 828,288 tons, employing 665 men, working 215 days and made an average daily hoist of 3853 tons.

No. 1 was sixth, producing 681,852 tons, employing 659 men, working 212 days, and making an average daily hoist of 3216 tons.

In the Coal Report of Illinois, for the year ended June 30, 1913, there were 33 mines that had an annual production of more than 400,000 tons and 61 mines that produced more than 300,000 tons. The Coal Report of Illinois, for the year ended June 30, 1903, showed that four mines had a production of more than 400,000 tons and 15 a production of more than 300,000 tons.

This is a splendid increase in the number of large producing mines and the tendency is to a still greater producing capacity. In this connection, the following comparison shows an interesting growth:

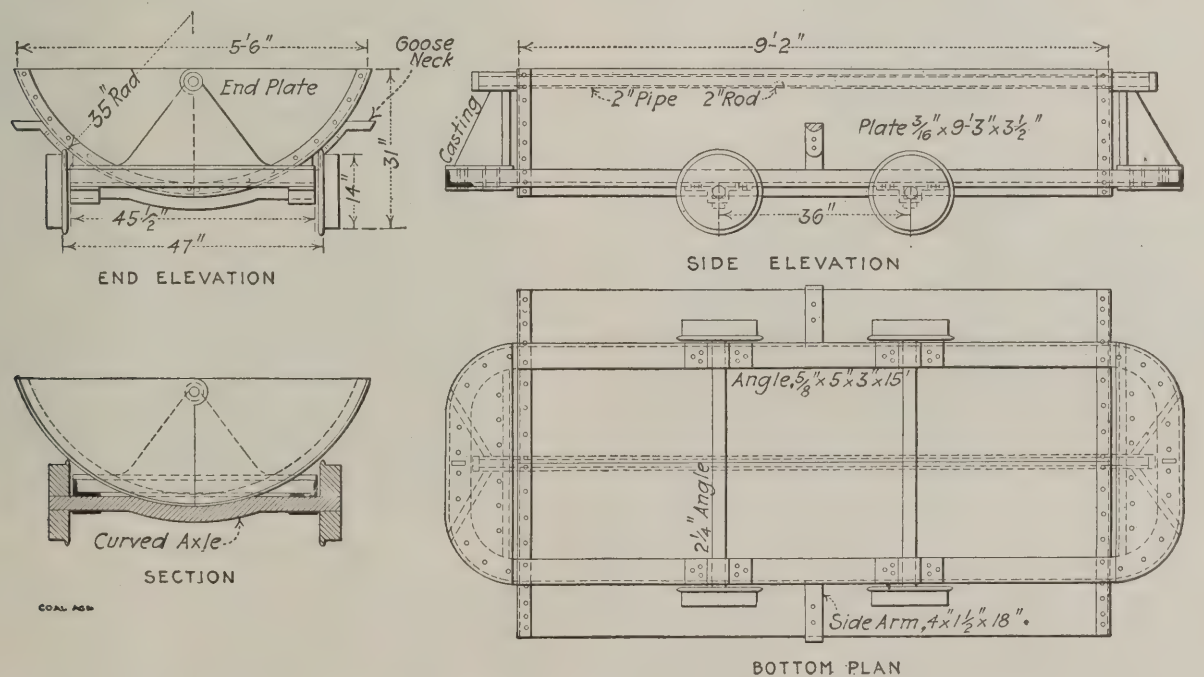
	1903	1913
Shipping mines in operation	353	371
Total number of employees	49,814	79,497
Total tonnage	34,955,400	61,846,204
Mined by machines (tons)	7,646,777	30,228,520
Fatal accidents	156	175
Nonfatal accidents (30 days lost time)	410	1025
Death rate per 1000 men	3.13	2.20
Death rate per million tons of coal	4.46	2.83

Since the foregoing was written, we have been informed that the No. 2 and No. 3 mines of the Superior Coal Co., have each made a record hoist of more than 5000 tons of coal in an eight-hour day. Saturday, Mar. 14, No. 2 mine hoisted 5023 tons; and Thursday No. 3 tried for the 5000-ton mark and failed. They were able to hoist 4854 tons, but on Friday, Mar. 20, No. 3 jumped into the 5000-ton class and hoisted 5116 tons, which is at the rate of 639.5 tons per hour, or more than 10 tons a minute. In making the record at the No. 2 mine, 1562 mine cars were brought to the surface and it required 108 railroad cars to haul the coal away from the mine.

The mines last named, Nos. 2 and 3, are each shaft mines to the No. 6 seam and are 340 ft. deep; the coal is 7 ft. 6 in. in thickness and is mined by machines.

The Clam-Shell Mine Car

A new mine car has been designed by N. H. Mannakee, a mining engineer of Williamson, Mingo County, W. Va. It reduces the labor of dumping at tipples, head houses and bins. The cars need not even be uncoupled when dumped, and if discharged onto a moving apron, they would empty their load without any breakage. In any event, their manner of dumping is such that they are far less destructive to coal than the old end-gate car.



The Mannakee Mine Car Which Opens Like a Steam-Shovel Bucket

For work in a low seam, the car will carry a larger capacity than the ordinary steel or wood cars of the same height above the rail and the same outside dimensions in plan. This results from the fact that by the curvature of the axles, the car body is kept closer to the rail. These axles support the car and keep it true to radius.

The goosenecks or side arms which lift the jaws of

the bucket are raised slowly by the pushing or pulling of the car past curved guide bars on the side of the track. These bars are so shaped or bent that when the car is opened full they keep it in this condition for a distance about equal to the length of the car. The guides then curve downward to allow the shells to come together gently as the car passes onward.

Theoretically, the gooseneck should be lifted an amount equal to about one-half the size of the largest lump of coal to be discharged. In practice, probably a lift of 15 in. would be enough. This would provide an opening in the bottom of 30 in., and in the inventor's experience, he has found this opening sufficient.

It can be readily seen that a car with much greater capacity could be obtained by raising the sides. The bill of material, weights, etc., for a car for use in a low seam, follow:

BILL OF MATERIAL OF MANNAKEE CAR

Pieces	Size	Weight	Description
2	2¼" sq.x57"	166	Axles
4	14" diam.	372	Wheels
4	¾"x16"x5"	18	Boxes
2	3"x5"x⅜"	473	Frame angles
2	Castings	400	End supports
2	¾"x48"x13"	125	Bottom bumper plate
4	⅝"x42"x2¼"x2¼"	82.6	Angles at ends
2	4"x1½"x18"	120	Side arms
1	2"x126"	112	Round shaft
1	2"x120"	30	Pipe
4	3/16"x4 sq. 7x7.65	135	Sheet steel ends
2	3/16"x9.25x7.65	500	Sheet steel side
72	½"	20	Rivets
65		140	Bolts
	Total	2683.6	

Capacity of the car level full = 133,159 cu.in. = 49.54 bushels allowing 2.688 cu.in. per bushel. Weight of coal estimated at 2.05 + net tons.

West Virginia Miners Outdig Canal Laborers

In the last three years the excavation incident to the mining of coal in West Virginia has been greater than the excavation required in eleven years to dig the Panama Canal.

When the engineers of the Panama Canal, in 1903, began their work, they made a careful survey and found that approximately 195,323,000 cu.yd. of excavation was necessary. This was regarded as a stupendous undertaking and was commonly spoken of as the largest excavation job the world has ever seen. Laborers were imported to the Canal Zone, and column after column was written showing how marvelously these laborers were "making the dirt fly" under the direction of the most expert engineers the world has ever seen.

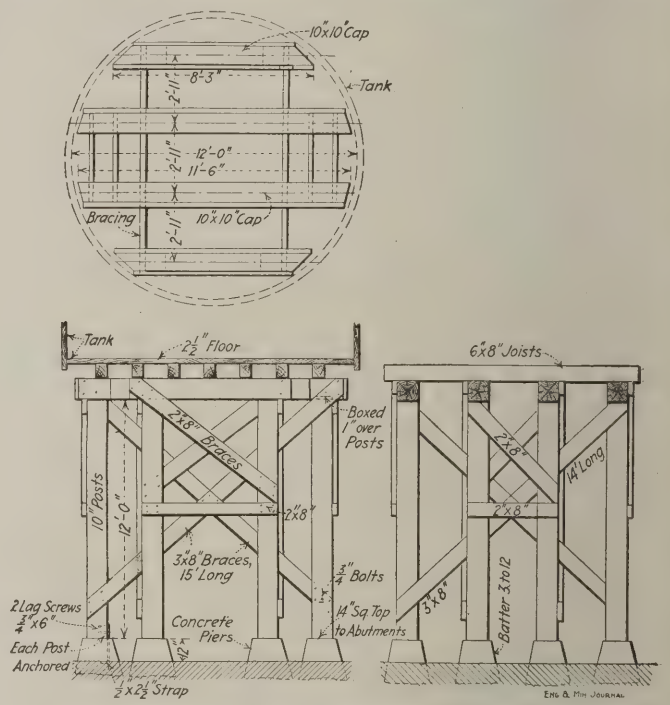
But the 195,323,000 cu.yd., the original estimate, were not all that the Panama Canal laborers were to dig after they had started. On account of the slides in Culebra cut, another hundred million cubic yards were to be added to their work. This made 295,323,000 cu.yd., which were dug in eleven years.

Under conditions far more difficult, the coal miners of West Virginia were to do an amount of excavating in the same eleven years that would make the digging incident to the Panama Canal look like child's play. The work of these West Virginia miners has never been heralded to the world as the last word in excavation efficiency. As a matter of fact, the general public has paid little attention to it. But in the eleven years, while the much heralded work at the Panama Canal was producing 295,323,000 cu.yd. of earth—and all of the excavating was being done on the surface—the coal miners of West Virginia were getting out of the bowels of the earth 542,949,446 cu.yd. of coal. This was almost twice the amount of excavation of the Panama Canal, and it was done under far more difficult conditions.

Substructure of Wooden Water Tank

By William Wallace*

A necessary adjunct to every iron-range boiler plant is the water tank. The flat topography usually eliminates the possibility of setting the tank on high ground to gain head, and for that reason it is usually put near the boiler house. The latest tanks are of the elliptical-bottom steel



Posts, Stringers and Bracing to Carry Wooden Tank

type, raised to considerable height on a steel structure, but wooden tanks supported on a wooden substructure in the manner of railway tanks are still common. Such a substructure of standard type is illustrated herewith. It is built of sawed timber set on concrete piers and usually painted. The tank supported in this case is 12x12 ft.—*Engineering and Mining Journal.*

BY THE WAY

Those things we never had we can never lose.

It is easier to follow foolish precedents than to think.

Things sweetest to the taste often prove sourest in the stomach.

Exhaustive observation is an element of every great achievement.

Adjourning sine die seems to be the most popular indoor sport in the coal industry today.

Exclusive praise must not be given to the horse that wins the race—some belongs to the man that keeps the stable.

*Mining engineer, New York.

Who's Who in Coal Mining

Frederick William Whiteside was born at Chicago, Ill., Nov. 2, 1875. On his mother's side, Mr. Whiteside was a direct descendant of Captain Amasa Hungerford, of the Revolutionary Vermont troops, the Hungerford family having landed upon American soil in 1632.

Mr. Whiteside's education was obtained in the public schools of Denver, Colo., and at the University of Colorado, from which latter institution he graduated.

His first work on leaving the university was as assistant engineer with the Denver Union Water Co., and later in the same capacity with the Denver & Rio Grande R.R. Co. He then became division engineer of the El Paso & Rock Island R.R. Co., which position he left to take up his first work in coal mining as assistant engineer, with the Colorado Fuel & Iron Company.



F. W. Whiteside

But railroad work once again attracted Mr. Whiteside and he became chief engineer for the New Mexico Midland R.R. Co. However, he soon returned to the coal industry, becoming chief engineer of the Southern Fuel Co.

Mr. Whiteside is now chief engineer of the Victor-American Fuel Co. as well as other enterprises, such as marble, telegraph and railroad companies, besides being retained in a consulting capacity by the Keystone Fuel Co. He is Secretary-Treasurer of the Rocky Mountain Coal Mining Institute, and a member of both the Colorado Electric Club and the University of Colorado Club, of Denver. Mr. Whiteside has been a frequent contributor to the technical press of the country, and occasionally lectures at the educational institutions in Colorado.

Harry Mortimer Kanarr was born Aug. 31, 1876, near Deckers Point, Indiana County, Penn. Mr. Kanarr's early education was obtained in the public schools, which was followed up by a special mathematical course in the State Normal School at Indiana, Penn., and supplemented by home studies.

His first practical training was obtained under his father, and consisted mostly of land and property surveying. In October, 1902, however, we find him out on his own initiative, being employed as a transitman under Walter F. Arms, chief engineer of the Rochester & Pittsburgh Coal & Iron Co. His first work for this concern was in charge of the construction at the Ernest Mines, near Indiana.

Exactly one year later he was transferred to Iselin as



H. M. Kanarr

assistant to Robt. H. Wilson, chief engineer in charge of the construction of that plant. January, 1905, found him again transferred to Punxsutawney, where he became division engineer under Geo. D. Bartholomew, a few months later becoming Mr. Bartholomew's assistant. In May, 1907, he was appointed chief engineer in responsible charge of all the work formerly handled by all three of his previous employers.

Mr. Kanarr is now chief engineer of the Rochester & Pittsburgh Coal & Iron Co., the Jefferson & Clearfield Coal & Iron Co., the Cowanshannock Coal & Coke Co., the Reynoldsville & Falls Creek R.R. Co., and at the present time, he is also serving as secretary-treasurer of the Hudson Coal Mining Co.

The Labor Situation in Ohio

Walter R. Woodford, president of the Eastern Ohio Operators' Association, is preparing a suit to be filed as soon as possible to test the validity of the Ohio screen-coal bill. There is a question as to whether this case can be brought before the law becomes effective on May 20. In the meantime, the operators of Ohio are waiting for developments.

George Savage, secretary of the United Mine Workers of Ohio, has announced that steps will be taken immediately toward bringing about a joint conference with Ohio operators.

Every mine in Ohio closed Tuesday night of last week; Wednesday, eight-hour day meetings were held in all of the principal coal mining centers. President John Moore, of the United Mine Workers of Ohio, addressed a mass meeting in Bridgeport. He prefaced his remarks by calling upon the miners to remain loyal to the organization and admonished them against socialists and the Industrial Workers of the World. The latter organization at the present time is attempting to rouse miners of the No. 8 district.

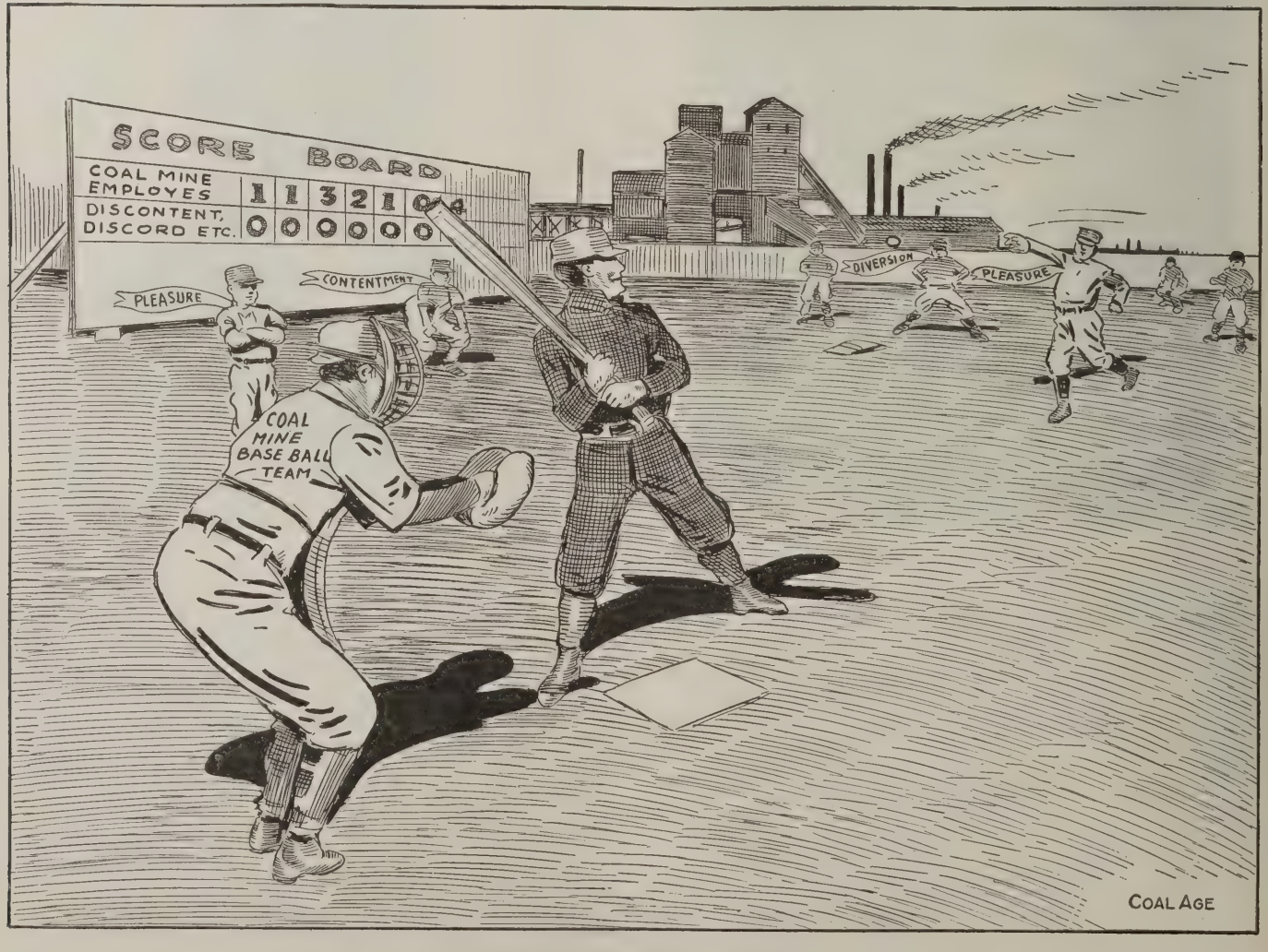
A Split in the Union Ranks

At Roseville, the local union passed resolutions calling upon John P. White, president; Frank J. Hayes, vice-president; and W. O. Green, secretary-treasurer of the United Mine Workers of America, together with the members of the policy committee of the union, to resign. The Roseville union charged that the negotiations and policy of the officials were not satisfactory nor to the best interest of the men. The resolution was forwarded to all of the unions in Ohio with a request that similar action be taken.

This movement and the defection of miners are so serious that Mr. Green will address the Crooksville, Ohio, union Tuesday. He will ask for explanations. A circular mailed out from the headquarters in Indianapolis, Saturday, exhorts the miners to remain loyal and advises them to support the officers in the referendum being taken on the policy adopted by the committee.

The failure to win the mine-run wage scale throughout the state has caused the miners to attempt to make local settlements. None of the companies has shown any intention of weakening. The miners have not succeeded in getting conferences in the sub-districts and it looks as if nothing will be done except as a state organization.

Miners are not all of one opinion, but the majority of them are convinced that the mines will generally remain closed until the mine-run law has been tested in the courts. They do not expect to have work until late in the summer in most instances.



The Real Base Ball Team

Editorials

The Present Industrial Idleness

To judge by the dailies of our various cities, the country is now menaced with an army of unemployed, larger and more desperate than we have known for years.

Our newly appointed Federal Industrial Commission has been seriously enough impressed by the facts as reported, to feel justified in ordering an immediate investigation, looking toward action by the Federal Government, to relieve unemployment. Frank P. Walsh, chairman of the commission, is quoted as saying: "Groups numbering from 100 to 1000 stand outside our great industrial plants each morning at six o'clock, hoping the foremen will pull them out of line and put them to work. They are thankful if they get only a few hours' work.

"Poorly nourished and thinly clad, these men gather each morning and then drift away to the cheap saloons or cheap lodging houses to wait for any other chance.

"None can see this spectacle without realizing that it is something society cannot afford to tolerate. An employer never thinks of laying off his bookkeeper or clerk after employing him three or four hours in a day or three or four days in a week.

"The problem of continuous employment for laborers is more difficult, but it is a problem that must be solved if we are to check the increase in our great army of hopeless, homeless men. If nothing else will avail, it may be necessary to urge insurance against nonemployment."

Now would be a good time for some of you mine owners to invite the reporters from some of these same dailies to inspect your diggings; especially the fellows who always refer to you in graphic sneers. In spite of the fact that the coal trade has been extremely dull this winter, our coal-mining camps are not infested by hungry bands seeking employment and such spectacles as Mr. Walsh describes are almost unbelievable to coal miners in America.

A Smell Is a Smell

Kipling has stirred up a very lively discussion in England by publishing the following lines: "I suggest, subject to correction, that there are only two elemental smells of universal appeal—the smell of burning fuel and the smell of melting grease. In other words, the smell of what man cooks his food over and what he cooks his food in."

If Kipling ever visited a mine, his smeller must have been off duty, or else he forgot the experience before he wrote the above lines. And even at that, we insist that his wits must have been wool-gathering when he sat down to write. Before man can start a fire to cook food, he must have the fuel and the food, and while he is digging these up, the real elemental smell comes into being. You can trace it back to Genesis; "In the sweat of thy face shalt thou eat bread, till thou return unto the ground."

At a coal mine, equipped with a modern bath and change house, this elemental smell may not penetrate the camp, but it is generally within striking distance, nevertheless. At the less favored camps, it is more than liable to come out to meet you, as you enter a house, and around some of the rooming houses, there is danger of its standing guard and driving away the uninitiated and faint-hearted.

We are not casting any aspersion toward our coal miners; they probably bathe oftener than any other class of workingmen; but a smell is smell for all that.

Chickens as Gas Detectors

Experiments seem to prove that chickens are not suitable for use as detectors of gaseous atmospheres in mine-rescue work. In combating a mine fire at a colliery in the Raniganj coal field in India, a chicken was carried in by two members of the fire-fighting squad. On returning to the pit bottom the chicken was all right, but both men fell to the ground in a collapsed state.

Another instance of the use of chickens was at the rescue operations at the Kendwagih colliery, where it was noticed that the chickens were quite unaffected by the mine atmosphere while the men were knocked over.

One reason for the experiments with chickens is due to the fact that many mining men believe that mice and canaries are too delicate indicators of danger. Such authorities contend that the margin of safety with mice and canaries is too large, for these latter, when used as detectors, keel over at a time when men are still unaffected and can continue quite a while in their rescue operations.

What is desired is some animal or bird that is only slightly more susceptible to poisonous atmospheres than man. At the same time, of course, it must be remembered that in rescue work, the man is actively engaged in expending physical effort, while the animal is usually at rest.

Don't Destroy Your Records

The press dispatches from Houghton, Mich., of Mar. 4, reported that the books of the mining companies were brought into court to disprove miners' statements as to starvation earnings they received during the years 1908 and 1911.

The companies were thus able to exhibit to the court the original entries, down to the last penny, showing the actual earnings of all of the men who had testified, and the evidence thus presented, disproved most of the miners' contentions.

Here, then, is another illustration of the importance of preserving old records. Year by year, as the books of any company begin to accumulate, the temptation to destroy old files becomes more and more persistent and occasionally a good-sized bonfire follows. But, unfortunately, something more troublesome than musty files often rises up from the bonfire ashes.

The popular idea, that if a bank president or a corporation auditor testifies that the books of his firm were destroyed, he admits that he is trying to hide someone's guilt, is far from correct, in many instances, as some who read these lines could probably testify. But knowing a thing yourself and being able to convince others of the truth of your information, are quite different matters.

We recall a laughable but highly satisfactory turn to testimony being taken before an arbitration board, during a miners' strike, some years ago. The president of the miners' union had been ranting in quite approved manner about the terrible iniquities of the company stores in the district and the unreasonableness of expecting the men to do all of their trading in these stores, when competing merchants offered so much more for one's money.

This miner's president lived at one of the mining villages where there was one of these commissaries and some six or eight independent stores, so he surely spoke with full knowledge. Imagine the surprise of all present when counsel for the operators produced the books from the terrible company store in the very village where the miners' president lived, and proved that this very president was buying voluntarily from this "robbisary" and buying in such quantities that he must have depended upon it for most of his supplies.

Of course the miners' counsel was able to explain such conduct (to his own satisfaction at least). He stated that the goods handled by the company store were fresher than similar goods handled by competitive stores and his client, the miners' president, was able to stand the premium demanded.

Schools

This is an age of schools. No one nowadays who looks for success expects to get it without training his employees. We except mining men from this rule. They are imparting a knowledge of mine management, but they are only seeking to develop the men who are striving for first honors.

We were recently reviewing a book on the art of firing a boiler. Like all real mining men, we had not yet realized that there was a true art in heaving and spreading coal and raking the grate bars. But there is. When we begin to try to teach our employees how to perform their duties, we shall learn what a lot there is that we do not know about the fundamentals of our work and it will be hard indeed to tell who are most educated by the school, the teachers or the taught.

We have our miners, our car trimmers, our locomotive engineers, our dumpers, our shotfirers, our stationary engineers and our firemen to teach. Then there must be schools for our store clerks and office men. Have we realized that the sales forces of an insurance company, a cash-registry corporation or a telephone exchange has gone through a course to train them to please the public and help you with your problems?

Why do we take any kind of callow youth to sell groceries and let him stir up dissension by his indifference to customers and drive trade away by his uncleanly appearance? Why are we indifferent to his lack of knowledge as to values and the needs of the trade? Many a company has aroused all the women folk at their mines to open enmity because the store was not run as if their trade depended on the way in which their pleasures were met.

The time will come when our young miners will come from the village school primed with the facts of first aid and self-preservation and having at least a smattering of the rules of the art of mining. A half century ago, perhaps 25 per cent. of the people could neither read nor write. Ten years from today, everyone will have a certain amount of vocational training. What that time will bring forth in the way of efficiency, we do not dare to guess, but we shall look back then with surprise at the crude attempts at industry which now fill us with admiration.

Everywhere comes the cry, "It can't be done—these men are not bookkeepers, surveyors, track-layers or chemists." Thus systems, simple in character, requiring a week's study perhaps, from those who should carry them out are declared impossible, because the men who must perform them are not sufficiently trained, or lack the necessary desire for efficiency. When men are properly taught, they will themselves originate systems of procedure requiring more skill than we venture now to propose to them.

The Union and the Republic

Our attitude toward the Miners' Union cannot justly be different from our attitude toward the government under which we live, for in one the laboring man is the only voter, in the other it is his vote which determines the issue. After all, there is little difference between the people represented in the labor unions and in Congress. To despair of the workingmen's councils is to question the safety and the future of the republic.

When we see the conservatism and justice of the masses voting as citizens, how can we doubt their essential fairness and honesty voting as members of a union? Logic and patience will assure industrial peace, just as those qualities will preserve the national existence free from internecine strife.

He who doubts that the union will ultimately realize its responsibility has lost his hold on our past history and the basic facts of our democratic government. By the exercise of industrial statesmanship, we shall at length arrive at a time when the unions will eject from their counsels, as they have largely from their leadership, those mere trouble-makers and mercenaries who threaten alike the operator and the union, and wreck at once the fortunes of the operator and the happiness of the operative.

By giving the labor leader a recognized position and the dignity which goes with it, we assure ourselves that he will respect his responsibilities and will work to advance sanity in labor agitation, honesty in the making of agreements and safety in mine operation.

There are parts of the country where already the union men are learning that to be tribunes of the people does not demand loud-mouthed oratory and class hatred, but qualities of restraint and character such as are demanded of those whose duty it is to direct the destiny of the nation. In such places the leaders go hand in hand with the operator in promoting the common good, and only part when their interests conflict, and then not in anger, but with the object of advancing their legitimate interests. A little reason and an infinity of patience will soon result in bringing union and operator into peaceful agreement.

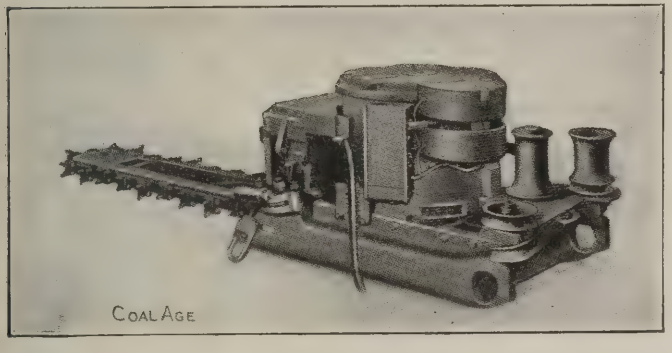
Alternating-Current Coal Cutter

To meet the demand of operators located near transmission lines of large central power plants producing alternating current, a new alternating-current short-wall coal cutter has been placed upon the market by the Morgan-Gardner Electric Company.

The motor is very efficient, having great mechanical strength and ample overload capacity. The small number of parts assure continuous operation with practically no attention. This motor is exceptionally well ventilated. The star-delta control is used, which is the most simple, satisfactory control for induction motors of this capacity.

The stator can be quickly removed from the motor body. The stator core disks are waterproofed and riveted together under hydraulic pressure. The stator coils are form-wound and impregnated with a moisture- and oil-resisting compound that will stand a high degree of temperature. These coils are laid in open slots and easily accessible.

The rotor is fireproof, the bars being imbedded in a special moisture- and heat-resisting cement. The short-



A Short-Wall Coal Cutter Actuated by Alternating Current

circuiting rings are cast solid with the bars, leaving nothing on the rotor to work loose. The rotor shaft is exceptionally heavy with removable heat-treated chrome-nickel-steel pinion.

The three self-aligning ball bearings are of ample proportions to insure cool running and long life, the air gap is always uniform and the motor cannot strike the stator. These dirt-proof bearings are grease lubricated, eliminating all danger of oil trouble.

The construction of the rest of this machine is identical with the well known short-wall type of direct-current machine, embodying such features as single-reduction spur-gear drive to chain-drive sprocket, safety-break washer protecting feed-cable mechanism from overload, means for sumping without use of extra equipment. All parts are inclosed in a heavy rugged frame, yet easily accessible. The cutter arm is of cast steel and the cutting chains are for heavy duty and of single- or double-bit type.

A special feature is the simplicity and safety in handling these machines. A quick-acting positive clutch and the safety-break washer protect the feed cable from overload. The current is controlled by a simple knife switch within easy reach of the operator. By the drag-line control the operator can instantly start or stop the feed of the machine. All operations, unloading, sumping, cutting, loading and transportation are done by power.

A self-propelling steel truck with friction drive, reverse-drive gearing and removable automatic cable reel are used for transportation.

Saline County Mine Safety Association

The organization of the Saline County Mine Safety Association was perfected on Mar. 19, at a meeting held in the office of the O'Gara Coal Co., in Harrisburg. The following constitution and bylaws is given in full as an example for use by other similar organizations.

NAME—This organization shall be known as the Saline County Mine Safety Association.

OBJECT—The object of this association shall be, through its membership, to learn and to teach the most approved first-aid-to-the-injured and mine-rescue methods; to put this knowledge to practical use through organized teams and classes of instruction whenever occasion offers; to endeavor to increase the membership by getting others to take up the work; to bind closer together those who have taken training by holding frequent local meetings for study and practice, and annual state meetings with like associations for the purpose of comparison and inspiration; and to give to its members an opportunity to study mining, mine safety, first aid, etc., through coöperation with the State Rescue Commission, the Illinois Miners' and Mechanics' Institutes, the State Mining Board, and the United States Bureau of Mines.

CONSTITUTION

ARTICLE I—Section 1. All persons who have taken, or desire to take, the course prescribed for First Aid or Mine Rescue by the State Mine Rescue Commission, or who have been enrolled in the instruction classes of the Illinois Miners' and Mechanics' Institutes, are eligible for membership in this association.

ARTICLE II—Section 1. The officers of this association shall be a president, vice-president, secretary and treasurer, who shall be elected by a majority vote of the members present at the annual business meeting of the association.

Section 2. The government of this association shall be by a board of directors, who shall be elected in the same manner and at the same time as the officers. This board shall consist of sixteen men, of whom the four officers of the association shall be members ex-officio.

ARTICLE III—Section 1. The dues of this association shall be fixed by the by-laws.

ARTICLE IV—Section 1. The president shall preside at all meetings of the association and of the board of directors; shall sign all official documents and bills when satisfied of their correctness; shall appoint a custodian of the association's property; shall appoint a committee to audit the books semi-annually; shall appoint such first-aid and mine-rescue instructors and teachers in mining, as are needed; and shall at all times endeavor to build up the association and increase its usefulness. All appointments by the president shall be made subject to the advice and approval of the board of directors and of the coöperating state department.

Section 2. The vice-president shall, in the necessary absence of the president, assume all the duties and responsibilities of that officer.

Section 3. The secretary shall keep true minutes of all the transactions of the association; shall receive all admission fees, dues and donations; shall give a receipt for all money received, and shall keep a correct account of the same and turn all money over to the treasurer, taking his receipt for the same; and shall sign all bills approved for payment.

Section 4. The treasurer shall receive and care for all money of the association, and pay all bills when they are properly signed by the president and the secretary, taking a receipt for all money paid out; and shall keep a set of books showing all money received and paid out.

BY-LAWS

ARTICLE I—Section 1. The association shall meet at 7:00 o'clock the first Wednesday evening of each month except during June, July, August and September.

Section 2. Special meetings may be called at any time by the president.

Section 3. The officers shall be elected on the regular meeting night in the month of October, and this meeting shall be called the annual business meeting of the association.

ARTICLE II. The dues of the association shall be One Dollar per year, payable in advance.

ARTICLE III—Section 1. The order of business for the annual meeting, and for the meetings of the board of directors, shall be: 1. Roll call. 2. Reading of minutes. 3. Applications for membership. 4. Reports of officers and committees. 5. Communications. 6. Unfinished business. 7. New business. 8. Election of officers. 9. Adjournment.

Section 2. Roberts' Rules of Order shall apply at all business meetings.

Following the adoption of the constitution, committees were appointed to perfect the arrangements for the first aid contest to be held at Harrisburg on May 2. The following committees were appointed: Invitation, Wm. Johnson, chairman; Finance, Ed. Joyce, chairman; Grounds, D. B. McGeehee, chairman; Prizes, Wm. Johnson, chairman; Entertainment, O. M. Karraker, chairman; Programme, Oscar Cartlidge, chairman.

During the evening the meeting was addressed by Oscar Cartlidge, superintendent of the Illinois State Mine Rescue Commission, on the purposes and aims of the first-aid movement, it being the intention of the local association to cooperate with the State Commission in this work. He promised the hearty support of the commission under his management, and is arranging to have periodical examinations of the students in first-aid work, for the purpose of granting certificates to those men who demonstrate their proficiency in the work. R. Y. Williams, director of the Illinois Miners' and Mechanics' Institutes, addressed the meeting on the purposes and aims of these institutes, and introduced the instructor, E. C. Lee, who is in charge of the schools just opened in Harrisburg and Herrin under the direction of the institutes. The latter discussed in detail the scope of the work to be covered by the schools, and the method of instruction, extending an invitation to all present to join the classes.

Referendum of United Mine Workers

In an official circular, President John P. White, Vice-President Frank J. Hayes and Secretary-Treasurer William Green, recount the unsuccessful attempts of the scale committee to secure an agreement with the operators at the Philadelphia meeting, which commenced Feb. 10, and also at the Chicago meeting, which opened session Mar. 17. They say that the policy committee then met to define the course to be pursued and "deemed it unwise to engage in a national strike at this time for the enforcement of" their "demands."

They call for a referendum vote on Apr. 14, authorizing:

The representatives of the United Mine Workers of America in subdistricts, districts and groups of districts to negotiate * * * * wage agreements with coal operators * * * * who will agree to the prices now being paid under the present contract for pick and machine mining, day labor, yardage and dead work or the equivalent of the tonnage and mining prices where any district, subdistrict or groups of districts, either by reason of an act of the legislature or by agreement may change their method of mining from screen coal to mine run.

The proposal to be submitted to referendum permits the local determination of inequalities as to prices and conditions, *requires* the continuance at work of the men pending a settlement of these minor matters where the operators agree to the prices, hours of labor and conditions of employment now in effect, *permits* the working of the men where the scale is being changed from a screen-coal to a mine-run basis while a settlement is being reached and provides that the contracts when made shall be in force for a period of two years, to end Mar. 31, 1916.

The circular states:

The nonunion operators desire a strike in the organized fields so that they can obtain contracts. We were reliably informed that representatives of the nonunion operators of Kentucky, West Virginia, Pennsylvania and elsewhere, were in both Philadelphia and Chicago while the joint conferences were in session, doing all within their power to bring about a disagreement and a strike. And so, in view of the slack work generally, we are unwilling to play into the hands of the unorganized operations by going on strike, throwing the union mines idle and thus allowing the nonunion fields to fill the markets with their coal.

The reports of the election must be sent to the international secretary not later than Tuesday, Apr. 21.

The joint scale committee of miners and operators of central Pennsylvania, which was in session for two weeks in Philadelphia trying to make a scale, adjourned on Saturday, Apr. 5, and will meet again after the decision by referendum is reached. The operators were unwilling to continue in session with the miners because the latter were not empowered to make a final settlement. There is some hope that the meeting will be able to reconvene about Apr. 24. Meanwhile the mines will continue to work as orders are received, but as business is not brisk, there is no prospect of steady work. The miners and operators in central Pennsylvania agree that the miners should have the same tonnage rate as in the two years past. The miners, however, want car pushing abolished. This the operators are unwilling to concede without a reduction in the contract rate.

Anthracite Section of American Institute of Mining Engineers

At a meeting of the anthracite section of the American Institute of Mining Engineers, R. V. Norris, of Wilkes Barre, was elected president, and four vice-presidents were also elected, each of whom is to have general direction of the section's activities in one of the coal fields. W. J. Richards, vice-president and general manager of the Philadelphia & Reading Coal & Iron Co., is to have general direction for the Southern coal field, Edwin Ludlow, vice-president and general manager of the Lehigh Coal & Navigation Co., for the Middle coal field, Arthur Storrs, mining and consulting engineer, for the Lackawanna Valley, and C. F. Huber, vice-president and general manager of the Lehigh & Wilkes Barre Coal Co., for the Wyoming Valley. Charles Enzian, mining engineer and the Government representative of the United States Bureau of Mines in the anthracite fields, was elected secretary-treasurer.

An executive committee was formed, consisting of Frank Hill, a coal operator, R. A. Quin, vice-president and general manager of the Susquehanna Coal Co., R. J. Foster, vice-president International Correspondence Schools, A. B. Jessup, vice-president and general manager of the G. B. Markle Co., D. Bunting, chief engineer of the Lehigh & Wilkes Barre Coal Co., and J. M. Humphrey, mining engineer of the Lehigh Valley Coal Co.

A request from the president of State College was read at this meeting, asking that three delegates be appointed by the society to vote at the annual election for trustee.

Douglas Bunting was elected chairman of the committee to select the subject for discussion at the next meeting. The committee selected "The Limits of Mining under Heavy Wash," and J. M. Humphrey will also read a special paper on strippings. The meeting will be held on Saturday evening, May 9, at 7:30 in the Auditorium of the Lehigh & Wilkes-Barre office building at Wilkes-Barre, Pa.

Discussion By Readers

Straightforwardness in Mine Inspection

I was much impressed with the frank and manly statements quoted in the brief review of Mine Inspector McGregor's report, COAL AGE, Mar. 21, p. 474. I think these brief statements are the clearest and most direct that I have ever observed as coming from a mine inspector.

While commending Mr. McGregor on the straightforward, frank manner in which he states facts and truths that every mining man knows but that few have the courage to assert, I must also give COAL AGE due credit for giving to these statements a wider publicity than they would otherwise have and which they truly deserve. By this means, the statements are brought home to the men who should profit most by the opinions so frankly stated. There is too often a tendency to restrict the publication of frank and honest statements relating to actual facts and existing conditions. These must be known and appreciated in order to properly stimulate the many worthy efforts that are now being made on such an extended scale to increase safety in the mines.

It is a matter of common observation that mine inspectors' reports are too often stereotyped forms, consisting of printed blanks filled in with figures and supplemented by perfunctory statements that reveal little or nothing of the real knowledge and conviction of the man making the report. The public have a right to know the honest, candid opinions and conclusions of the men entrusted with the work of inspection and who are best qualified to place the blame for existing dangerous conditions or accidents where it properly belongs. Such candid reports would represent a consensus of opinions of qualified men that could be used as a basis on which to devise means for greater safety.

The Court of Public Opinion is far more powerful than the law itself to eradicate evil, lessen danger and reduce the accident list. The "hush" policy is wrong in principle, as it obstructs the formation of correct public opinion. Only by a frank, open statement of facts, in the technical press, can the misrepresentation and exaggerated statements of the secular journals be corrected. It is such misstatements and wrong viewpoints that often go far toward undoing the work that has been accomplished in the interest of safety. Every state mine official is the paid servant of the people, and loyalty to the trust confided to him should always compel a frank, conscientious statement of his honest convictions.

That the general reticence of mine inspectors is always the result of restrictions placed upon them by their superiors in state office is hardly conceivable. It has been my good fortune to know intimately a number of miners and mining men who have risen from the ranks to the position of mine inspector. While these men, in a subordinate position, were frank and outspoken in reference to the existence of a wrong or dangerous condition, in most cases they have shut up like clams when they have risen to the position of mine inspector. Let us hope that this mistaken policy will be abandoned by many in the future and that more will follow the path dictated by their honest convictions.

SIM. C. REYNOLDS.

Houston, Penn.

The Certificate Law

Letter No. 26—I have been pleased to note that the question of an interstate certificate law, which I suggested for consideration in COAL AGE, some time since, has been discussed so thoroughly. The discussion has proved most interesting, and I am pleased to note that the majority of the writers seem to favor the proposed interchange of certificates between states.

I cannot agree with the suggestion that the practice would be "harmful;" on the contrary, I consider it would be an inspiring incentive to every man desiring to extend his knowledge and experience beyond the narrow limits to which he is confined in his own state. As well might a sea captain be required to have a navigator's license to sail every sea and navigate every coast line as for a capable mine foreman holding a state certificate, to be required to pass examination before he can hold the same position in another state.

In respect to physical conditions in coal mining, state lines have no existence; and conditions are more or less alike in the various coal-mining districts. Flat and pitching seams, gaseous and nongaseous mines, are quite generally distributed; and methods of working, mining machinery and equipment, and mining laws are very much the same everywhere. The various nationalities of the miners present the same difficulties in one place as in another.

If these facts are generally conceded there would seem to be no tangible reason why coal-mining states should hesitate to make provision for an interstate certificate law. Not only would this open a wider field to students of mining, as suggested; but operators would benefit by such a law, since it would afford them a wider territory from which to select men of intelligence and ability.

The province of Alberta, Canada, has recently passed a law, authorizing the issuing of a certificate of competency to all applicants who hold a similar certificate granted in another country, provided the examining board in Alberta certifies that the standard of training and examination required by the foreign certificate is equivalent to that required in their own province. (COAL AGE, Apr. 4, p. 584.) Certificates of competency granted in England are good in all her territorial possessions, notwithstanding her supposed insularism.

A little reflection forces upon us the conviction that the restrictions and limitations of our mining laws are, in this respect, an obstacle to progress and the gaining of wider experience. Men who have proved their ability and success in coal mining and who already possess a certificate of competency of the required standard should

not be classed in the same category with the student whose experience is yet to be gained and whose ability is yet to be proved.

The spirit of a law making state-line limitations possible, in the matter of the recognition of industrial experience and ability, is, to say the least, unreasonable and un-American. It is to be hoped that this discussion will be the means of enlisting the interest of lawmakers and that an enactment may be secured that will broaden the field to mining men.

CHARLTON DIXON.

Pittsburgh, Penn.

Working Coal under Watery Strata

Letter No. 6—The inquiry of George McPhail, COAL AGE, Jan. 3, p. 30, in regard to working a coal seam under a watery strata, and the later discussion by readers, has been of more than ordinary interest to me. I have just completed the sinking of a shaft here at Lehigh, Mont., under conditions very similar to those described by Mr. McPhail, with the exception that the coal seam here is 13 ft. in thickness, instead of 3 or 4 ft., as he states.

The information given regarding the geological cross-section of the country, and which would be of great assistance in intelligently answering this inquiry, as remarked by the editor at the time, was lacking. It would be feasible to assume that the shafts to be sunk are located in a basin, at or near the bottom of a synclinal trough. Taking these to be the existing conditions, geologically, I offer the following as my opinion and answer to the several queries submitted.

I believe that if the sandstone is broken, large quantities of water would flow into the mine, as the resulting caves would expose a much greater surface through which the water would find an easy channel into the workings. I also believe that a coal seam or mine of this kind would encounter large inflows of water wherever any displacement has occurred in the overlying strata, producing faults or large joints, which frequently cut across the bedding planes of coal seams. The inflow would be greater or less than the inflow into the shaft, according to the relative position of the break with respect to the shaft, the porosity and fissures in the sandstone. As will be noted from the statement of Mr. McPhail, the shaft did not affect the supply of water from the drillhole located only 50 ft. away. It seems evident that the whole of the formation of water-bearing sandstone, in this case, is practically one large reservoir, which will have to be drained in order to reduce the inflow of water into the mine, and I am of the opinion that, as the head of water in this basin is lowered, there will be a relative reduction in the inflow of water into the shaft and workings.

In answer to the second question, I consider that, in a mine located under the conditions described, the management should make arrangements and be prepared to handle large inflows of water, in case of emergency. Large sumps should be provided and equipped with uptodate pumping machinery. A good, efficient pumping system I always consider a valuable asset and investment for any company operating under these conditions.

Replying to the third question, I am of the opinion that the hoisting shaft, which is to be sunk, will encounter just as large a quantity of water as the air shaft sunk previously and possibly more if it has a larger area, unless the water has been drained in the meantime, in this basin, which is not probable, as the main hoisting shaft is generally sunk as soon as possible, so that it can be used in the development of the mine and for a second opening and ventilating purposes.

In reference to leaving about 50 per cent. of the coal in place, in order to prevent breaking the sandrock, I believe that a system of working could be adopted, in a thin seam of coal 3 or 4 ft. thick, that would make it unnecessary to lose any large percentage of the coal.

I consider that the safest method of working to adopt would be to open up the mine on a pillar-and-stall system, and then systematically flush the excavated area. In a thin seam of this kind there would be a large amount of material available for stowing in the workings, as the haulageways, roadways and airways would have to be brushed to a sufficient height, say 7 ft. This would produce quite a large amount of material and reduce in proportion the amount of material required to flush the workings. This system, when practicable, is the safest method to install that I know of, and is being used with success in quite a large number of mining districts today.

On the Continent, in Upper Silesia, over a hundred collieries have installed the hydraulic-packing or flushing system, in seams varying from 4 to 40 ft. in thickness, and have reduced the subsidence, which formerly varied from 30 to 70 per cent. down to a range of from 0.3 to 7.8 per cent. of the total thickness of the seams. In Essen, Germany, the Krupp firm is successfully extracting, from underneath their railway works, railways and large public buildings, 8 seams of coal, varying from 20 in. to 5½ ft., in thickness. They are enabled to do this with impunity, owing to the completeness with which the workings are filled with flushed material. Another method of working I would suggest, is to open up the workings on a pillar-and-stall, panel system, the entire panel to be surrounded by substantial pillars, which should have as few openings as practically possible and a minimum area. When the stalls are completed, in a panel, all the pillars should be withdrawn as rapidly as possible, precautions being taken to have good permanent stoppings built in all openings possible, surrounding the excavated area; and preparations made, in openings necessary for transportation and ventilation, so that in case of an inflow of water they may be quickly closed, thereby sealing up the excavated territory.

By experimenting with one or two panels of this kind, the action of the roof, and the effect it would have on the watery zone overlying the seam, would be practically demonstrated to the management, without their leaving in a large percentage of the coal seam. Then, if the expected or unexpected happened, they would be in a position to combat it successfully. They would also be prepared to adopt a system that would be suitable to the conditions which presented themselves. However, in conclusion I wish to state that the successful working of any coal property where adverse conditions present themselves will depend to a great extent upon the practical knowledge and judgment of the officials in charge.

J. W. POWELL, Supt.,
The Cottonwood Coal Co.

Windham, Mont.

Standardization of Mine-Track Gages

I noted with interest the request for a general discussion of the question of the standardization of track gages in mine haulage, COAL AGE, Mar. 21, p. 494. This is a many-sided question. It would be a simple matter to standardize track gages in mines, provided all coal seams were of the same thickness and other conditions relating to roof, coal and floor and the area to be worked were the same in all mines.

It is a well known fact that conditions in mines must largely govern the adoption of a fixed track gage. In the working of a 5-ft. seam, it would not be practicable to use the same track gage that would be adopted for similar conditions in a 7-ft. seam. In each case, the mine cars are built in proportions that are adapted to the special requirements, with a view to making the work of moving the cars as easy as possible for both men and animals. For this reason, in a 5-ft. vein, the track gage may vary, under ordinary conditions, from 18 to 36 in.; while, in a 7-ft. vein, a track gage varying from 36 to 44 in. would probably be used.

There are, besides, other conditions common to mining that determine the proper track gage. For instance, a tender roof would hardly permit the use of a 40-in. gage, even in a 7-ft. seam of coal. To reduce the cost of maintaining roadways they must be driven narrow, under a tender roof. Then, as the mining law generally requires a sufficient clearance for men and animals at the side of the track, it is necessary to use a comparatively narrow gage. At the same time, under these conditions, due regard must be had for the proper proportionment of the cars.

In general, in the operation of a large mine covering a wide area and requiring a large daily output of coal, the capacity of the mine car is an important factor. While, in a large number of mines, cars having a capacity of from 35 to 45 bu. are in use, in other mines this capacity will often have to be increased to 50 and 60 bu., in order to meet the requirements of a large daily output, especially in mines having an extended area of workings. Cars having so large a capacity require track gages varying from 44 to 48 in.

When considering the question of standardization of mine-track gages, therefore, it is necessary to take into account all of these conditions and many others that are of equal importance with those mentioned.

PENNSYLVANIA ENGINEER.

Oliphant Furnace, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

The use of the "relative potential" value, in all calculations to determine the natural division of air between two or more airways, is one of the most important considerations in the saving of time and labor and avoiding unnecessary multiplicity of figures, which increases the opportunities for error and yields less accurate results. An example or two will serve to make this fact plain.

EXAMPLES IN NATURAL DIVISION

Example—An air current of 100,000 cu.ft. per min. is divided at the foot of the downcast shaft, between the following four air courses or splits, thereby providing two separate ventilation districts on each side of the shaft:

Split A,	8 × 12 ft., 6000 ft. long
Split B,	6 × 20 ft., 12,000 ft. long
Split C,	6 × 12 ft., 8000 ft. long
Split D,	4 × 6 ft., 1000 ft. long

All the splits are open to the free passage of the air, no regulators being used. (a) Find the natural division of the main air current or the quantity of air passing in each split. (b) What is the pressure due to this circulation? (c) What is the horsepower on the air?

Solution—(a) The first step is to calculate the relative pressure potential for each of the four air splits. The area, perimeter and length of each airway are as follows:

Split A,	$a = 96$ *sq.ft.*;	$o = 40$ *ft.*;	$l = 6{,}000$
Split B,	$a = 120$ *sq.ft.*;	$o = 52$ *ft.*;	$l = 12{,}000$
Split C,	$a = 72$ *sq.ft.*;	$o = 36$ *ft.*;	$l = 8{,}000$
Split D,	$a = 24$ *sq.ft.*;	$o = 20$ *ft.*;	$l = 1{,}000$

Instead of using these full values as when finding the true potential value of an airway, the lowest relative values for the areas, perimeters and lengths are used. These relative values are obtained by canceling the common factors in the areas, perimeters and lengths, separately, which gives

Split A,	$a = 4$;	$o = 10$;	$l = 6$
Split B,	$a = 5$;	$o = 13$;	$l = 12$
Split C,	$a = 3$;	$o = 9$;	$l = 8$
Split D,	$a = 1$;	$o = 5$,	$l = 1$

The relative split potentials are then found as follows:

Split A, $4\sqrt{\frac{4}{6 \times 10}} = 4\sqrt{\frac{1}{15}} = 4\sqrt{0.06666} = 0.258$

Split B, $5\sqrt{\frac{5}{12 \times 13}} = 5\sqrt{\frac{5}{156}} = 5\sqrt{0.03205} = 0.179$

Split C, $3\sqrt{\frac{3}{8 \times 9}} = 3\sqrt{\frac{1}{24}} = 3\sqrt{0.04166} = 0.204$

Split D, $1\sqrt{\frac{1}{1 \times 5}} = \sqrt{\frac{1}{5}} = \sqrt{0.2} = 0.447$

Sum of relative potentials..... 1.088

The Coal Age Pocket Book

Since the quantity of air passing in each split, in natural division is proportional to the corresponding potential, the quantity ratio is equal to the potential ratio, which is true also for the sum of the quantities and the sum of the potentials. Thus, the ratio of the quantity (q) passing in any split, to the total quantity (Q) in circulation, is equal to the ratio of the corresponding split pressure potential (X_p), to the sum of all the split potentials (ΣX_p).

$$\frac{q}{Q} = \frac{X_p}{\Sigma X_p}; \text{ which gives } q = \frac{X_p}{\Sigma X_p} Q$$

Therefore, substituting the relative potential values just found in this formula gives the following:

Split A, $q_a = \frac{0.258}{1.088} \times 100{,}000 = 23{,}710$ *cu.ft. per min.*

Split B, $q_b = \frac{0.179}{1.088} \times 100{,}000 = 16{,}450$ *cu.ft. per min.*

Split C, $q_c = \frac{0.204}{1.088} \times 100{,}000 = 18{,}750$ *cu.ft. per min.*

Split D, $q_d = \frac{0.447}{1.088} \times 100{,}000 = 41{,}090$ *cu.ft. per min.*

Total quantity..... 100,000 *cu.ft. per min.*

(b) Since the pressure is the same for all the splits, it can be calculated from any one of the given splits, by substituting the values for that split in the formula

$$p = \frac{k\,l\,o\,q^2}{a^3}$$

Thus, taking split A,

$$p = \frac{0.00000002 \times 6000 \times 40 \times 23{,}710^2}{96 \times 96 \times 96} = 3.05 \text{ } lb.\ per\ sq.ft.$$

(c) The horsepower on the air in the main entry, or the horsepower producing this circulation is, then,

$$H = \frac{Q\,p}{33{,}000} = \frac{100{,}000 \times 3.05}{33{,}000} = 9.24 \text{ } hp.$$

General Split Potential—The potential value for the combined splits must be calculated from the total quantity of air in circulation and the resulting pressure, using the formula

$$X^3_u = \frac{Q^2}{p}; \text{ or } X_u = \sqrt[3]{\frac{Q^2}{p}}$$

Example—What is the general power potential for all the splits combined, in the example given above, where 100,000 cu.ft. of air was circulated under a pressure of 3.05 lb. per sq.ft.?

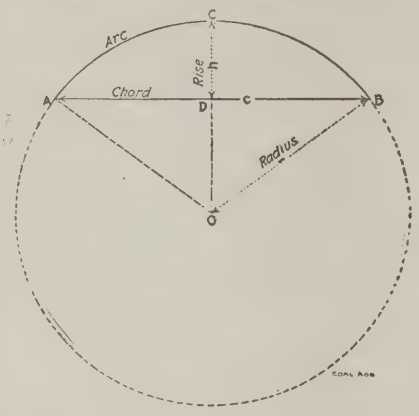
Solution—The general power potential for these combined splits is

Mine power potential, $X_u = \sqrt[3]{\frac{Q^2}{p}} = \sqrt[3]{\frac{100{,}000^2}{3.05}} = 1875$

Inquiries of General Interest

Study Question--The Circle

Referring to the inquiry in reference to finding the area of a segment of a circle when the length of the chord and the rise of the arc are known, COAL AGE, Mar. 21, p. 500, I wish to submit the following simple solution that does not entail the use of trionometry. The formula is taken from Des Ingenieurs Taschenbuch, 18th edition, Berlin, 1902, p. 34.



THE SEGMENT OF A CIRCLE

Referring to the accompanying figure, in which the length of the chord subtending the arc is c and its rise h, the radius of the circle being r, the length of the arc is first found by the formula.

$$arc = \sqrt{c^2 + 16/3\,(h^2)}$$

Then, making $c = 12$; $h = 3$, and substituting these values in the formula we have

$$arc = \sqrt{12^2 + 16/3\,(3^2)} = 13.86$$

The area of the sector $ACBO$ is next found by multiplying the length of the arc ACB by one-half the radius of the circle. The radius of the circle being the hypotenuse of the right triangle ODB, its length is found as follows:

$$r^2 = (c/2)^2 + (r - h)^2$$

$$r = \frac{(c/2)^2 + h^2}{2h} = \frac{6^2 + 3^2}{2 \times 3} = 7.5\ ft.$$

The area of the sector $ACBO$ is then $13.86 \times 7.5/2 = 51.975$ sq.ft. Subtracting from this the area of the triangle ABO, which is $c/2\ (r - h) = 6 \times 4.5 = 27$ sq.ft., the area of the segment $ACBD$ is $51.975 - 27 = 24.975$ sq.ft., approximately.

V. SRAJN,
Mining Engineer.

Hymera, Ind.

I noticed a request from "Reader," COAL AGE, Mar. 21, p. 500, for a formula for finding the area of a segment of a circle from the length of its chord and the rise of the arc, without the use of trigonometry. The following simple rule may be of use in the solution of this question:

RULE—*Add together one-fourth of the square of the chord and two-fifths of the square of the rise of the arc. Multiply the square root of this sum by four-thirds of the rise of the arc.*

Calling the chord subtending the arc c and the rise of the arc h, this rule is expressed by the formula:

$$area\ of\ segment = 4/3\ h\ \sqrt{c^2/4 + 2/5\ (h^2)}$$

Then substituting the values $c = 12$; $h = 3$,

$$area\ of\ segment = \frac{4 \times 3}{3}\sqrt{\frac{12^2}{4} + \frac{2}{5}(3^2)}$$

$$= 4\sqrt{\tfrac{144}{4} + \tfrac{18}{5}} = 4\sqrt{39.6} = 25.17\ sq.ft.$$

Cobalt, Canada. JOHN MCPHEE.

Both of the solutions given above obtain more or less approximate results. To show the degree of approximation that can be obtained by the solution, COAL AGE, Mar. 21, p. 500, we will calculate the successive values for h_1 h_2, h_3, etc., according to the method there explained, using Formula 3, for that purpose, which is

$$h_1 = r\ (1 - \sqrt{1 - h/2\,r})$$

In this formula, $r = 7.5$ ft. and $h = 3$ ft.; but the values h_1, h_2, h_3, etc., are each in turn substituted for h, to obtain the next succeeding value, as follows:

$$h_1 = 7.5\ (1 - \sqrt{1 - 3/15}) = 0.792$$

Again, substituting this value of h_1 for h, in the same formula, gives

$$h_2 = 7.5\ (1 - \sqrt{1 - 0.0792/15}) = 0.201$$

Likewise, substituting this value of h_2 for h, in the same formula, gives

$$h_3 = 7.5\ (1 - \sqrt{1 - 0.201/15}) = 0.0504$$

Similarly, substituting consecutively the values for h_3, h_4, etc., the following values are obtained: $h_4 = 0.01261$; $h_5 = 0.003154$, nearly; $h_6 = 0.0007885$, nearly.

The length of a subarc or unit division can be calculated from any one of these values and such unit length multiplied by the corresponding number of subdivisions, to obtain the length of the full arc ACB. It is evident that if the work is carefully performed, the greater the number of subdivisions, the closer the result will approximate the true length of arc.

In any case, the length of arc is calculated by the formula

$$arc = 2^{n+1}\sqrt{2\,r\,h_n}$$

Multiplying the length of the arc ACB, as thus calculated, by one-half the radius of the circle will give the area of the sector $ACBO$: and, finally, subtracting the area of the triangle ABO (27 sq.ft.) from the area of this sector, will give the required area of the segment $ACBD$.

The lengths of the arc $A\,C\,B$, as calculated from the respective values of h_3, h_4, h_5 and h_6, previously given, are as follows: 13.912; 13.918; 13.920; 13.920 ft., and the corresponding areas of the segment $ACBD$, as calculated in the manner previously described, are 25.17; 25.19; 25.20; 25.20 sq.ft. The last two values are, thus, practically identical and may be taken as being the closest possible approximation.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—What is the total weight of an open tank 9 ft. long, 4 ft. wide and 2 ft. high, made of ¾-in. boiler plate; allowing 8 per cent. additional weight for the flanges and assuming that 1 sq.ft. of boiler plate 1 in. thick weighs 45 lb.?

Ans.—The perimeter of the tank, or the measurement around the sides and ends is 2 (9 + 4) = 26 ft. The superficial surface of the sides and ends is then 2 × 26 = 52 sq.ft. To this must be added the area of the bottom of the tank, 4 × 9 = 36 sq.ft.; making the entire superficial surface of the tank 52 + 36 = 88 sq.ft. For a ¾-in. boiler plate, the corresponding weight of the iron in the tank is ¾ (45 × 88) = 2970 lb. Allowing 8 per cent. additional weight for the flanges makes the total weight of this tank 2970 × 1.08 = 3207.6 lb.

Ques.—(a) The course of the main entry of a mine is N 17° W; what is the course of a cross-entry turned to the right of the main entry, at an angle of 90 deg.? (b) What is the course of the rooms turned off this cross-entry, at an angle of 67° 30′, to the right?

Ans.—(a) The course of the main entry lying in the northwest quadrant and the cross-entry being turned to the right, its course is 90 — 17 = N 73° E.

(b) The rooms being turned 67° 30′ to the right of the cross-entry, their course is found by adding this angle to the azimuth of the cross-entry, which gives for the azimuth of the rooms, 73° + 67° 30′ = 140° 30′. Since this azimuth lies in the southeast quadrant, the corresponding bearing or course of the rooms is 180° — 140° 30′ = S 39° 30′ E.

Ques.—Assuming a ventilating fan running at constant speed and having a constant manometric efficiency, in which case would this fan circulate the largest quantity of air: 1. When operating on four airways, each 4x5 ft. in section and 800 ft. long. 2. When operating on a single airway 8x10 ft. in section and 1600 ft. long?

Ans.—The four airways, 4x5 ft., 800 ft. long, have the same sectional area (80 sq.ft.) and the same rubbing surface (57,600 sq.ft.) as the single airway 8x10 ft., 1600 ft. long. The potentials of these airways and that of the circulation are, therefore, the same in each case; and the fan, running at the same speed, will have the same manometric efficiency and produce the same quantity of air, in each case.

Ques.—A mine sump is 62 ft. long, 11 ft. wide and 9 ft. deep and full of water. How long will it take a 6-in. pump to empty this sump, at a piston speed of 100 ft. per min., the efficiency of the pump being 80 per cent.?

Ans.—The sectional area of a 6-in. plunger or piston is 0.7854 × 6^2 = 28.2744 sq.in. At a speed of 100 ft per min., the piston displacement of this pump is 28.2744 × 100 ÷ 144 = 19.635 cu ft. per min. Assuming an efficiency of the water end of the pump as 80 per cent., the pump will discharge 19.635 × 0.80 = 15.708 cu.ft. of water per min.

The capacity of the sump is 62 × 11 × 9 = 6138 cu.ft. The time required for the pump to empty the sump is 6138 ÷ 15.708 = 390+ min., or 6 hr. 30 min.

Ques.—(a) Define the term "potential," as applied to electricity in mines. (b) Define the term "difference of potential," as applied to electricity. (c) Define the terms "low voltage," "medium voltage" and "high voltage," stating to what class of work each of these terms is applicable, for use in mines.

Ans.—(a) In electrical work, the term "potential" is commonly used as synonymous with voltage and refers to the *pressure* of the current, as measured by the voltage.

(b) The expression "difference of potential," in electricity, refers to the *drop of pressure* between two points of the circuit. This is referred to, also, as the *"line drop."* It is the loss due to the transmission of the current between two points, as, for example, from the generator to the machine to be operated.

(c) Where the conditions of the supply of electricity are such that the difference of potential between any two points in the circuit cannot exceed 300 volts, the Bituminous Mine Law of Pennsylvania (Art. II) would class the current as one of "low voltage." Where the conditions are such that the said difference of potential exceeds 300 volts, but cannot exceed 650 volts, the same law classes the current as one of "medium voltage." Where the conditions of supply are such that the difference of potential exceeds 650 volts, the current is classed by the same law, as one of "high voltage."

Owing to the danger of contact of men and animals with live wires, *low-voltage* currents are preferable in all mine work underground, except where it is necessary to reduce to a minimum the size of wire conductors or cost of copper, for the transmission of power to the working face. *Medium-voltage* currents are better adapted for the operation of most machinery on the surface, as, for example, air compressors, hoisting and haulage engines and fan motors. Medium voltage is also best adapted for transmission of electrical power underground; but, in all cases, conductors carrying such voltage should be insulated and otherwise safeguarded. *High-voltage* currents are chiefly used for long-distance transmission of power, on the surface and, in rare cases, underground.

In the transmission of electrical power, the size of wire or cost of copper is reduced to a minimum by the use of an alternating current of high voltage; but direct current is almost always employed for the operation of motors for haulage, coal cutting, hoisting or wherever a high-starting torque is required. In the use of electrical power, therefore, at a considerable distance from the generator, it is more economical to use a medium- or high-voltage, alternating current for transmission to the point where the power is required; and transform and "step down" this current, at that point, so as to obtain a direct current of low voltage for use in the machine.

Coal and Coke News

Washington, D. C.

The Committee on Mines and Mining in the House of Representatives has begun a new inquiry into certain phases of the Colorado strike situation by calling before it John D. Rockefeller, Jr., and questioning him concerning the Rockefeller interests in the Colorado region. Mr. Rockefeller in testifying on Monday, Apr. 6, said that he was one of his father's representatives in care of his investments in the Colorado Fuel & Iron Co., in which J. D. Rockefeller, Sr., held about 40 per cent. of the common and preferred stock and about 50 per cent. in all of the bonds.

Mr. Rockefeller, Jr., did not know much about the holdings of other stockholders but he described the relationship between L. M. Bowers and the Rockefeller interests by saying that "he came to us and asked us if we had any interests in which he could be of service in the West, and knowing him to be of great value as a business man we asked him to investigate some investments we had in the far West at the time. This he did. Then he said he was to live in Denver, and we were glad to have him care for our interests there. He was first treasurer of the company and afterward made chairman of the board and this was done by the board itself without any knowledge on our part. I mention this to show you that he has been retained by the board because his long continued relationship with the company has been of great value to the enterprise."

When asked whether he was a dummy director, Mr. Rockefeller said that his practice was to get the best men that could be had and then stand by them. He himself had rarely attended the directors' meetings. When questioned with respect to the labor conditions in Colorado he said he had been impressed with the extensive welfare work that had been done by the Colorado Fuel & Iron Co. and offered to file the correspondence with the concern during the time the trouble culminating in the recent strike was in progress.

Mr. Rockefeller rejected the idea that he had only a passing interest in the situation in Colorado and asserted that he thought Mr. Bowers was the best man to handle the situation. He had not gone to Colorado himself because he preferred, as previously stated, to leave practical details in the hands of skilled men who were capable of dealing thoroughly with them, holding such men responsible for the results actually secured.

The hearing is to be continued with other witnesses concerning the circumstances under which existing conditions in the mining regions developed.

Amendments to the Mining Law

Senator Walsh Chairman of the Committee on Mines and Mining has offered a bill amending section 2348 of the Revised Statutes so as to read as follows:

Sec. 2348. Any person, or any corporation organized under the laws of the United States, or of any state, or municipality, or municipal subdivision of any state, as above provided, who have opened and improved, or shall hereafter open and improve, any coal mine or mines upon the public lands, and shall be in actual possession of the same, shall be entitled to a preference right of entry under the preceding section, of the mines so opened and improved.

It is believed that this bill or one to the same general effect will be acted upon by the Committee.

Senator Walsh has also offered a bill for the amendment of section 2347, Revised Statutes so as to make it read as follows:

Sec. 2347. Every person above the age of twenty-one years, who is a citizen of the United States, or who has declared his intention to become such, or any corporation organized under the laws of the United States, or of any state, or municipality, or municipal subdivision of any state, shall, upon application to the register of the proper land office, have the right to enter, by legal subdivision, any quantity of vacant coal lands of the United States not otherwise appropriated or reserved by competent authority, not exceeding 1280 acres, upon payment to the receiver of not less than $10 per acre for such lands, where the same shall be situated more than fifteen miles from any completed railroad, and not less than $20 per acre for such lands as shall be within fifteen miles of such road.

In addition to this he proposes to change section 2350 so as to authorize only one entry by the same person or corporation.

Harrisburg, Penn.

Further testimony to show that additional competition in the transportation of anthracite coal from the Schuylkill region would not be commercially feasible was given on Mar. 31, by A. T. Dice, general manager and vice-president of the Philadelphia & Reading Ry. Co., at the resumption of hearings for the defense in the Government's anti-trust suit against the Reading system and other anthracite interests.

It was brought out that surveys made in 1906 showed the construction of a railroad across the Broad Top Mountain to supersede the Mahanoy Plane would cost $7,500,000. The same construction, if undertaken now, it was asserted, would involve an expenditure of $9,000,000.

The old question of the abandonment of the Schuylkill Canal was brought up by the Government attorneys who endeavored to obtain from Mr. Dice an admission that the canal had been "designedly abandoned." Mr. Dice said that he knew of no canal that is now commercially successful. The Reading, he said, discontinued the use of the Schuylkill Canal because, although actual transportation of coal via the canal might be cheaper than by rail, the difficulties of loading and unloading and the distance of the canal from the collieries and coal yards, more than compensated any advantage, and made the canal route, as a whole, the more costly.

The decline, and finally the almost total elimination of the Schuylkill Canal as a factor in the transportation of anthracite coal, were explained by Edwin F. Smith, formerly superintendent of that property, as being due solely to economic causes. Although he said the users of coal preferred to receive it by rail, and that this preference ended the canal's career, he denied that the canal ever had been competitive with the Reading Railway. Mr. Coudert at last brought his cross-examination of Mr. Smith to the point where the latter admitted that every one else might call it competition, but still he would not.

Although the Pennsylvania Railroad is not a party to the suit, Robert H. Large, general coal freight agent of that company, testified as a witness for the defense. He said it is not the policy of his company to enter into joint rates with other carriers along whose lines bituminous coal is produced. He defended the right of the company, in the absence of compulsion by the Interstate Commerce Commission to endeavor to conserve its bituminous trade. Joint rates on anthracite coal, he maintained, inured to the public benefit.

Admission that the Reading Coal & Iron Co. is favored above other shippers of anthracite by the Reading Railway in the matter of extension of credit for freight charges was made on Apr. 3, by W. G. White, comptroller of the railway company.

Mr. White conceded, under cross examination, that the Reading Coal & Iron Co., gave no bonds, a privilege extended to only one or two shippers. He could recall no others which were given credit to the extent of as much as $100,000 for 60 to 90 days. Mr. Coudert, counsel, for the Government, read into the records accounts of the railway company showing an indebtedness of recent years running as high as $1,500,000 on the part of the Coal and Iron Co.

PENNSYLVANIA

Anthracite

Duryea—Suit has been entered against the Pennsylvania Coal Co., by A. B. Brown, who asks $5000 damages to his property caused by mine water. He claims that in the year 1908 the coal company sunk a bore hole near his property and has since pumped out a large quantity of water which at times overflows a small water course and enters upon his property causing culm, refuse, etc., to be deposited thereon.

Locust Gap—In a fire at Alaska Shaft early on Apr. 1, Thomas Graham and William McCoy, fire bosses were badly burned. A large number of men formed a fire-fighting force. The blaze grew rapidly but was finally gotten under control.

Cranberry—The mine workers at the collieries of A. Pardee & Co. threatened, on Apr. 2, to strike unless about 40 of the men back in their union dues paid up within the next week. "Button" troubles have recently occurred at a number of the mines in this vicinity, but there have been no strikes to enforce payment of dues.

Bituminous

Charleroi—The Charleroi mine of the Carnegie Coal Co. resumed work Apr. 2 with approximately 500 men. This number will be increased as miners become available.

Washington—Despite the counsel of the Official Board of District No. 5 of the United Mine Workers there were on Apr. 3 over 20,000 mine workers idle in Washington County. Of these all but about 800 quit because they did not wish to continue work until the wage scale was decided.

Connellsville—A considerable section of the state road just south of Poplar Grove in Connellsville Township recently collapsed into an abandoned mine.

Butler—Because the Erie Coal & Coke Co. refused to accede to their demands for an eight hour day 250 miners employed at Ferris went on strike recently. This and other mines in the Hilliards district have been working under union scale and conditions except as to hours of labor for the past three years.

WEST VIRGINIA

Wheeling—Since the strike of the Ohio coal miners was declared a migration of foreigners from the idle fields has been in progress. It is believed that the majority of the foreigners in the 5th Ohio Sub-District will be gone by the last of the month if the strike is not settled by that time.

The effects of this coal strike are declared to be wide spread affecting many lines of business other than mines. The railroads are hard hit and a conservative figure by a railroad official is that a million dollars a month will only about approximate the loss to the roads. There is also the loss to the employees through slack work which is considerable.

Colliers—Thirteen demands are presented by the striking miners of the Pittsburgh & West Virginia Coal Co. for consideration by the Board of Arbitration which Governor Hatfield proposes to name. Among the most important of these are recognition of the Union and an eight-hour day.

KENTUCKY

Louisville—The conference of Western Kentucky coal operators and miners was brought to an abrupt conclusion by the operators' ultimatum that no concessions involving an increased cost of production would be considered. Further negotiations will be carried on through the Joint Scale Committee. Meanwhile the 6000 miners affected will continue working under the 1912 agreement.

Lexington—The College of Mining of the State University has announced details of its short course in coal mining, which started Apr. 1 and will continue to May 27. Instruction will be given in the following work: Study of different mining systems, laying out for mining, and methods for thin and thick, flat and pitching seams; blasting, covering various explosives and the evils of improper blasting; machine mining; supporting excavations, including the principles of timbering; ventilation, with a study of the different methods and of coursing, splitting and regulating the current; the use of anemometers, water gages and other mine equipment; and mine rescue work.

Madisonville—About 150 miners employed by the Kingdom Coal Co. went out on strike Mar. 31, on the refusal of the company to grant wage increases and other demands made by the men. This mine was recently unionized, as far as the greater number of the men were concerned. It is reported that a number of them were discharged for this reason, and that this is one of the causes of the strike.

OHIO

Bridgeport—The miners of Belmont and Jefferson counties, 15,000 of whom are on strike, are apparently preparing for a struggle which may last six months or longer. Thousands are seeking temporary employment to tide them over the strike period.

East Liverpool—The Island Run coal mine which has been operated for a number of years by the Tri-State Ry. Co. recently discontinued operations. This mine has been the main source of fuel for the street car company for a number of years and employed from 40 to 50 men working in two shifts of 8 hr. each.

Columbus—Figures have been prepared by a number of Hocking Valley and Pomeroy Bend operators showing the real difference in cost of mining under the screen system and the mine-run system. These figures will likely play an important part in the negotiations for the renewal of the mining scale after the question of the constitutionality of the mine-run law is decided. They show that under present conditions the cost of mining in the thin vein district of Pennsylvania would be $0.6464, and in the thick vein district, $0.5611. In the meantime miners are trying to show that $0.71 3-7 would be an equitable basis for coal mined in the Hocking Valley, No. 8, and Cambridge fields of Ohio. On a machine mining basis the thin vein district of Pennsylvania would pay $0.4461 for cutting, drilling, timbering and loading and the rate in the thick vein district would be $0.3892. The rates which are being discussed in the Hocking Valley are $0.4928; in No. 8, $0.4517, and in Cambridge, $0.4140. These figures tend to show that Ohio is being discriminated against in many ways.

Coshocton—Harry Daly recently made a discovery of a four-foot bed of cannel coal on the Stockum farm located about two miles east of Coshocton. Arrangements are being made to open a mine in the territory.

INDIANA

Indianapolis—A circular sent out from the International Headquarters at Indianapolis and made public Apr. 3, calls for a referendum vote on Apr. 14 upon the decision of the miners' representatives at the conference recently held in Chicago to withdraw wage demands and recommending that such questions as working conditions which the miners feel are in need of adjustment should be taken up with operators locally, the miners meantime to remain at work. If this decision is ratified it will mean industrial peace, if not, a more or less extended strike.

Terre Haute—Mine workers of district No. 11 met here Apr. 6, as an adjourned session of the biennial convention, to decide on the demands of miners, to be presented to a joint convention of miners and operators Apr. 9. There will be no formal suspension of work in the mines.

Brazil—At a meeting of the joint boards of operators and miners in the block coal fields, it was agreed to work the mines pending the settlement of wage and other differences. The operators are reported to have considerable coal on hand.

Sullivan—A suit to test the question of whether a landowner conveys oil and gas rights when he sells the coal under his land has been filed in the Circuit Court here by the Sullivan Gas & Oil Co. which has leased land, to drill for oil and gas but owners of the coal under the land have also begun drilling for oil.

Vincennes—The Indian Creek Coal Mining Co., operating the largest mine in Indiana, claims the hoisting record of the state, having in eight hours hauled to the surface 3104 tons, beating the mine's previous record by one ton.

ILLINOIS

Harrisburg—The route for the Miners' Examining Board of Illinois for the month of April is as follows: Spring Valley, Apr. 2; Canton, Apr. 3; Peoria, Apr. 4; Danville, Apr. 9; Pana, Apr. 14; Springfield, Apr. 15 and 16; Staunton, Apr. 17; Breese, Apr. 23; Belleville, Apr. 24; Eldorado, Apr. 26; Duquoin, Apr. 29; Herrin, Apr. 30.

Ottawa—Twelve hundred men are idle as a result of closing down the coal mines at La Salle, Peru, Oglesby, Jonesville, and Cedar Point. This shut down was caused by an over-stocked market, many big consumers fearing a strike having stored many tons of coal.

Peoria—The Illinois coal operators on Apr. 3 refused to grant the demands made by the miners and presented a counter-petition to the latter containing clauses which not only lower the present scale of wages, but which provide for easier working conditions as a means of decreasing the cost of production.

Chicago—Five hundred English, Welsh, Irish and Scotch miners who had been employed for some time in Illinois and Indiana coal fields left Chicago Apr. 2 on a special train for Halifax, Nova Scotia, where they will embark for their old homes. They are taking advantage of a shut down in the mines to visit relatives across the sea.

MISSOURI

Midway—A 14-ft. bed of coal was recently discovered on the Newlin lease of the American Zinc, Lead & Smelting Co. The coal was first encountered at a depth of 28 ft. and continued to a depth of 42 ft. It is said to be one of the biggest deposits ever found in the Joplin district.

OKLAHOMA

Coalgate—Old No. 3 mine recently made a record by hoisting 819 tons of coal in one day. This is the most that has been taken out of that mine in years. Long ago, however, it had a record of over 1000 tons.

TEXAS

Wichita Falls—It is planned to have a demonstration in this city on Apr. 21 protesting against the treatment given "Mother Jones" during the Colorado coal strike. It is affirmed that 10,000 or more men from the north of Texas and Oklahoma will be in town for this occasion.

MONTANA

Red Lodge—The Northwestern Improvement Co. has made arrangements to proceed with the work of developing the big body of coal under the west bench, and active operations will be commenced in June. This new field will be developed by shafting and tunneling, and beds Nos. 2 and 3 will be tapped. It is anticipated that development of the mine, and placing it in a position for production, will probably consume a period of about three years.

FOREIGN NEWS

London, England—On Apr. 2 all of the coal miners in Yorkshire, numbering 17,000, had left the mines when the last of the notices to quit work had expired. The men demand the introduction of a minimum wage scale. Stocks of coal at the pitheads are only sufficient to last about one week, at the expiration of which time those industries depending on Yorkshire collieries for fuel will be seriously hampered.

PERSONALS

Thomas L. Lewis recently stated unequivocally that he would not again be a candidate for any office in the United Mine Workers of America. He would not give any explanation for his decision.

Roger Martin, superintendent of the Vulcan Coal Co. recently returned home from the Hospital in Roanoke, Va., where he underwent an operation for an abscess in the side. He is now able to attend to his work.

E. B. Coolidge, who has been coal and coke agent for the Wheeling & Lake Erie R.R. Co. has been transferred to Chicago with the position of general western agent. His former headquarters were at Cleveland.

B. F. Robertson, for many years connected with the mercantile department of the Consolidation Coal Co., and lately general manager of stores, for that concern has resigned. He has not announced his plans for the future.

Joseph Yannis, vice-president of the United Mine Workers District No. 1, was recently held up by two masked highwaymen near his home in Wilkes-Barre and robbed. The highwaymen, however, only secured $11 in cash and a gold watch.

I. P. Mullen and E. L. Halbert, superintendent and mine foreman at the Royal works of W. J. Rainey, were recently arrested on charges of violating a mine law which specifies that bore holes shall be kept 3 ft. ahead of the coal in narrow mine workings.

Gordon B. Late, recently purchased the entire interest of the Irvington-Late Coal Co. and will conduct the business under the name of the Gordon B. Late Coal Co. This firm now has 800 acres of Kittanning coal located on the Hardman branch of the Baltimore & Ohio R.R. in Preston County, W. Va.

Arthur Nealee, of Pittsburgh, will be general manager and superintendent for the recently organized Montour Coal Co. which has leased what are known as the Illinois Colliery Co. mines located at Springfield, Auburn, Virden, and Girard in Illinois. Provided the wage question is settled satisfactorily these mines will be operated at an early date.

Matt. Yurkonis was recently granted a verdict in the Brooklyn Federal Court of New York for $50,000 against the Delaware, Lackawanna & Western R.R. Co. for personal injuries received on July 6, 1911. His injuries were received in a combined explosion of gas and powder in a mine at Luzerne, Penn. This is one of the largest verdicts ever rendered a miner for personal injuries.

Edward Devoy, one of the best known coal men in the Middle West, announced his retirement as president of the Devoy & Kuhn Coal & Coke Co. on Apr. 1, to engage in business for himself, under his own name, with offices in the Equitable Building, St. Louis. Mr. Devoy organized the Devoy & Feurborn Coal Co. in 1885, but was active in coal trade circles for many years previous to that. That company was succeeded by Devoy & Kuhn.

RECENT COAL AND COKE PATENTS

Boiler Cleaner. E. H. Reiter, Elgin, Ill. 1,085,357, Jan. 27, 1914. Filed Nov. 20, 1912. Serial No. 732,526.

Derrick for Mines. J. E. Jones, Carneyville, Wyo. 1,085,208, Jan. 27, 1914. Filed Jan. 29, 1913. Serial No. 745,017.

Gas Producer. P. G. Schmidt, Olympia, Wash. 1,086,229 Feb. 10, 1914. Filed Feb. 15, 1913. Serial No. 748,757.

Mechanical Stoker. G. B. Rait, Minneapolis, Minn. 1,085,630, Feb. 3, 1914. Filed May 15, 1912. Serial No. 697,428.

Automatic Boiler Cleaner. A. A. Olson, Riverside, Ill. 1,086,307, Feb. 3, 1914. Filed Nov. 15, 1912. Serial No. 731,471.

Coal Handling Apparatus. F. F. Joseph, Chicago, Ill. 1,086,536, Feb. 10, 1914. Filed Jan. 6, 1913. Serial No. 740,271.

Fuel Saver. J. T. McKee, St. Johns, New Brunswick, Can. 1,086,834, Feb. 10, 1914. Filed Dec. 23, 1912. Serial No. 738,342.

Steam Boiler Furnace. G. S. Gallagher, New York, N. Y. 1,085,859, Feb. 3, 1914. Filed Aug. 13, 1910. Serial No. 577,006.

Stoker for Underfeed Furnace Grates. F. E. Davis, Morgan Park, Ill. 1,085,248, Jan. 27, 1914. Filed Sept. 4, 1912. Serial No. 718,545.

Emergency Plug for Boiler Tubes. A. T. Anderson, Camden, N. J. 1,085,519, Jan. 27, 1914. Filed Feb. 10, 1913. Serial No. 747,490.

Safety Lock for Self-Dumping Mine Cages. W. J. Phelan, New Salem, Penn. 1,085,297, Jan. 27, 1914. Filed Apr. 12, 1913. Serial No. 760,734.

Process of Treating Soft or Bituminous Coal and the Like. W. A. Ayres, Hazleton, Penn. 1,086,503, Feb. 10, 1914. Filed Apr. 17, 1913. Serial No. 761,822.

Apparatus for Treating Soft or Bituminous Coal for the Separation of Slate Therefrom. W. A. Ayres, Hazleton, Penn. 1,086,502, Feb. 10, 1914. Filed Apr. 17, 1913. Serial No. 761,821.

Coal Breaker and Cleaner. G. W. Borton and J. L. Hiller, assignors to Pennsylvania Crusher Co., Philadelphia, Penn. 1,086,129, Feb. 3, 1914. Filed May 12, 1908. Serial No. 432,488.

CONSTRUCTION NEWS

Whitesburg, Ky.—Representatives of the Slemp Consolidated Coal Co. recently announced that a million dollar coal operation would be started near Craftville.

Springfield, Ill.—The Cora Coal Co. recently placed a contract for the erection of a new tipple to take the place of the one recently destroyed by fire at their mine near this city.

Benton, Ill.—A large new mine is to be opened on the outskirts of Benton during the coming summer by the Middle Fork Mining Co. This firm is incorporated for $200,000, and owns 1660 acres of coal land east of the city.

Meyersdale, Penn.—The mining plants at Jerome and Boswell, owned by the United Coal Co. interests, will be improved and other ventures started after the receivership of the owning company, the American Water Works Co., has been concluded.

Sturgis, Ky.—The West Kentucky Coal Co. has let to the Alloway Lumber Co. the contract for the construction of 10 new houses at its No. 1 mine and 15 houses at No. 9. The lumber company has placed the material on the ground, and work will shortly begin on the new houses.

Hazard, Ky.—The Hazardtown Coal Co. recently organized with a capital of $100,000 will begin work Apr. 10 on a first class mining plant immediately below Hazard where it will develop 1000 acres of choice coal lands. W. M. Jones, of Barbourville, Ky., will be manager of the new operations.

Barbourville, Ky.—A railroad surveying crew has been working between this place and Manchester, Clay County, Ky., for several weeks, and it is understood that the plan is to extend the proposed Cumberland Northern R.R. from Barbourville to Manchester, the company having already acquired a right of way.

Buffalo, N. Y.—The Buffalo By-Product Coke Co., organized in New York some months ago, has broken ground for a plant near the Lackawanna Steel Co.'s property. The gas will be sold to the Lackawanna company and the coke will be handled by M. A. Hanna & Co., of Cleveland, which is interested in the Buffalo Union Furnace Co.

Chattanooga, Tenn.—The Durham Coal & Iron Co. plans to construct by-product coke ovens in blocks of 30 to 60, with a view to future additions. These will consume about 800 tons of slack coal daily, and 5,000,000 cu.ft. of gas will be sold. The initial expenditure will be approximately $1,000,000.

Penny, Ky.—The Long Fork Coal Co. will begin by Apr. 15, it is announced, a mammoth coal operation near Penny on Long Fork Creek to be reached by a new five mile branch of the Baltimore & Ohio R.R. At least seven openings will be made. The building of a good sized industrial city will be begun at once. Eight to ten million dollars will be expended in the work.

Whitesburg, Ky.—Three coal operations are to be started within a short time at the mouth of Boone's Fork. The Roberta Coal Co. contemplates an extensive plant a short distance up Boone's Fork, where it will expend a large sum to establish a first-class plant. At Mater, at the mouth of Boone's Fork, the Boone's Fork Coal Co. is now making preliminary surveys preparatory to starting building operations at which 500 men will be put to work. Following this the Consolidated Coal Co., one mile below the mouth of Millstone Creek, will begin operations shortly on another big operation.

NEW INCORPORATIONS

Mount Vernon, Ohio—The Eastern Kentucky Coal Co. has increased its capital stock from $1000 to $500,000.

Seattle, Wash.—The Beacon Coal Mines Co. of Seattle has been organized with a capital of $1,000,000. The incorporators are A. L. Knouse, V. C. Brown, and John F. Dore.

Middleport, Ohio—The River View Coal & Mining Co. has been organized with a capital of $5000. The incorporators are W. A. Brown, Emil Sauer, Laura Brown, W. L. Engler and Laura Engler.

Knoxville, Tenn.—The Royal Coal & Coke Co. has amended its name to the Royal Consolidated Coal Co., and increased its capital from $100,000 to $300,000. The incorporators are H. S. Pless, W. A. Pless, J. W. Goons, G. A. Atchley, and Ben. A. Morton.

Springfield, Ill.—The Montour Coal Co. has been organized with a capital of $50,000 to manufacture, sell, and ship coal and other minerals, also, manufacture and sell by-products thereof. The incorporators are Wm. L. Patton, Henry L. Patton, and H. R. Hall.

Fairmount, W. Va.—The Fairmount-Lincoln Coal Co. has been organized for the purpose of mining coal, with a capital stock of $150,000. The incorporators are C. H. Waggener, John G. Pritchard, Carl Riggs, and W. S. Black, all of Fairmont, W. Va.

Huntington, W. Va.—The Litz-Smith Coal Co. has been organized with a capital of $40,000 to mine coal. The incorporators are A. L. Litz, of Tazewell, Va., R. I. Smith, of Huntington, W. Va., J. B. Agee, J. G. McGuire, and W. D Spicer, of Logan, W. Va.

Accoville, W. Va.—The H. B. Summers Coal Co. has been organized with a capital stock of $20,000, all of which has been paid in. The incorporators are M. A. Summers, Helen and May Summers, and Harry J. Summers, of Bridgeport, Ohio, and H. B. Summers, of Accoville.

Charleston, W. Va.—The Warrior Coal Co. has been incorporated with an authorized capital of $100,000. The incorporators are planning an early development of 400 to 500 acres of coal in McDowell County adjoining the operations of the Berwind-White Co., with a tipple at War, W. Va.

Piedmont, W. Va.—The Cheat River Coal Co. has been incorporated with a capital of $500,000. The officers are A. R. Balcom, pres., J. C. Mackley, secy. and A. R. Balcom, mgr. and constructing engineer. This firm will mine coal and manufacture coke. It will invest about $70,000 for machinery and plant, and expects to award the contracts for the above between Apr. 1 and May 30.

Duquoin, Ill.—Incorporation papers for a new railroad in Williamson County have been filed with the circuit clerk. The new road will extend from Fredonia, on the Paducah branch of the Illinois Central R.R., to Reeves, on the Johnston City branch of the same road, and will be known as the Fredonia and Reeves Ry. The incorporators are officials of the Illinois Central R.R., who expect to use the road almost exclusively for coal traffic.

INDUSTRIAL NEWS

Winchester, Ky.—Capt. J. G. Jones is negotiating with Eastern interests for the lease of about 1000 acres of coal land which he owns on the Big Sandy River.

Connellsville, Penn.—The Duquesne Coal & Coke Co. has purchased 250 acres of coal at Independence, in Washington County, at a price in excess of $100 an acre.

Stone, Ky.—The Alburn Coal Co. is opening two new mines and will make a large increase in its output beginning Apr. 15. It will put 100 extra men to work. Fifty additional miners' houses will also be built.

Winchester, Ky.—Green A. Combs, of Montgomery Creek, in Perry County, has sold a tract of about 1100 acres of coal land in Clay County to Henry Martin, of Winchester, for $22,000. The tract is located near Manchester, Ky.

Hellier, Ky.—The Henry Clay Coal Co., has increased its coal output from 75 to 100 cars per day and proposes other increases from time to time. It will start another operation in close proximity to the present one the coming summer.

Bristol, Tenn.—The Clinchfield Coal Corporation has contracted with the Seaboard Air Line Ry. Co. to deliver to that firm from the mines in Russell County, Va., 900,000 tons of steam coal. This fuel is to be delivered as it is needed.

Wolf Creek, Ky.—The Wolf Creek Coal Co. which recently started a coal operation here will begin the shipping of coal soon and follow it by increases until a big output is reached. Over 200 miners' houses have been completed, most of which are now occupied.

Herrin, Ill.—Another mining school has been opened by the Miners' and Mechanics' Institute of this state at Herrin, under the direction of E. C. Lee, a well known mining engineer, formerly of Kingston, Penn. The work of the Institute has been made possible recently by act of the Legislature providing ways and means for establishing local schools of this character throughout the state.

Peoria, Ill.—At a meeting of the Executive Board of the Illinois Mining Institute, held at Peoria, Apr. 1, it was arranged that the May meeting of the Institute would be held in Peoria, May 14, 15 and 16. The program will be announced later. Information in connection with the work of the Illinois Mining Institute can be had by writing to Martin Bolt, secretary and treasurer, 1526 South College St., Springfield, Ill.

Waynesburg, Penn.—A deed has been filed in the Greene County Court whereby J. V. Thompson, of Uniontown transfers 8000 acres of coal land in Perry Township to the St. Paul Coal Co., of Pittsburgh. This is the largest single transfer ever placed on record in Greene County. The property is that which was reported as being sold by Mr. Thompson to H. C. Frick. The consideration is given as $1.

Chicago, Ill.—The Link-Belt Co., manufacturers of the Link-Belt silent chain drive for the transmission of power, elevating and conveying machinery, locomotive cranes, power house conveyors for coal, ashes, etc., announces the opening of an office in Detroit, Michigan, in Room 911, Dime Bank Building. L. W. Longman, formerly connected with the Chicago and Indianapolis works of the Link-Belt Co., has been placed in charge.

Washington, D. C.—The U. S. Civil Service Commission announces an open competitive examination to and including May 11, 1914, for the following positions, open to men only: Mining Engineer at a salary of $2400 to $4000 per year; Mine Statistician at a salary ranging from $1800 to $2400 per year; and an Assistant Engineer of Mine Tests, at a salary of $1800 to $2400 per year. Parties interested in any or all of these positions should write the U. S. Civil Service Commission, Washington, D. C., for Circulars Nos. 367, 369 and 368, respectively.

Coal Trade Reviews

General Review

Customary spring activity in anthracite. Bituminous at a standstill, consumers showing no disposition to enter the market. Indications point to a declining market unless there is a rigid curtailment.

The anthracite trade is moving along briskly under the stimulus of abundant orders for April delivery. Tidewater businтss is particularly active, large quantities of coal going into the New England market, with indications that this will continue for two or three months at least. An increase of 25c. per ton in the April retail circular on the prepared grades at New York, as compared with last year's schedule, has created some hesitancy in the local situation there, but the opening business is about normal.

The Eastern bituminous market is at a complete standstill, with no orders, plenty of coal available, and the volume moving under contract away below normal. Concessions are necessary to avoid demurrage, as the market is absorbing coal slowly and buyers are inclined to postpone negotiations. A feeling of hopelessness pervades the trade as competition is close, and it looks like a declining market later.

Production in the Pittsburgh district is at something less than half capacity, there is no recognized circular, and consumers are instructing operators to discontinue shipments until stocks can be reduced; there is no business being done on new contracts, and the new season's schedule has not been announced. The lack of uniformity in operating, pending the fixing of a new wage scale, is aggravating the situation further, and the general outlook is not encouraging.

Although practically all of the Ohio mines are now closed, and neither side making any overtures for a settlement, the market still fails to develop any firmness. The final mine outputs are being delivered, and it is generally thought that most consumers now have a full two-months' supply. The formal opening of lake navigation a week ago Friday has found this business to be equally dull and heavy, because of the excess supply at the head of the lakes and the uncertainty in labor circles. A large number of inquiries are reported at the Hampton Road piers, prices are stationary, and there was a heavy dumping; the curtailment in the union fields, however, has failed to create any unusual activity.

There is a noticeable anxiety over the labor situation in the Middlewestern field, as indications are now pointing to more serious trouble than was anticipated. As yet, however, the market has failed to respond to this condition, even with the added inducement of the customary spring discount. One of the best features of the situation is the large inquiry on contracts, but operators are hesitating to negotiate because of the uncertainty in the labor problem.

EASTERN MARKET

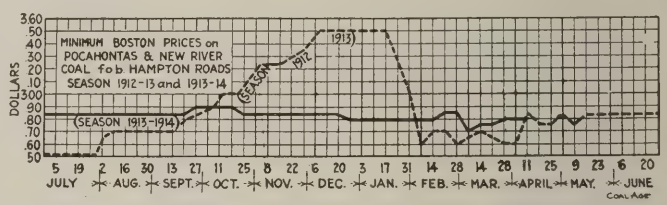
BOSTON

Movement of Pocahontas and New River way below normal and the trade shows rather a pessimistic tone. Unusually large volume of coal at Hampton Roads and market cargoes here are absorbed only with difficulty. Large reserve stocks in New England. Pennsylvania grades dull and heavy receipts of anthracite are expected.

Bituminous—The volume of Hampton Roads coals being applied to contract is way below normal and there is practically no spot demand whatever. At the same time most of the shippers are committed on marine transportation contracts and are therefore obliged to load vessels as they arrive. The market here is absorbing coal very slowly and in order to free cargoes of demurrage the distributors have to make such material concessions that new business and renewals as well are being considerably affected. Buyers are more than ever disposed to postpone and it certainly looks like a declining market later. The threatened Central Pennsylvania strike is regarded here as a flash in the pan affair and practically no interest is shown in it. With 175,000 to 200,000 tons reported standing at the three Hampton Roads ports it is not surprising that the trade here shows a pessimistic undertone.

Large reserve stocks are the rule at practically all the industrial plants, and especially those equipped with auxiliary water power, which is the heaviest in several years and there is no doubt the effect on coal consumption in those sections will be very marked for at least two or three months.

There are no new features in the market for Pennsylvania grades. With practically all the anthracite transportation engaged in moving domestic sizes, Pennsylvania coals are only incidental at tide-water at this time of year. The business is confined to special requisitions and not much is heard in a general way. All-rail there is only a fair movement with a lot of close competition for what new business offers. Prices on the popular grades are being held more or less rigidly and with the level so high and Hampton Roads coals so easy it is only natural many buyers here should turn back this year to the southern coals. It takes a high-grade Pennsylvania coal to withstand some of the low prices that are made to move distress cargoes at the various distributing points.



Anthracite—A heavy amount of April coal is coming forward to dealers all along the New England coast. The ice at the Kennebec and Penobscot rivers is just at the point of going out and soon shipments will be on in earnest. The long-awaited Apr. 1 has arrived and now the sales agents are wondering where business is to come from wren present orders are filled. The outlook is dull for the summer.

Boston prices were reduced 75c. on all sizes except egg on which the reduction is only 50c. This makes egg now the same price as stove. The list is as follows:

Broken	$6.50	Shamokin	7.50
Egg	7.25	Franklin	8.50
Stove	7.25	Bituminous	$4.65@4.90*
Nut	7.50	Screenings	3.00@3.25*
Pea	$5.50		

*Higher figure effective after Oct. 1

Bituminous at wholesale is quoted about as followe:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.90	2.92@3.02	
New York*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.63@3.73
Providence†				3.60@3.78

*F.o.b. †On cars.

NEW YORK

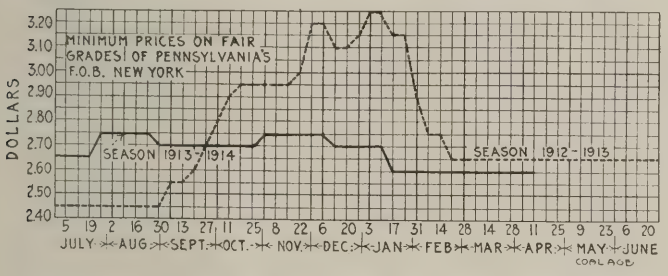
Interest of the bituminous agencies concentrated on the labor negotiations. Some business in contracts. Note of hesitancy in the anthracite trade due to the change in opening retail circular.

Bituminous—The New York soft-coal market is at a complete standstill. There is no demand, no orders, and plenty of coal on hand at all tide-water points. The entire attention of the trade seems to be concentrated on the labor trouble, and the situation is, of course, hinging to a certain extent upon the outcome of the different conferences now being held. If there is an important suspension in the bituminous regions, there will undoubtedly be a shortage of coal, and on the other hand, if operations are not restricted, the trade is facing a poor summer. In fact, there is a note of hopelessness prevailing in the trade regardless of which way the situation ultimately works out. The operators who will be shut down feel that the others in the nonunion fields will be able to keep the market well supplied and at the same time be the principal beneficiaries.

Some interest is still being shown in contracting. The conservative old-line companies holding out for last year's figures, probably have about half their expiring business renewed, with the balance still hanging fire. Other producers, willing to make concessions no doubt have more than this closed up. The spot market is not quotably changed, and continues the same as for the past several weeks, although

there is probably little or no business being negotiated at these figures: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70 @2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—The feature of the New York hard-coal market is the new retail price schedule of 25c. per ton on the prepared grades above that for last year. It is stated that 10c. of this increase is made to cover the new Pennsylvania state tax on anthracite, and the balance to provide for increased labor costs, such as the advance granted the boat captains during the winter. A portion of it will also be absorbed by the dealers, as it has been a generally accepted fact for some time that the retail trade has been working on too small a margin of profit. There appears to be some uncertainty as to whether this 25c. increase will be carried through each month and added to the winter circular also; it is reported at some points that the customary 10c. addition will not be made to the April circular on the first of May.



As a result of this increase, there has been some hesitancy on the part of buyers, particularly in New York proper, but as a rule the hard-coal business is about the same as usual during this month. The prepared grades are particularly active all rail, the steam sizes continue short at the upper ports, and rather long at the lower ports. We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.60		$4.55	
Egg	4.85	$4.85	4.80	$4.75@4.80
Stove	4.85	4.85	4.80	4.80
Chestnut	5.10	5.10	5.05	5.05
Pea	3.55	3.55	3.50	3.35@3.50
Buckwheat	2.80	2.80@2.90	2.50@2.75	2.35@2.75
Rice	2.30	2.30@2.40	2.00@2.30	1.90@2.30
Barley	1.80	1.80@1.90	1.70	1.45@1.70

PHILADELPHIA

Activity still marks the anthracite trade. Mining in full operation, and all sizes moving off promptly. Bituminous market shows little or no signs of improvement. Little fear of trouble with miners anticipated.

Anthracite—The second week of the spring anthracite business finds the trade moving along under the impetus of abundant orders for all domestic sizes, and a good market for the small or steam sizes but a season of mild weather will find much of this coal going into stock. No. 1 buckwheat seems to be finding the best market, with rice second; pea coal has already felt the effect of milder weather conditions, as evidenced by the fact that the individual operators still find it necessary to concede ten or fifteen cents from the so called circular prices to create a market.

The tidewater business is particularly satisfactory. Large quantities of coal are going to the New England market, and business from this end looks promising for at least two or three months. It is understood that the far Eastern points are rapidly resuming navigation and before the middle of the month, few if any will be inaccessible. The outlook for tidewater trade is bright. Ruling prices are as follows:

	Circular	Individual
Broken	$4.25	$4.35 @ 4.50
Egg	4.50	4.50
Stove	4.50	4.60
Chestnut	4.75	4.75
Pea	3.25	3.10 @ 3.15

Bituminous—While the market as a whole may be characterized as weak, yet there seems to be a tendency toward an improvement. The labor agitation had little effect on the local market, either in the way of added demand, or advanced prices, and what coal has been placed has mostly been on contracts. Prices continue on about a parity with the previous week.

BALTIMORE

Big gain in export coal trade is looked for. Prices firm but market listless. Contracting season draws to close in satisfactory manner.

A considerable improvement is anticipated in the export trade that will somewhat offset the otherwise dull market. Spain, Italy, Mexico, Cuba and South American Atlantic ports are making inquiries of importance. Chartering is such that April will probably see a gain over the same period of last year. March witnessed an increase of nearly 2000 tons.

While the general coal trade is rather lifeless, prices hold quite firmly. West Virginia gas coals vary between 75 and 85c., and steam fuels are selling at the mines at from 95c. to $1. Pennsylvania lower grades readily command $1 to $1.15, and best grades from $1.30 to $1.40. The closing of the contract season finds the majority of April business signed up.

A continuance of cool weather the past week caused some late buying of anthracite by householders with short supplies. The spring business as a rule, however, will be deferred until after the local retail coal exchange sets the new schedule. Considerable interest is felt in the local trade in a city government plan to purchase coal in bulk instead of by department lots. The specifications are rather exacting and a number of coal firms may hesitate to bid as a result.

CENTRAL STATES

PITTSBURGH, PENN.

No market for coal following settlement of wage scale, with some mines entirely closed and others operating part capacity. Many consumers have ordered shipments curtailed or suspended. Prices nominal. Connellsville coke softer, with uncovered consumers buying prompt lots instead of contracting. Production and shipments decreased.

Bituminous—The coal market became flat immediately it became known that there would be no general suspension on account of wage-scale differences. On behalf of the Pittsburgh district it was announced that there would be no suspension, except such closing as was forced by lack of demand. This closing has been rather pronounced. Nearly half the total capacity is temporarily represented in mines closed except for cleaning up work, while mines nominally in operation are running at greatly reduced rates, and shipments from Pittsburgh district mines since Apr. 1 have easily averaged below 50% of capacity.

There is no recognized market price for coal. Prior to Apr. 1 there had been cutting of the regular list to the extent of 10@20c. a ton and such prices could still be found now in all probability if consumers sought them, but instead they have been disposed to instruct operators to discontinue shipments until they can liquidate at least a portion of the stocks they accumulated in expectation of a general suspension. A number of contracts expired Apr. 1 and these must in time be renewed, but at the moment there is no disposition on the part of consumers to negotiate. It is not settled, of course, what prices operators will eventually quote on contracts but their general attitude is that of adhering to the former list, which is now nominally the market, though shaded as to prompt business: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The market is quiet and somewhat softer in general tone. Coke operators recognize that iron-market conditions are unfavorable, at least temporarily, and that active furnaces are more likely to blow out than idle furnaces to blow in. The only activity in the past few days has been in prompt lots, which went at $1.95 generally for first-class grade. The purchasers, however, were consumers who had been expected to buy for the month of April as a whole, or even for the second quarter, and the attitude of buyers is that the shorter periods they engage themselves for the better, as they expect to buy at lower figures as time passes. We quote: Prompt furnace, $1.90@2; contract furnace, $2; prompt foundry, $2.40@2.50; contract foundry, $2.40@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Mar. 28 at 360,018 tons, a decrease of 4062 tons, and shipments at 347,490 tons, a decrease of 22,040 tons. Production appears to have exceeded shipments by 12,528 tons.

BUFFALO

Too much bituminous on track, particularly at terminal points. Anthracite about normal. Country delivery hampered by muddy roads. Coke very heavy.

Bituminous—There is practically no regular market to report and will not be any for some time. The output has been cut down materially by suspensions here and there, but

the action is not uniform. Some mines are already starting up, after a short shutdown, and it looks as if others would follow in a short time, as the men are anxious to work and the operators will not curtail production.

This means a market continually overstocked and the consumer making his own prices. For quite a long time there has been little coal shipped, except on contract, that was not urged on the consumer just to get rid of it. As a rule, the consumers are not only much overstocked, but there is a large amount of coal on track, much of it on car service. It would take a month to clean up this surplus and make a firm market possible. At the same time there is demand for slack, though it is not what it was. It is well that it is not selling very brisk, for it is hard to get it while so much mine-run and sizes are awaiting sale. Such a condition pulls the trade to pieces badly, though it makes the Allegheny Valley slack as high in price as Pittsburgh, in spite of the lower freight. The general outlook is not encouraging as a whole.

Quotations remain weak and uncertain on the basis of $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run, and $2.25 for slack, including Allegheny Valley, although other sizes of this coal are about 25c. lower than Pittsburgh.

Coke—As anticipated last week the report of a possible advance in foundry coke has not materialized. The trade is as dull as ever and any increase of output would be disastrous. Consumption is not increasing, and prices continue on the basis of $4.50 for 72-hr. Connellsville foundry.

Anthracite—There is a good April trade in all branches of the business, although country jobbers complain of bad roads that interfere with deliveries. The excess of egg coal continues and it is predicted that some new plan for breaking coal will have to be adopted sooner or later. The loading of anthracite for lake shipment continues slowly, more than 20 cargoes now being afloat. Not much more will be done at present, as there is little demand for it at upper-lake ports and the prospect is for a late opening of the lake trade. Vessels will hold back as long as possible, as there is no iron ore for down shipment yet.

TOLEDO

The trade here is waiting future developments. Price lists are entirely off and everything unusually quiet and dull. Opening of navigation.

There is no perceptible change in Toledo. With a strike on, the conditions here are little different from what they have been for many weeks. Everything is decidedly dull. During the week it has been impossible to move the small quantity of track coal, held in the local yards, even at big concessions. Consumers either stocked sufficient to last during a brief suspension or will depend upon West Virginia coal. It is thought that the majority have enough accumulated stock for at least a month or six weeks. The railroads, have at least a two months supply on hand and one of the largest factories announced that they had enough to last until the end of June.

The demand for domestic, which was the life of the trade during the past six weeks is now entirely dead.

The length of the Ohio strike is the determining factor in local conditions. Most of the operators are of the opinion that it will last for some time.

Navigation was formally opened on Wednesday. Considerable coal has already arrived here for lake shipment. Large tonnages are held for this purpose on the east side awaiting the opening of the Pennsylvania bridge.

Prices are quotable as follows:

	Pocahontas	Kanawha
Domestic lump	$1.60	$1.40
Egg	1.60	1.30
Nut	1.40	1.25
¾ lump	1.25	1.15
Mine-run	1.25	1.10
Slack	....	0.65

No prices on Hocking, Jackson, Pomeroy, Massillon, Pittsburg and Cambridge.

COLUMBUS

Trade at a standstill. Practically no coal produced and the demand weak. No indications for a renewal of the wage agreement have appeared.

As anticipated, practically all of the operators in this state closed their mines Mar. 31 and they will remain closed until a satisfactory wage agreement is signed. As a result after the first two days of the week there was no production of consequence. Both operators and miners have been playing a waiting game and no move has been made toward a renewal of the conferences. Neither side is sure of their ground as the passage of the mine-run law has seriously complicated matters.

While the policy committee of the United Mine Workers of America announced that the miners would be willing to work pending negotiations on the wage agreement, the operators decided to close down their mines. They have not yet taken any action to test the constitutionality of the mine-run law and cannot until after the referendum period is over which is about May 20. In the meantime the attorneys will canvass the situation and outline a plan of action to be followed.

So far no effort has been made toward putting tipples and plants in shape to comply with the new law. This work will require several months and an expenditure of $2,000,000 to $3,000,000. The operators appear to be well organized and are standing solidly against resuming work before a number of disputed points are settled. The market is in such a condition that a suspension of 60 days would not hurt anybody and would result in cleaning up stocks nicely. It is freely predicted that when work is resumed coal will be sold at a higher figure than prevailed since the first of the year. It is believed the cost of production under the new law will be advanced fully 8 to 10c. per ton.

The indications for the lake trade are not very promising. Reports from the Northwest show there is still a considerable tonnage on the docks of the upper lake ports. There will not be much demand for lake tonnage before the middle of the season.

What quotations are being made in the Ohio fields are as follows:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.30
Screenings	1.67	1.85@1.95	1.62	

CLEVELAND

Lake coal shipping started last Friday at Huron. The suspension in Ohio failed to bring any appreciable benefit to the market and prices rule on the low level of the last few weeks.

Every commercial mine in Ohio closed down Tuesday night, and most of them will remain closed for some time. Although consumers realized the threatened suspension was not a myth, they did not come into the market with a rush; much stocking has been done in this district and little may be expected in the way of improvement in the near future.

The last coal mined in Ohio under the old contract has reached the markets, but it is not expected it will sell readily. The local trade has been carrying between 500 and 600 cars of coal, which will not be moved in less than two weeks. Prices continue low because operators and jobbers must sell coal to avoid car service.

Anthracite is coming to retail dealers and as many of the retail yards have large stocks of soft coal they are somewhat crowded.

Lake shipping began Friday when a small steamer and barge left Huron with coal for St. Clair River ports. Another steamer and barge cleared Saturday for river points. Coal is arriving for lake shipment in small quantities. The B. & O. is accepting lake coal only when the vessel is waiting at Lorain to load. The B. & O. machines at Lorain went in operation Apr. 10.

Coal shippers are not actively working among vessel owners. The situation at the mines in Ohio and parts of western Pennsylvania is so uncertain they cannot be sure of having coal and there will be no demand from the upper lake ports for at least sixty days. It is said among shippers that additional chartering of vessel capacity will not be done for another three or four weeks.

The spot market is quotable as follows:

	Pocahontas	No. 8	Middle District	Fairmount	Youghiogheny
Lump, 1¼ in.	$2.75@2.90*	$1.90@1.95	$1.80@1.85	$1.90	$2.25
Egg	2.75@2.90*				
Mine-run	2.55@2.60*	1.85	1.80@1.85		2.15
Nut		1.90	1.80		2.00@2.05*
Slack	1.25*	1.75	1.70		1.90

*For coal shipped or en route.

CINCINNATI

Closing down of Ohio mines stirs local demand. Trade looks to West Virginia and Kentucky for tonnage. River movement steady with all harbors, down to New Orleans, well supplied.

The trade here is now passing through a transitional period and the market is rather quiet. The demand for shipments from Kentucky and West Virginia has been greatly emphasized since the closing of the Ohio mines last week. Operators in the Southern districts are watching with the

keenest interest the events now taking place north of the river, and while the majority of the dealers here believe that the situation will be relieved in the near future, Southern producers are making every effort to increase their production.

The rail movement through here is about as heavy as the lines North can take care of. This will be greatly relieved, however, by the diversion of C. & O. coal to the Hocking Valley for distribution in the central and northern parts of the state. Every harbor from Cincinnati to New Orleans is well supplied, the river movement having been steady.

In some quarters it is said that the domestic trade is at a complete standstill, which condition will likely continue for some time, as retail dealers show little disposition to put in stock for next winter. Producers are sanguine that dealers will begin calling for shipments within the next few weeks which will have a tendency to relieve the market.

DETROIT

Improved demand and outlook is brighter. Activity on contracts for the new year.

Bituminous—The local situation has cleared up somewhat, and the indications are brighter for a good healthy business the coming season. The demand has quickened and a more optimistic feeling prevails. There has been a great deal of activity in contracting particularly, and considerable business is said to have been closed at profitable figures. Operators are showing no particular anxiety to close contracts, and are exercising some care in taking only what business they want. Some small premiums have been offered for light consignments of track coal, but this is rather the exception than the rule.

Coke—The situation is practically unchanged with the demand only fair for this time of the year. Indications point to increased business shortly. Connellsville is quoted at $3 with Sement Solvay at $3.25, and gas house at $2.90, all f.o.b. ovens.

HAMPTON ROADS

Week's shipments heavy. Dumpings for month of March more than one million tons. Prospects for heavy movement during April.

The dumpings over all piers at Hampton Roads have been good and the demand for coal is much better than it has been for some time.

Prices remain stationary. From the number of inquiries in the market for coal for prompt movement indications are that shipments will be heavy during the current month.

Foreign shipments for the week have been to Naples, St. Lucia, Cuba, Montevideo, Canal Zone, Georgetown, Coronel, Port Morant, Ceara and Manoz. In addition to the foreign movement the coastwise shipments have been heavy.

The Norfolk & Western Ry. at Lamberts Point made a new record for fast loading on Mar. 28 when they dumped 7751 tons of cargo and bunkers into the S.S. "Middlesex," this coal being put aboard in the short space of 4 hr. and 10 min. The best previous record out of this port being 4 hr. and 50 min. for a like quantity of tonnage.

Shipments of coal out of Hampton Roads for the month of March amounted to over one million tons of which quantity the Norfolk & Western Ry. at Lamberts Point dumped 532,525 tons, the Chesapeake & Ohio Ry. at Newport News 331,633 tons and the Virginian Ry. from Sewalls Point 222,803 tons.

LOUISVILLE

Continued mild weather stops the domestic movement and business is at a low ebb. The steam market is equally weak. Suspensions in other districts have had no effect as yet.

In spite of the stiffening which should normally follow a suspension of operations in other fields, the market in this territory is extremely weak, owing largely to the practical cessation of the movement of the prepared grades. Retailers report that there is no demand whatever, and as yet they have shown no inclination to begin stocking in anticipation of the summer business. The expected suspension in western Kentucky will not improve things appreciably, as there is simply no market for coal at this time.

The steam market is also slow, despite the scarcity of screenings which might be expected to follow a weakness in the domestic market. This is due to the inactivity in many industries, resulting in a lessened need for fuel and low prices, ranging from the rock-bottom figure of 35c. for western Kentucky nut and slack to 75c. or thereabouts for the better grades of eastern Kentucky, with few sales. It is reported that 6-in. block has been offered as low as 85c., indicating a market so quiet that it might be called quite dead.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Lump coal and steam coal very quiet. Furnace and foundry coke show little change and blacksmith coal is normal. Car supply satisfactory. Spring prices on Cahaba coal.

With the coming of summer weather, all spot business on lump coal has vanished, and while spring prices are now prevailing, business, so far, has been short of expectations. However, the next thirty days will show heavy bookings of lump coal for summer and fall shipment. Following are prices on standard Cahaba nut, No. 2 lump and fancy lump.

	2x5 Nut	No. 2 Lump	Fancy Lump
April	2.00	2.25	2.50
May	2.10	2.35	2.60
June	2.20	2.45	2.70
July	2.30	2.55	2.80
August	2.40	2.65	2.90
September	2.50	2.75	3.00
October	2.50	2.75	3.00
November to March	2.75	3.00	3.25

These prices are based on business being normal. Should the winter be cold they will advance, but if mild they would drop.

The steam coal business is far from being satisfactory, but the operators are expecting an improvement within the next ten days or two weeks. There is little or no change in the furnace or foundry coke market, it still being very quiet. Blacksmith coal is about normal. Furnaces report only small sales of pig iron for last week, with prices around the $11 mark for 2 Foundry f.o.b. Birmingham. The car supply is satisfactory.

INDIANAPOLIS

Fair domestic trade due to cool weather requiring continuance of furnace fires. Steam grades moving about the same. Industrial demand improving and some storing still being done. Prices hold steady.

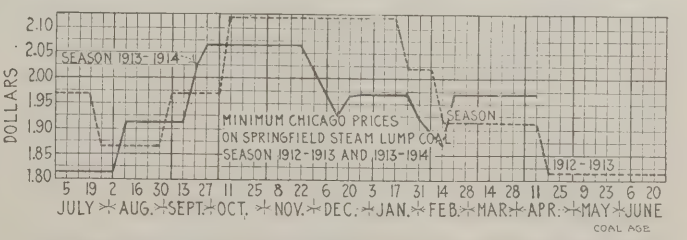
The weather continues cool and there is still a fair trade in domestic coals in Indiana. The demand for steam grades continues about the same; an improvement was expected but the industrial situation has not picked up. However, building operations have a start now and this will mean more activity generally. It is also the time of year when the automobile factories make a good showing. While these are far from being at full capacity, yet, they show considerable improvement over their winter schedule. Some other lines are also more active.

All this, added to the storing of coal by the larger buyers, because the new wage agreement is not yet signed, gives Indiana mines fairly active going. It is noted in this city that some consumers of domestic grades are laying in stocks of coal while they are sure they can get it. There is considerable inquiry concerning contracts for next year, but some hesitancy on the part of operators in quoting old prices during the pending uncertainties. Some of the mines have closed for repairs and a few hundred miners have taken advantage of this and of the delay in reaching a wage agreement and have left for Europe for a few weeks' vacation. Some mines were closed Apr. 1 that the miners might celebrate the aniversary of the eight-hour-day law. Prices continue generally unchanged.

CHICAGO

Summer discounts and labor troubles fail to stimulate business. Considerable activity in contracting with new business at last year's figures.

The expected movement toward a large storage of coal in preparation for a mine suspension did not materialize and a flat and dull market is the result. The general reduction in prices for the summer did not seem to aid the situation to any appreciable extent.



Contracting continues to feature the smokeless coal market, with the larger portion of the Chicago business all

closed although there is still some which is not as expeditious as was expected. Satisfactory conditions prevail in spot business with a number of concerns entirely sold up for delivery of prepared coal in April and May and more than half sold up on June and July delivery. Prices are steady at $1.25 for mine-run up to Aug. 1 and $1.40 after that date. For lump and egg the price is $1.60 for April, $1.70 for May, $1.90 for June, $2 for July and $2.25 for August and probably the balance of the year.

Conditions have been unusually dull with regard to the Hocking situation as a result of the energy of dealers who aided their customers in filling up before the mine suspension. Franklin County, Carterville and Harrisburg mines are awaiting the outcome of the labor situation, and they have provided their contract customers with as much coal as they could be induced to take. The belief is that there will be no serious interruption to mining. Similar conditions prevail in Indiana with an expected shut down of from two to three weeks; it is understood that the market is well enough stocked to withstand this.

Prevailing prices in Chicago are:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45 @ 1.35	.....	$1.50 @ 1.40	$1 40 @ 1.35
¾ inch	1.30 @ 1.25	$1.20 @ 1 15	1.35 @ 1.30	1.30 @ 1.25
Nut	1.25 @ 1.20	.....	1 30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.85 @ 0 80	.....	0.90 @ 0.85	0.75 @ 0.70
Coarse slack	0.75 @ 0.70	1 00 @ 0.95	0.80 @ 0.75	0.65 @ 0.60

Coke—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

ST. LOUIS

Labor situation takes an unexpected turn for the worse and some anxiety now evident. Nearly all mines shut down. Prices unchanged but tending to advance.

There is a feeling of anxiety in the local coal trade circles as to the future developments in the labor situation in the Illinois field. In only a few instances has there been much storage coal bought by the steam plants here but the developments of the past few days have caused a great deal of anxiety as indications are that things will not be as smooth as was anticipated by the railroad interests. These latter were advising the public all the time that there would be no strike, but in the meantime they were shipping all the coal they could get for railroad storage purposes, taking advantage of the cheap prices that prevailed on account of the rumor that there would be no protracted shut down.

Some of the mines in the Standard district are working but only a few. There are no mines being operated in the outer districts, as far as can be learned. The circular prices as quoted in the last issue are practically the same, with the exception of screenings. The market at the close of last week on Carterville screenings was 90 to 95c., with a tendency to bring $1 and only a little offered. The Standard market was about 65 to 70c., with a tendency to go to 75 and 80 cents.

There is no washed coal on the market, and nut coal is somewhat scarce from all fields. Egg has moved more freely than lump, so that such mines as have coal on track have nothing but lump.

KANSAS CITY

Market generally steady. Increased production of cheap steam-shovel coal causing a readjustment of trade conditions.

Demand for lump is at a standstill, while steam coal is showing improvement. The market is generally steady, though Cherokee lump is badly off because of competition with the steam-shovel operations in the Pittsburg and other fields. With the arrival of good weather, the steam-shovel mining is progressing at an increased rate, with the result that shaft operators are finding themselves at a marked disadvantage. The cost of shovel mining is much less than by shaft, though that method does not allow as large an output as the latter. Operators mining Cherokee lump are finding it impossible to compete with the steam shovels and the situation is causing a good deal of uncertainty. It appears as if the shaft operators will be able to sell only surplus demand which cannot be cared for by the shovel mines.

FOREIGN MARKETS

GREAT BRITAIN

Mar. 27—With the approaching of the Easter holidays and heavier chartering of late, the outlook is more promising. Prices are approximately as follows:

Best Welsh steam	$4.35	Best Monmouthshires	$4.09
Best seconds	4.20	Seconds	3.90
Seconds	4.08	Best Cardiff smalls	2 60
Best dry coals	4.14	Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follow: complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

A foreign business man informs an American consular officer that he is anxious to introduce American coal into the country in which he is located, and has just entered into negotiations with a Government official in reference to supplies of American coal. There is a disposition to buy such product provided the quality compares favorably with that of Cardiff coals. If American firms can compete it is believed that 200,000 tons of coal can be disposed of. Translation of the specifications which cover the purchase of Government supplies accompanied the report, and can be obtained by interested firms from the Bureau of Foreign and Domestic Commerce. —**No. 12,790.**

The Bureau of Foreign and Domestic Commerce is in receipt of a communication from a trade organization in the United States stating that one of its officials will make a trip to a European country in several months for business purposes. He desires to take advantage of this opportunity to introduce American coal into the country in question. He states that he has good connections in the market and believes that the time is opportune for establishing a permanent trade in this article.—**No. 12,777.**

PRODUCTION AND TRANSPORTATION STATISTICS

ANTHRACITE SHIPMENTS

Anthracite shipments for March and the first three months of the current year as compared with last year were as follows:

	March		3 Months	
	1914	1913	1914	1913
Phila. & Reading	936,304	976,712	2,698,223	3,399,293
Lehigh Valley	926,701	829,502	2,419,133	3,066,782
Cent. R.R. N.J.	750,381	665,856	2,018,522	2,240,293
Del. Lack. & West.	668,038	532,247	1,860,529	2,217,917
Del. & Hudson	446,135	562,440	1,475,406	1,782,988
Pennsylvania	585,190	429,211	1,547,408	1,496,825
Erie	660,924	700,388	1,900,534	2,073,542
Ont. & Western	191,030	212,932	542,131	642,236
Total	5,164,703	4,909,288	14,461,886	16,919,876

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Apr. 4:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	84½	84	84½	86¼	84½
American Coal Products Pref.	104½	104½	104½	106	104
Colorado Fuel & Iron	34⅝	31½	31⅞	34½	28½
Colorado Fuel & Iron Pref.	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102½	....	....
Island Creek Coal Com	48	47	48	....	....
Island Creek Coal Pref.	87½	86½	86½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	21½	21	21	23⅜	17⅝
Pittsburgh Coal Pref.	92¾	91½	92	93⅜	86
Pond Creek	18½	17	17	....	....
Reading	166½	164⅝	165⅜	172¼	161¾
Reading 1st Pref.	88	88	88	89	87½
Reading 2nd Pref.	88½	88½	88½	93	90
Virginia Iron, Coal & Coke	50	50	50	52	40

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. g n. s.f.g. 5s	97	98½	98	98	91½	99
Colo. F. & I. gen. 6s	108	110	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	78¼	Sale	78½	78¾	76½	82
Cons. Ind. Coal Me. 1st 5s	..	73	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89½	92	89	Mar. '14	89	89
Gr. Riv. Coal & C. 1st g 6s	91	..	99⅛	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	98½	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	91	..	93	93	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	88½	89	88	88	84	88
Tenn. Coal gen. 5s	78	82½	80¼	Mar. '14	77	82
Birm. Div. 1st consol. 6s	103	Sale	103	103	97½	103½
Tenn. Div. 1st g 6s	102	103	101½	Mar. '14	101½	103
Cah. C. M. Co. 1st g 6s	101⅞	103	101½	102	101	102½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	101¼
Victor Fuel 1st s f 5s	..	75	80	May '13	..	..
Va. I. Coal & Coke 1st g 5s	93	Sale	93	93	92½	95

No Important Dividends were announced during the week.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 16
Issued Every Saturday
Hill Publishing Company

NEW YORK, APRIL 18, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

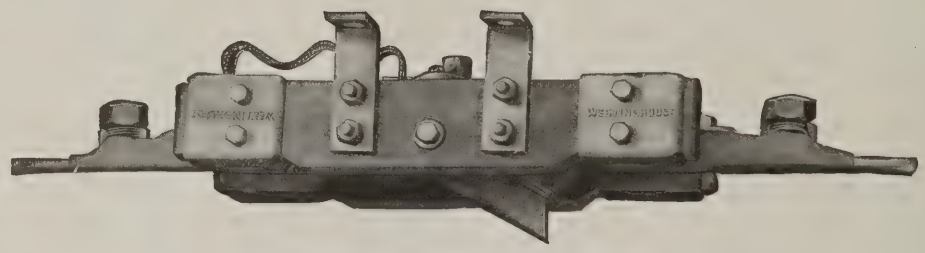


Steel Tipple of Chicago, Wilmington and Vermillion Coal Co., in Franklin County, Illinois.

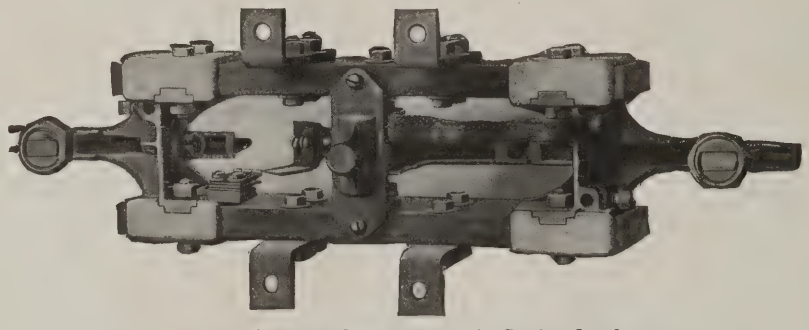
Cut out the branch trolley lines in your mine when they are not in use with

Westinghouse

Automatic Section Insulators



Westinghouse Automatic Section Insulator



Top View of Westinghouse Automatic Section Insulator

BRANCH trolley lines protected by these insulators are only energized by the locomotive throwing the insulator switch when entering the branch.

The circuit is opened and closed by a switch blade mounted on a rocker which the trolley operates. In one position the blade connects with copper contacts, in the other there is no connection. A spring prevents the rocker from remaining in an intermediate position.

There is no arcing at the switch contact, because the rocker is always energized, and the switch connection is always closed while the trolley wheel is on the rocker.

This device complies with the Pennsylvania Bituminous Mine Law of 1911, Section 41, Page 67, which requires that branch trolley lines be fitted with automatic trolley switch, etc.

Westinghouse Electric & Manufacturing Co.

Sales Offices in 45 American Cities — East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 APRIL 18, 1914 NUMBER 16

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 635

Makes the suggestion that mine managers investigate the different types of mine rolling stock. Much unnecessary expense is incurred through the employment of mine-car wheels that are not adapted for the service and conditions to which they are subjected.

IDEAS AND SUGGESTIONS: *Pages* 636-637

Getting Results—*Surface Steam-Line Supports—Cost Sheets: Their Uses and Their Limitations—Dewatering Coal After Washing.

*A MODERN ILLINOIS COAL-MINING PLANT: *Pages* 638-639

A southern Illinois coal-mining plant where the machinery and equipment are thoroughly up to date. R. G. Read. COAL AGE, Vol. 5.

*A PORTABLE SELF-RESCUER: *Page* 640

FIRST-AID TREATMENT FOR FRACTURED OR INJURED PELVIS: *Page* 640

PREVENTION OF COAL-DUST EXPLOSIONS: *Pages* 641-643

The British authorities recommend a mixture of stone dust with the powdered coal of the mines, such that, on incineration, the ash left will weigh half as much as the sample taken. COAL AGE, Vol. 5.

*MARKETING CONDITIONS AT NEW ORLEANS: *Pages* 644-645

With the near approach of the opening of the Panama Canal, the coal situation at New Orleans is attracting general interest. Development of an all-water route from the Alabama fields is one of the most important factors so far. Paul Wooton. COAL AGE, Vol. 5.

THE FIRST "STRIP PIT" SOLD: *Page* 645

*GASOLINE LOCOMOTIVE IN A PENNSYLVANIA MINE: *Pages* 646-647

A comparative study of the cost of gasoline-locomotive haulage versus mule haulage in proportion to production at the Hagevo operation of the Shade Coal Mining Co. COAL AGE, Vol. 5.

GOVERNMENT CONTROL OF LAKE TRAFFIC: *Page* 647

A STUDY OF MINE FATALITIES: *Page* 648

GRAVITY RAILROAD YARDS: *Page* 648

*THE CHAMPION MINES OF KANSAS: *Pages* 648-649

By Barry Scobee. COAL AGE, Vol. 5.

GERMAN COKE OVENS: *Page* 650

*CAGE FOR ANIMAL AIR TESTS: *Page* 650

TEXT BOOK ON SAFETY: *Page* 651

*PROMISE AND PERFORMANCE: *Page* 651

Poem by Breton Braley. COAL AGE, Vol. 5.

WHO'S WHO IN COAL MINING: *Page* 652

Brief sketches of the lives of George R. Wood, electrical and mechanical engineer for the Berwind-White Coal Mining Co., Martin's Ferry, Ohio, and Oscar Cartlidge, manager of the Illinois State Mine Rescue Station.

EDITORIALS: *Pages* 653-654

The Lockout—Is the Ohio Screen Law Constitutional?—Conservation—Straightforwardness—One Way to Introduce Your Coal.

LEGAL DEPARTMENT: *Page* 655

Damages for Wrongfully Mining Coal: Recovery is measurable by value of the coal at the pit's mouth, less the cost of production, unless the taking was willful, in which case no allowance is made for expense in mining and removal. Qualifications of the rule noted. A. L. H. Street. COAL AGE, Vol. 5.

LOCKOUT IN CENTRAL PENNSYLVANIA: *Page* 656

TWO W. VA. MINES HAVE MADE NEW RECORDS: *Page* 656

DISCUSSION BY READERS: *Pages* 657-659

Safety or Refuge Chambers in Mines. Letter No. 1—The Certificate Law. Letter No. 27—Fan Ventilation—The Mine Foreman.

STUDY COURSE IN COAL MINING: *Page* 659

INQUIRIES OF INTEREST: *Page* 660

Study Question, Ventilation—Cubic Capacity of Anthracite Sizes.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 661

COAL AND COKE NEWS: *Pages* 662-665

COAL TRADE REVIEW: *Pages* 666-670

INDEX OF COAL LITERATURE: *Pages* 671-672

ADVERTISING INDEX *Page* 34

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

It's Up To You!

The Weekly Ad-Talk Page

Advertising has done great things for you, reader.

It has cheapened the cost of goods by making the marketing easier and less expensive.

It has forced the manufacturer to keep his eyes and ears open for suggestions and recent inventions.

It has forced the retailer to have a cleaner store; a larger force of trained clerks; a better system to take care of your wants.

Advertising has broadened competition. It has made progress vital. It has opened the markets of the world.

The opened market has forced the advertiser to keep ahead of his competitor.

For this reason one big concern pays a man a fabulous salary to study and improve the devices it manufactures.

Every onward, upward step in the technical world is reflected in the selling section of this paper.

It is an index of technical progress.

Are you measuring your steps by it?

When you keep step with the development of your field, your efficiency keeps a jump ahead of the man who is content to putter along with yesterday's success.

In this issue you will find some new device, some labor or time saver that marks another onward step.

Advertising has done great things for you, reader. Have you benefited?

COAL AGE

Vol. 5 NEW YORK, APRIL 18, 1914 No. 16

Mr. Mine Manager, what do you know about mine rolling stock?

When you purchase mine car wheels, these days, you are not limited to one type of wheel, as you were some half dozen years ago; you may make your choice, for instance, from at least a dozen different designs of self-oiling wheels; probably an equal number of roller-bearing patterns, to say nothing of ball bearings and others.

Have you, at your finger ends, any positive information that would justify you in eliminating some of these types from consideration and allow you to choose intelligently from the balance?

To be more specific; let's assume that in one of your mines you have a long motor haul where you are now pulling your cars at the rate of about five miles per hour. It appears that because of the rapidity with which you are driving the narrow work, that it will soon be necessary to increase your haulage speed to eight miles per hour, and, eventually, to twelve miles per hour. Do you know whether the wheels you now have in service on your mine cars, will stand up under such speeds; and, if not, do you know of any type of wheel that will?

Let's go a little farther. Do you know whether it costs more to lubricate the self-oiling wheels, using black oil than the roller-bearing and ball-bearing wheels that require an entirely different kind of lubricant?

Do you know the difference in drawbar pull between cars equipped with any one of the types of wheels mentioned, in contrast to any other one type.

Have you any figures showing the comparative life of any two of the types of wheels mentioned? Do you know whether some of these types are especially adapted to slope hauls, while others are peculiarly adapted to practically level hauls?

Come now—fess up; you need not be ashamed of your ignorance! Listen to this:

So far as we are aware, not a single mining corporation has covered such an investigation, intelligently and fully —or at least, if they have, they have not seen fit to take the mining fraternity into their confidence.

Surely the inventors of these different types of wheels are deserving of some kind of a hearing; and as for the owners of our mining property, you know they need all the dollars that can be wrested from present cost sheets.

Get busy: If we have misstated your experience, tell us so emphatically; we won't take offense.

Ideas and Suggestions

Getting Results

By William H. Schaeffer*

An intelligent imitator always gets *some* results. He is up and doing while the other fellow, hoping to find a file of Original Ideas dropped upon his desk, finds himself shriveling up in the Chair of Opportunity.

Action generates originality, and it takes originality to imitate, paradoxical as that may seem. The original man takes an original way to better results. The old way was to survey the road yourself and erect from personal experience the necessary guide posts. The new way, the original way, is to study first the accounts of the journeys that other men have made over the same ground, marking down in your mind the pitfalls, the soft spots, and the treacherous places that they have encountered, and then going ahead and side-stepping all of these known difficulties. Then when the unexpected difficulty comes, you can meet it more easily because it was the *only* obstacle you didn't know about and you have conserved your full strength to concentrate upon it.

You never will find two problems in real life identical. The art of adapting to one business the principles developed in another seems to be the fountain of efficiency, and is actually as simple as A. B. C. On that idea alone, efficiency engineers have enabled themselves to really earn big remunerations from shrewd business men, who failed to grasp the simple idea involved.

Individual experiences are but illustrations of the application of the principle they strive to carry home. Don't hitch the cart before the horse and regard the principle as the example and the experience as the fundamental truth involved. That's what the fellow is doing who is up against the problem that is *"so* different."

The same principle is now being adapted to coal mining and if by a study of technical literature, you dig for ideas as conscientiously as you dig for coal, you won't be covering the road of Progress between Here and Best Results without knowing before you start the maps that others have laid out in the territory affected.

Surface Steam-Line Supports

The accompanying illustrations show the method adopted in the Norrie group of mines at Ironwood for supporting an outdoor steam pipe. The steam is conveyed some distance from the boiler house to the hoist at one of the shafts. The pipe is carried on the structural-steel bents shown in order to maintain the desired grade over the variable ground.

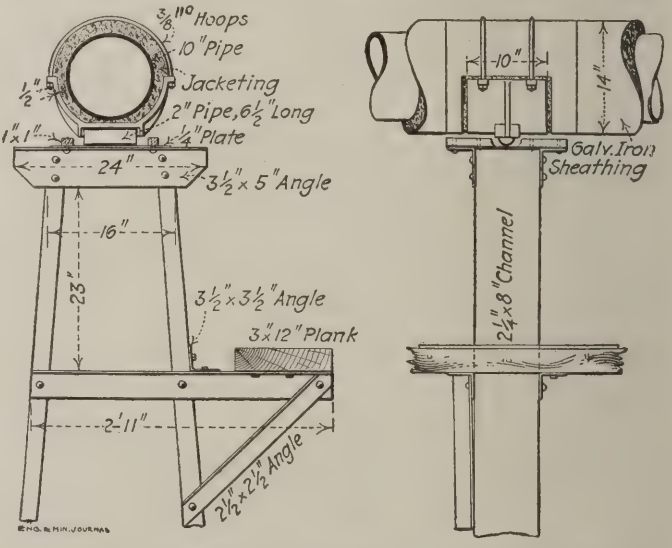
The bents are spaced about 15 ft.; every 200-ft. approximately a slip joint is inserted to take care of expansion. This is carried on the structure shown near the center of the photograph. The bents are set on concrete foundations to which they are held by plates bent at an angle, riveted to the legs and bolted to the concrete. The 3x12-in. plank supported on angles along one side, serves as a walk when it is necessary to inspect the pipe or pack the slip joints. The cross-braces are spaced 3½ ft. center to center and as many are used as the height of the bent requires.

*Akron, Ohio.



Pipe Line from the Boiler House

The manner of holding the pipe on the top of the bent so as to permit longitudinal motion, is of interest. The pipe is jacketed with insulating material and sheathed in galvanized iron wired on. A cast saddle at each bent is



Top of a Bent, Showing Saddle and Roller

bolted to the bottom of the pipe with two ⅜-in. bolts, over the top. The bottom of this casting is a socket which fits over a short section of 2-in. pipe. This pipe acts as a roller; it is free to roll longitudinally on a plate which forms the top of the bent, but is held against lateral motion by 1x1-in. pieces riveted to the plate. The details of construction of the top of the bent are evident from the drawing.—*The Engineering and Mining Journal.*

Cost Sheets--Their Uses and Their Limitations

By J. B. de Hart*

SYNOPSIS—The daily cost sheet, while indispensable to the mine foreman as a record of the daily expenditures of the company, is, necessarily, an imperfect record of the production cost and should, therefore, be supplemented by a weekly or fortnightly cost sheet.

The output of most coal mines includes a daily cost sheet. Let us consider for a few moments what this record shows, and of what use it is. In the first place, the term "cost sheet" is liable to be misleading. A daily cost sheet does not, and never can, show the actual cost per ton of coal mined. What it does show is the daily expenditure of the company and the way in which this money has been spent. A glance at the figures at the end of a cost sheet, "total cost $x. per ton," shows us simply nothing. In order to be in a position to use the cost sheet to the best advantage we must first come to a realization of this fact, and we must also learn whence the inaccuracies arise.

Let us first consider the item "Mining Materials," which includes timber, rails, pipes, planks, sheet iron, and so forth. The supply of timber which is sent down a mine each day does not vary to any large extent, except as the mineral output varies. At most mines, however, rails are sent down not every day, but once in about every three days. The usual method of procedure is for the foreman to write an order on the warehouse for the rails, and the cost of these is charged against the output of the mine on the day when the order was written, shown by the date on the order.

Clearly these rails should have been charged against the total output for the three days, and not against the production of any single day. If they are room rails, or rails not used in a main entry, they will be taken up and used over and over again, and so will help to produce a large amount of coal. Yet, on the cost sheet, they are charged against the output of a single day.

Overcoming the Difficulty

The question naturally arises, "How can we overcome this difficulty?" Clearly, it is impossible to postpone the making up of the cost sheet until the rails are worn out, or buried beyond hope of recovery. The best we can do is to get out a cost sheet covering all three days, and such a plan will eliminate the greater part of the error. This is a simple matter, and hence we find at most mines, not only daily, but also weekly or fortnightly cost sheets. Such cost sheets show a much nearer approximation to the cost per ton for a given period, although they are not absolutely accurate.

Let us suppose that there is a cave on one of the main roads, and that it takes a week to have it repaired. This work is usually charged to the output for that week, and, other things being equal, we get a too high cost per ton for that week. To be accurate we should spread the cost for this work over the whole output for a period equal to the average time which elapses between the days when we spend a week repairing caves. For example, if we, at the end of a year, have spent one week only repairing such caves, then the cost should have been borne by the whole year's output; if we have spent four weeks at such work, then the cost of the one week should have been borne by the output for three months. It is as well to realize this fact; that even a fortnightly cost sheet does not show an absolutely accurate cost per ton. Nevertheless, a fortnightly cost sheet does under ordinary circumstances show a cost per ton which is accurate enough for all practical purposes.

In spite of its defects, a daily cost sheet is indispensable to the mine manager. It must be looked upon, however, as showing the distribution of labor cost, and not the true cost per ton, or the cost per ton of material. It shows us the disposition of the forces; it shows the proportion of shiftmen to miners, of undercutters to miners, and the output per miner and per man. With all of these facts the mine manager must be familiar in order to cut down expenses to a minimum. On the other hand, we must always bear in mind that it is necessary to look further into the matter than the figures shown by the daily cost sheet, before we can confidently go to the mine and say to the foreman, "Your cost for material is going up."

*Coleman, Alta, Canada.

Dewatering Coal after Washing

One of the most difficult problems in connection with coal washing, in the past, has been the dewatering of the coal, after finishing its treatment in the washer. This difficulty seems now to have been successfully overcome by two companies; namely, the American Concentrator Co., of Joplin, Mo., and Springfield, Ohio, and the Link Belt Co., of Chicago, Ill.

Each of these companies has been experimenting with machines, during the past year, and they have now reached a point in their investigations where they are accepting orders.

The American Concentrator Co. installed their experimental dryer at the plant of the Pennsylvania Steel Co., at Steelton, Penn., last summer, and now, within a month, will have two large washer installations in operation using their machines; one in Alabama and one in Pennsylvania.

The Link-Belt experiments were carried on at the plant of the Illinois Steel Co. and they have recently closed a contract for a plant in Alabama, which calls for the installation of their dryers.

Both machines are centrifugal in action, and, their makers claim, will deliver coal after treatment with a uniform moisture content not to exceed 6 per cent. Heretofore, the owner of a washery had his choice of storing his washed coal in bins, for several days, and then elevating it with cranes and grab buckets, or else taking it directly from the so called dewatering elevators, with its moisture content varying anywhere from 7 to 20 per cent.

Another advantage which will, no doubt, accrue from the use of these dryers, will be the entire recovery of the very fine coal that ordinarily floats off with the waste water.

Development along this line will be followed with a great deal of interest by all who are interested in coal washeries.

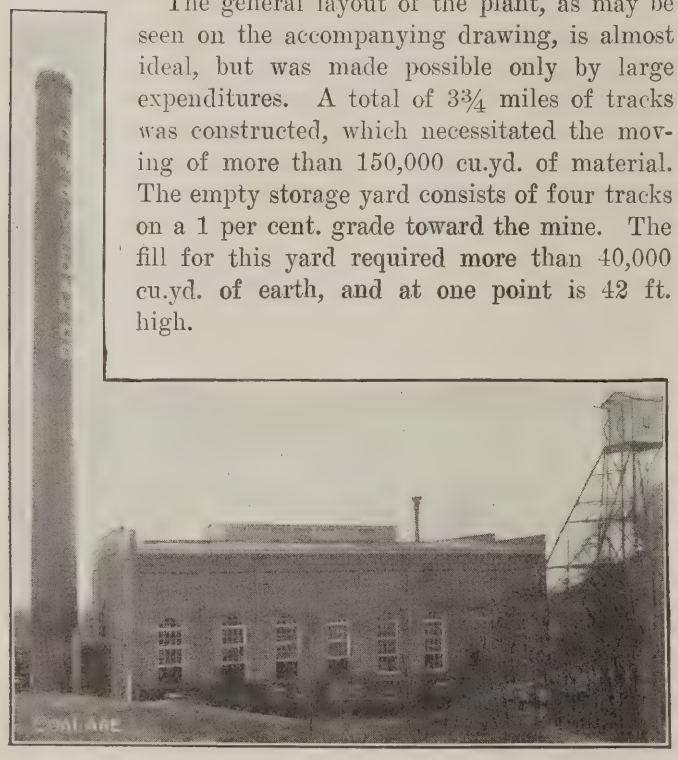
A Modern Illinois Coal-Mining Plant

By R. G. Read*

SYNOPSIS—A Southern Illinois coal-mining plant where the machinery and equipment are thoroughly up-to-date.

The new plant of the Chicago, Wilmington & Vermillion Coal Co., located at Orient, on a spur connecting with the Chicago, Burlington & Quincy, and the Chicago & Eastern Illinois Rys., is the first of a series of plants to be constructed for the development of a tract of 7000 acres of coal owned by this company in Denning Township, Franklin County, Ill.

The general layout of the plant, as may be seen on the accompanying drawing, is almost ideal, but was made possible only by large expenditures. A total of 3¾ miles of tracks was constructed, which necessitated the moving of more than 150,000 cu.yd. of material. The empty storage yard consists of four tracks on a 1 per cent. grade toward the mine. The fill for this yard required more than 40,000 cu.yd. of earth, and at one point is 42 ft. high.



General View of the Power Plant

The shaft is 520 ft. deep, and the point of dumping in the tipple is 70 ft. above the ground surface, making a total lift of 590 ft. Separate hoisting and air shafts have been constructed, each being 11 ft. 6 in. by 18 ft. in the clear and lined with 10-in. reinforced concrete extending from the surface to the bottom of the shaft. The air shaft, furthermore, has a reinforced-concrete partition separating the airway from the stairway compartment. An auxiliary hoist for men and material will be here installed.

The town site is located on rolling ground, and is provided with modern conveniences, including electric light and running water in each house. A hotel and 75 dwellings have already been completed.

The mechanical equipment was designed for a working capacity of 4500 tons per day of eight hours. In order to handle this output it was realized that a maximum hourly capacity of 1000 tons would have to be attained. The hoisting and screening equipments were, therefore, designed with this end in view. Special attention was given to simplicity and strength of the various machines, so that the risk from delays due to breakdowns would be reduced as far as possible. The question of economy in power consumption was also given careful

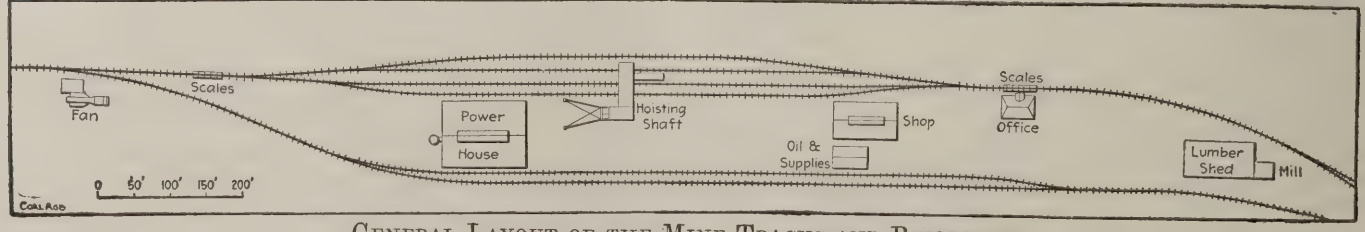


View of the Shaking Screens

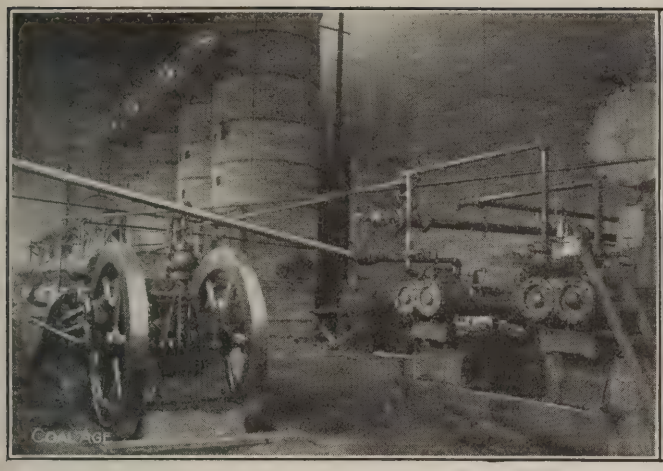
consideration, with the result that the steam consumption per ton of coal produced is small.

The tipple and screening equipment was given much thought with a view to thorough preparation of the coal. A side elevation of the tipple is shown in the accompanying drawing. The plan adopted for the mine rendered it desirable to place the hoist at right angles to the screen. The coal is dumped by means of self-discharging cages into a chute from which it flows by gravity into a weigh-hopper, provided with automatic recording scales and an electrically operated gate through which it is discharged into a "spiral" chute 10 ft. wide. This provides both a means of bringing the coal to the center line of the

*Webster Bldg., Chicago, Ill.



General Layout of the Mine Tracks and Buildings



A View in the Boiler Room



The Hoist and Generator Room

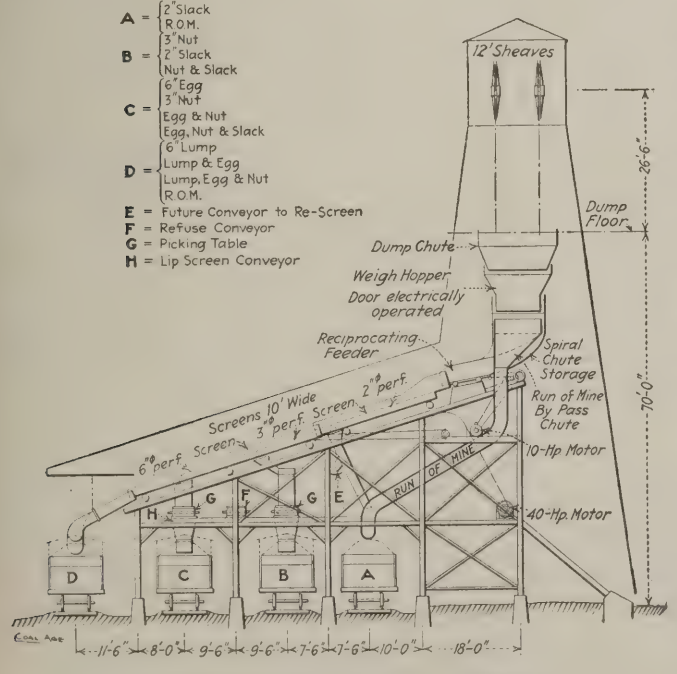
screen and a considerable amount of storage with a minimum of breakage.

This storage (about 20 tons) enables the dumping to proceed when the screens are for any reason momentarily stopped. A reciprocating motor-driven feeder which may be stopped or started at will delivers the coal to the screen.

The screens themselves which are perhaps the largest ever constructed are 10 ft. wide, each, with one perforated and one blank deck. No veil plates have yet been used for making the several mixtures indicated on the drawing. A separate steel structure supports the oscillating parts so that vibration is not transmitted to the hoisting tower or tipple building. A run-of-mine bypass chute independent of all machinery is provided for use in case of emergency.

The picking equipment consists of two 4-ft. tables of the apron type for the egg and nut sizes. Each table is about 25 ft. long and is carried by an independent steel frame. These tables are pivoted and provided with a hoisting mechanism so that they can be raised to discharge into chutes leading to box-cars when desired.

The refuse removed from the coal in the picking operation is thrown upon an apron conveyor and discharged into a 50-ton bin over the egg track. For all of these conveyors separate motor drives are provided. A combined picking table and loading boom for the lump coal will be installed in the future as well as a rescreening plant for separating the small sizes. The high class of construction of this machinery may be judged from the accompanying photographs.



Cross-Section through Tipple

The power house is a brick building, 90x114 ft., with steel roof and concrete floors. The boiler plant proper at present consists of four 400-hp. Wickes vertical water-tube boilers fired by Green chain-grate stokers. Provision is also made for adding two more future boilers which will bring the total capacity up to 2400 hp. Brick flues or smoke ducts connect the boilers to an 8x175-ft. Weiderholt reinforced-concrete stack. A tunnel has been built for the handling of ashes, and a coal-handling equipment with a bunker is to be installed in the future.

The hoisting engine, which is located in the power plant proper, is a duplex Nordberg Corliss 28x48 in., driving a 10-ft. drum. This is believed to be the first engine of this type to be installed in this field. The electric energy is furnished to the mine by a 300-kw. Crocker-Wheeler generator direct connected to 22x30-in. Nordberg Corliss engine. Space is provided for two similar additional units. A 35-kw. generator for lighting is also installed so that the large unit is used only during working hours. A small air compressor is also provided for cleaning boilers, riveting, etc.

A Jeffrey 6x16 ft. ventilating van direct connected to a 22x30-in. Nordberg Corliss engine is housed in a separate fireproof building. The shop, warehouse and office buildings are all of fireproof construction with modern equipment. The mine is operated with Sullivan short-wall chain mining machines and General Electric haulage and gathering locomotives. The construction work of this plant was in charge of D. A. Herbert, who is now general superintendent.

It is suggested that the fireboss, when looking for gas caps, should (1) employ the same lamp every day; (2) that the lamp—if correct percentages are aimed at—should be in exactly the same condition each time the test is made; (3) that the oil and wick and everything in connection with the lamp should be exactly the same at all times. The first condition may be easy to fulfill, but the second and third present some difficulties. The fireboss who gets over them should publish his experience for the benefit of the whole community.

A Portable Self-Rescuer

A portable rescue apparatus for emergency use in mine accidents has been placed on the market recently by the Draeger Oxygen Apparatus Co., of Pittsburgh, Penn. The apparatus weighs only 6½ lb., and can be carried slung over the shoulder or suspended from the neck. The oxygen supply is sufficient to furnish an abundance of air for a period of from 30 to 45 minutes.

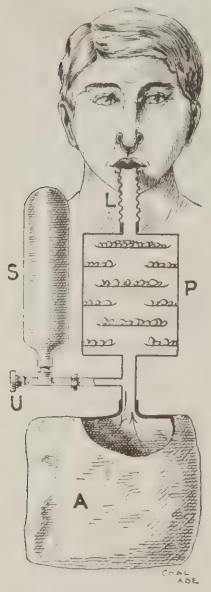


FIG. 1. SECTION OF BREATHING APPARATUS

The accompanying sectional drawing will give some idea of the operation of the apparatus. The oxygen passes from the oxygen cylinder *S* through the closing valve *U* into the breathing bag *A*. The first inhalation draws the air from the breathing bag through the potash cartridge *B*, and the flexible tube *L*. The exhaled air comes back through the tube *L* into the cartridge *B*. Here the nitrogen is freed from the carbon-dioxide, and, passing into the breathing bag *A*, absorbs sufficient oxygen and is again inhaled through the cartridge and the tube into the lungs.

When the oxygen supply becomes depleted, the air can be refreshed by quickly turning the closing valve *N*, admitting a new supply into the breathing bag.

In event of accident, the wearer opens the canvas cover, places the rubber mouth-piece firmly in his mouth, adjusts the nose slits, and then opens and closes the oxygen-cylinder valves. He is immediately supplied with an adequate amount of air.

As seen with breathing bag inflated, it reaches down below the waist line of the wearer and the apparatus appears somewhat cumbersome, but as shown in Fig. 2, which represents a man carrying the apparatus when not in use, it does not occupy much space and could be carried on the back entirely without annoyance. All that is necessary to put it into operation is to unbutton the canvas apron, place the rubber mouthpiece in the mouth, so that the flap sets firmly between the lips and gums. The teeth hold the small rubber lugs in place. The nose clip is next adjusted and the oxygen cylinder opened for a few seconds until the breathing bag is filled. Smoke goggles, if such have been supplied, can then be adjusted over the eyes.



FIG. 2. THE SELF RESCUER FOLDED UP AND STRUNG OVER THE NECK

The breathing bag should not be inflated with outside air before turning on the oxygen valve. By letting the inflation of the bag depend entirely on the presence of oxygen, its deflation will be evidence of the absorption of that oxygen as carbon dioxide in the potash cartridge. The oxygen valve is opened and closed intermittently, so as to keep the bag supplied with the right quantity of oxygen. Too much should not be used at one time or the pressure will be too high and exhalation will be difficult.

Of course, only fresh cartridges should be used. The potash will rattle when shaken so long as it is fresh. After it has lost its power of absorbing the impurities in the air, it will cease to rattle.

First-Aid Treatment for Fractured or Injured Pelvis

BY A. S. SNYDER*

It is always necessary to examine a fractured or severely injured pelvis in order to render first-aid intelligently; and in any case where there is doubt as to fracture, the injured should be treated as if fracture had occurred. It is also important to treat for shock, and some form of stimulant should be administered. When practicable, the patient should be well covered and warmth should be applied to the body.

In securing the injury, place a broad-fold bandage or two, if necessary, around the pelvis; tighten it up until the patient experiences the greatest degree of comfort and then tie it in place. This refers to triangular bandages, as they are generally the only material for that purpose on hand. It is better, however, to have long strips of muslin, from 6 to 8 in. wide, for injuries of this kind, and to secure them by pinning in about four places.

When it is necessary to transfer the injured from the stretcher to the ambulance cot, spread a blanket on the stretcher before placing the patient thereon, so that he may be lifted from the stretcher to the cot without danger of any further injury. In lifting the injured, it is important to keep the blanket well stretched, and, to insure this, three men should be employed on each side. Another man can remove the stretcher and place the ambulance cot beneath the patient, so that he may be lowered perpendicularly on to the cot. The same blanket may be used, in the same manner, in unloading the patent at the hospital.

Careful and gentle handling are all important.

Illinois State Mine Certificates

The State Mining Board of Illinois will hold a meeting at the State House, Springfield, commencing Monday, April 20, for the purpose of examining candidates applying for certificates as Mine Managers (First and Second Class), Mine Examiner, and Hoisting Engineer. Registration of candidates for these examinations will close at 5 p.m., Monday, Apr. 20, at the office of the Mining Board. The State Mining Board is composed of the following men: John Bohlander, president; James Forester, Thomas L. Jones, James Shaw and J. B. McKiernan.

It is possible to inclose all electrical conductors used in coal mines in substantial metallic outer coverings, and Robert Nelson says an appreciable step forward in the direction of greater security will be made when it is fully recognized that all electrical plants intended for use below ground should be so enclosed. This applies to light and to heavy apparatus, that is, to the cables and fittings for electric-lighting apparatus, and to all cables in conjunction with such apparatus.

*Instructor in first-aid and mine-rescue work, Berwind-White Coal Co., Windber, Penn.

Prevention of Coal-Dust Explosions

SYNOPSIS—The British authorities recommend a mixture of stone dust with the powdered coal of the mines, such that, on incineration, the ash left will weigh half as much as the sample taken. This amount will not assure absolute safety, for an explosion which has gained violence in far more favorable mixtures, will extend long distances in roadways strewn with stone dust in the proportion thus suggested.

An experiment conducted by the committee showed that the presence of incombustible dust decreases the inflammability of coal dust. The *relative* ignition temperature of a coal dust and of the same dust mixed with shale dust so that the mixture contained 20 per cent. of the latter, was 1005 deg. and 1095 deg., respectively. The committee states that the effect of an admixture of an incombustible dust with coal dust on the propagation of inflammation is also marked, and they tabulate the results of experiments in the Altofts gallery as follows:

TABLE SHOWING HOW INCOMBUSTIBLE DUST PREVENTS EXTENSION OF INFLAMMATION

Mixture Parts by Weight Coal Dust	Shale Dust	Mixture per Cu.Ft. of Air Space Oz.	Result
100	0	0.2	Flame propagated throughout the gallery
90	10	0.2	Flame traveled 110 ft. only
90	10	0.4	Flame propagated throughout the gallery
80	20	0.4	Flame traveled 80 ft. only
80	20	0.6	Flame propagated throughout the gallery
70	30	0.6	Flame traveled 63 ft. only
70	30	0.8	Flame propagated throughout the gallery
60	40	0.8	Flame traveled 16.5 ft. only
60	40	1.0	Flame propagated throughout the gallery
50	50	1.0	Evidence of flame in vicinity of cannon only.

The experiments show that the admixture of so small a quantity of incombustible dust as to form 10 per cent. only of the mixture greatly retards the development of an explosion. Thus comparative experiments with (1) pure coal dust and (2) coal dust containing 10 per cent. of shale dust, conditions being otherwise identical, showed:

TABLE SHOWING THAT PROPAGATION AND PRESSURE DEPEND ON PURITY OF DUST

	Mean Rate of Propagation of Flame, in Ft. per Sec.	Maximum Pressure Developed, Lb. per Sq.In.
Pure coal dust	1700	50.0
Coal dust containing 10 per cent. of shale dust.....	185	4.8

Dust Acts Like an Inert Gas

The admixture of an incombustible dust with the coal dust, it is explained, appears to act in the same way as the admixture of an inert gas with an explosive gas mixture; the incombustible dust, like the inert gas, takes up heat from the contiguous molecules, and, not being combustible itself, reduces the average temperature. If the temperature is sufficiently reduced the flame cannot be propagated.

The committee emphasize the fact that the "limiting mixture"—half coal dust and half incombustible dust—suggested as uninflammable by the above experiments, only holds for the conditions of the experiments, and for the means of ignition employed. A more violent means of ignition, such as they have obtained by starting the flame in a mixture of coal dust and air *per se*, may cause propagation of flame even under the adverse condition where inorganic and organic dusts are in equal proportion.

Anthracite Dust Will Extend an Explosion

It is suggested that in the propagation of flame along a large dust-strewn gallery, the dust from one bituminous coal can be regarded as of nearly equal sensitiveness with the dust from other bituminous coals. The dusts from anthracite coals are, as is well known, of a low degree of inflammability. It is difficult to *start* the general inflammation of a cloud of anthracite dust; but anthracite dust is quite capable of extending an explosion.

It is not essential to an explosion that coal dust be quite dry; on the contrary, coal with a considerable quantity of moisture in it may form a cloud of dust and be inflamed.

The behavior of coal dust varies with the method of ignition. For example, a large flame of burning gas, unaccompanied by any concussion or violent disturbance of the air, will fail to cause even pure coal dust to propagate flame for more than a limited distance, when the dust is simply deposited in the path of the flame. In order that a self-propagating inflammation of coal dust may be produced by such a flame, it is necessary that the dust should be in suspension in the air as a fairly dense cloud for a considerable distance.

When the flame is accompanied by concussion, as is the case with a blown-out or overcharged shot or an explosion of firedamp, it is no longer necessary for the coal dust to be previously in suspension in the air; but it must be so disposed in the region of the shot that the flame therefrom shall have every chance of igniting a considerable volume of dust-cloud raised by the concussion. In other words, the coal dust must be thick in the air before it can be fired.

Explosion Is Not Caused When Coal and Incombustible Dust Are in Equal Proportions

A mixture in equal proportions of coal and incombustible dust, lying close to the path of the discharge, did not give rise to a spreading inflammation when a charge of 24 oz. of blasting powder was fired from a cannon in the gallery. It is, therefore, unlikely that such a mixture lying on the floor or other surfaces in a mine would give a spreading inflammation when subjected to the flame of a blown-out shot from a similar charge.

A mixture in these proportions (1:1) is, however, capable of being raised and ignited by a pure coal-dust inflammation (started by means of a cannon shot), and the inflammation, so started, may then be propagated through such mixture.

Much More Inert Dust Needed for Extinction

Under the same conditions a mixture containing two parts by weight of incombustible dust to one of coal dust is capable of prolonging the flame of an inflammation started by black blasting powder shot in coal dust, and the flame may continue for a considerable distance

Note—Report of British Explosions in Mines Committee on experiments to determine the influence of incombustible dusts in preventing the inflammation of coal dust.

through such mixture before it dies out. Possibly such a mixture might propagate flame indefinitely if the zone of combustion were under still higher pressure. The committee's experiments have only dealt as yet with inflammations in the clear gallery open at one end and without artificial restrictions.

A slowly traveling inflammation, such as is produced when a ready-made dust cloud is ignited by a large jet of gas (unaccompanied by concussion) is at first capable of licking up coal dust deposited upon the surface of an incombustible dust and propagating itself for some distance until sufficient violence is developed to raise the incombustible dust also. This raising of the incombustible dust is more readily effected when a lighter or more buoyant dust, such as flue dust or fuller's earth, is employed, both coal and incombustible dust being raised in suspension together, and the flame soon dying down.

Explosions Not Always Instantly Checked by Inert Dust

A cloud of ignited coal dust may travel a considerable distance along a clear gallery free from coal or other dust. In many cases also the committee found that an ignition caused by the cannon and tube succeeded by 250 ft. of pure coal dust traveled 500 ft. along a gallery strewn with a 2 : 1 or even 3 : 1 mixture of incombustible dust and coal dust—the mixture of incombustible dust and coal being partly blown out of the gallery in front of the flame, and partly burned on mingling with the pure coal dust driven forward from the inflammation zone of pure coal dust.

When the coal dust forming the inflammation zone is previously diluted so as to contain 40 per cent. of incombustible dust, the inflammation is not propagated through a 2 : 1 mixture strewn in front of it along the gallery, since the mingling of the two mixtures cannot form a combustible cloud for any considerable distance.

Incombustible dust is more effective in preventing the ignition of coal dust than in checking an inflammation that has started. It should, therefore, be distributed uniformly throughout those galleries of the mine subject to the danger of coal-dust ignition, and if maintained in the proportion of between one and two parts by weight of incombustible dust to one of coal dust, the chances of such ignition taking place would be very small. Even a small proportion of incombustible dust (20 or 30 per cent. by weight) has a marked effect in checking an incipient inflammation.

Zonal Treatment Not Effective

The disposal of incombustible dust in zones or in easily disturbed masses concentrated in certain positions, leaving portions of the roads untreated, is, the committee thinks, not likely to be effective. In the case of mild inflammations, an incombustible dust that is readily raised and floats in the air has been found to be more effective than one which, owing to its shape or density, is less buoyant.

Shale dusts, or even heavier dusts, such as sand, are, however, effective when sufficient violence has been attained to raise them in suspension in the air.

As a provisional precaution till their experiments are more advanced, the committee makes the following suggestions: The experiments have clearly shown the great difficulty of initiating an explosion in a gallery where the coal dust has been mixed with an easily raised incombustible dust so that the mixture contained at least 50 per cent. of incombustible material. Hence, the committee is confident that the dust in a mine so treated would be relatively safe from ordinary ignitions, and consequently that the chance of a disastrous explosion would be greatly diminished.

Use at Least as Much Stone Dust as There Is Powdered Coal

It is true that such a mixture might not extinguish the fierce flame due to the explosion of a cloud of pure coal dust, or to an explosion of firedamp and air, either of which has gathered violence in its passage along a roadway—these conditions, and the effect of firedamp in the air have still to be tested. But a mixture containing 50 per cent. of incombustible matter may be raised in a cloud and brought into contact with a flame of equal or even greater intensity and volume than those ordinarily met with in a mine, such as might be produced by the ignition of a blower or an accumulation of firedamp, an accidental electric arc, or by a blownout black blasting-powder shot, without inflammation being propagated through it.

Since this admixture with 50 per cent. of incombustible matter, which can be carried out in a simple and practical way, confers on coal dust such power of resisting inflammation, it might be, in the committee's opinion, most usefully adopted now, even if further experiments lead to new developments, or other methods be found more efficient.

Approve of Stone Dust Being Used Instead of Water

They think, therefore, that, as an alternative to watering, the treatment of coal dust by an incombustible dust —so as to maintain an excess of incombustible matter in the mixed dust—might be adopted as fulfilling the requirements of the Coal Mines Act, 1911.

By section 62 (3) and (4) of that act, it is enacted that:

> The roof, floor and sides of the roads shall be systematically cleared so as to prevent coal dust from accumulating as far as practicable, and * * * * systematic steps, either by way of watering or otherwise * * * * shall be taken to prevent explosions of coal dust occurring or being carried along the roads.

Such a systematic step as is laid down in the above clause would be taken, in the committee's opinion, if the roads were treated with incombustible dust *provided* that the clearing of the roads required above and the treatment with incombustible dust were carried out in such a manner that at no time should such fine dust as was capable of being raised in suspension from the exposed surfaces of the roads contain less than such a quantity of incombustible matter as would make a mixture yielding on incineration at least 50 per cent. of ash.

Application Should Assure That There Is as Much Inert Gas as Powdered Coal Always and Everywhere

It should be clearly understood that in recommending this limit of 50 per cent. of ash, they are putting it forward provisionally and as a *minimum*.

The incineration test has been proposed by the committee to test the proportion of shales and other similar

forms of incombustible dusts. But it is not intended to condemn the use of other tests provided they yield trustworthy and equivalent results.

It is not possible to prescribe the quantity of incombustible dust to be applied or the periods of its application, since these will vary according to the conditions of each mine and of different parts of the same mine. But the *proportion* of incombustible to combustible matter in the dust—which is the main factor of security—can easily be tested.

It does not think it practicable to prescribe the methods by which incombustible dust should be applied. The best method would depend upon the circumstances and conditions of each mine; but the incombustible dust should be so applied as to free the timbers and higher ledges as far as practicable from coal dust, and to replace it by incombustible dust.

Inasmuch as in practice the incombustible dust will be applied at intervals, it is obvious that for some time after its application the roadways may contain a proportion of incombustible matter larger than that which the committee recommend as the minimum.

Suggestions for Testing

For the purpose of examination it is suggested that each sample should be collected not from one spot only, but from the dust deposited generally on the floor, roof and sides over some yards of roadway.

The several samples collected should be well mixed, and a portion sieved through a piece of metallic gauze (such as safety-lamp gauze) with a mesh of 28 to the linear inch; any dust that will not pass through such a sieve should be omitted from the determination.

Incineration Test Recommended as Safe and Simple, Not Scientific

For the purpose of the incineration test, a weighed quantity of the fine portions so separated should be brought to a red heat in an open vessel until it no longer loses weight. In this process all the natural ash in the coal is reckoned as incombustible dust, and on the other hand any combustible or volatile matter in the incombustible dust is reckoned as coal.

Shales usually contain a small quantity of carbonaceous matter, which is rightly reckoned as coal in the mixture, since it might act as fuel in a mine explosion; but shales always contain also a considerable quantity of incombustible volatile matter, mainly water, which is driven off at a red heat. It will be obvious that this incombustible volatile matter will afford a margin of safety, since in the method of evaluation recommended, such lost matter, although not contributing to make up the 50 per cent. of ash required, will really be effective in the quenching of inflammations in the mine.

For example, in a mixture of equal parts by weight of shale and coal dust used in the committee's experiments, they found on incineration 48 per cent. of ash. The coal contained 3.6 per cent. of ash, so that 50 per cent. of it contained 1.8 parts of ash. The shale lost 7.6 per cent. at a red heat, so that 50 parts lost 3.8 parts, and left 46.2 parts of ash:

	From Coal	From Shale		Total
Ash	1.8	46.2	=	48
Matter lost at red heat	48.2	3.8	=	52
Total	50.0	50.0		100

Consequently, this 50 per cent. mixture (equal parts by weight) yielded a total of 48 per cent. of ash, i.e., would have been returned as falling two parts below the proposed minimum requirement, although in reality the mixture contained over 50 per cent. of incombustible matter. The committee have borne in mind this margin of safety in recommending the minimum of 50 per cent. of ash on incineration.

Effect of Gas on Problem

A considerable difficulty arises with regard to practical application of such a suggestion to the working faces of a mine and to the roads immediately adjoining. This is a matter on which the committee think it desirable that both further experimental data and practical experience should be acquired.

It is possible that the presence of small percentages of firedamp may influence the inflammability of mixtures of coal and of incombustible dusts. But if this is found to be the case it would not affect the suggestion for the treatment of the roadways, since in the main haulage roads, where the coal dust is most dangerous, the amount of gas is usually small.

Experiments upon the effects of watering and other methods of rendering coal dust harmless have yet to be made, and some other matters bearing upon the coal-dust question have yet to be elucidated.

Briquette Production Valued at More Than Million Dollars

Coal briquettes to the amount of 181,859 short tons, valued at the plants at $1,007,327, were manufactured in 1913, according to Edward W. Parker, of the United States Geological Survey. The figures for 1913 show a decrease of 17 per cent. in the tonnage of briquettes manufactured, but an increase of over 5½ per cent. in value over the figures for 1912. Seventeen briquetting plants were in operation during the year, eight in the Eastern States, five in the Central States, and four on the Pacific Coast. Seven of these plants used anthracite culm or "fines," five used bituminous or semi-bituminous coal, two used carbon residue from oil-gas works, and the others used mixed coals. Coal-tar pitch is the principal binder employed, eight plants using it. Patented binders were used at five plants.

If the future of this infant relative of the coal-mining industry is to be judged by the record of 1913, the judgment should be based on the increase in value rather than on the decrease in plants and in tonnage. Briquetted fuel in the United States is essentially a domestic fuel, for which there was a slackened demand in 1913, owing to the exceptional mildness of the winter of 1912-13, and of last November and December. In consequence the consumption of briquettes for domestic purposes, like that of raw fuel, was generally less throughout the United States in 1913 than in either 1911 or 1912. An exception to this decrease is to be noted on the Pacific coast, where the number of operating plants increased from three to four, and the production in 1913 was exactly double that of 1912, with a gain in value of somewhat larger proportion.

Marketing Conditions, New Orleans

By Paul Wooton*

SYNOPSIS—With the near approach of the opening of the Panama Canal, the coal situation at New Orleans is attracting general interest. Development of an all-water route from the Alabama fields is one of the most important factors so far. Local consumption has tripled in the past decade and even greater increases are anticipated in the future.

New Orleans has to thank the same flood waters, that have menaced so many of Louisiana's fertile acres this year, for the largest supply of coal ever brought to the city. And while the river craft are piling up the reserves of Pittsburgh coal at one end of the harbor, bulging gondolas are being shunted in train lots onto the chutes at the other, where the Alabama supply is overtaxing storage room.

Rapid Growth of the Local Trade

That there should ever be a heavy demand for coal at this port was unthought of a few years ago. Big cotton crops, general increases in shipping, the growing importance of the fruit trade and of the passenger travel to Panama, Central America and the West Indies, in addition to the greater number of steam plants ashore, are some of the causes which have more than tripled the coal consumption of this port in less than a decade. In the light of this growth and in view of the opening of the Panama Canal, there is not a coal man in New Orleans who does not take a roseate view of the future.

Alabama interests, feeling that they are handicapped by the lack of water transportation, are spending $1,500,000 to make possible the landing of their product independent of the rail lines. In order to get Alabama coal to New Orleans by water it has been necessary to dredge the old Lake Borgne Canal, clean out portions of three rivers, build an extensive loading station and construct specially built barges. Further expenditure has been made in equipping trams for loading the barges in Alabama. The barges will be loaded at stations along the Black Warrior River. The Tombigbee and Alabama Rivers will be followed to Mobile, thence across Mobile Bay and Mississippi Sound to Lake Borgne and to the opening of the canal, which has its terminus at Violet, La., on the river eleven miles below New Orleans.

In order to supply the barges for this trade at the least cost it was found necessary to equip a shipyard at Violet. Here the fifteen barges, which will open the trade, have been built. Each barge is 240 ft. long with a 32-ft. beam. They are equipped with twin screws and producer-gas engines; they have a rated speed of eight miles an hour at sea, a carrying capacity of 100 tons and draw six feet of water.



Empties Starting up the Mississippi for Pittsburgh

A power lighter with a handling tower of 500 tons per hour capacity has been launched in the river at Violet and every facility has been installed to insure rapid and economical handling. The locks, shops and all machinery are operated electrically. A turning basin 300 ft. long has been dredged.



Coaling Ocean-Going Vessels in the Harbor at New Orleans

Alabama Coal vs. the Pittsburgh Product

As the mines along the Warrior River are developed, the tonnage will be increased. This development will be rapid as the location and continuity of the seams has been proved by diamond drilling. For this reason, the ship yard will continue turning out barges as rapidly as possible. It is predicted that the demand for coal in New

*319 South Cortez St., New Orleans, La.

Orleans will be great enough within the next two or three years to justify the use of hundreds of barges in this trade.

While many claims are made by rival interests, it is the opinion of disinterested students of the situation that Alabama coal can never entirely shut out the Pittsburgh product. On the other hand, it has been proved beyond a doubt that the monopoly once enjoyed by the Pittsburgh dealers can never again be established.

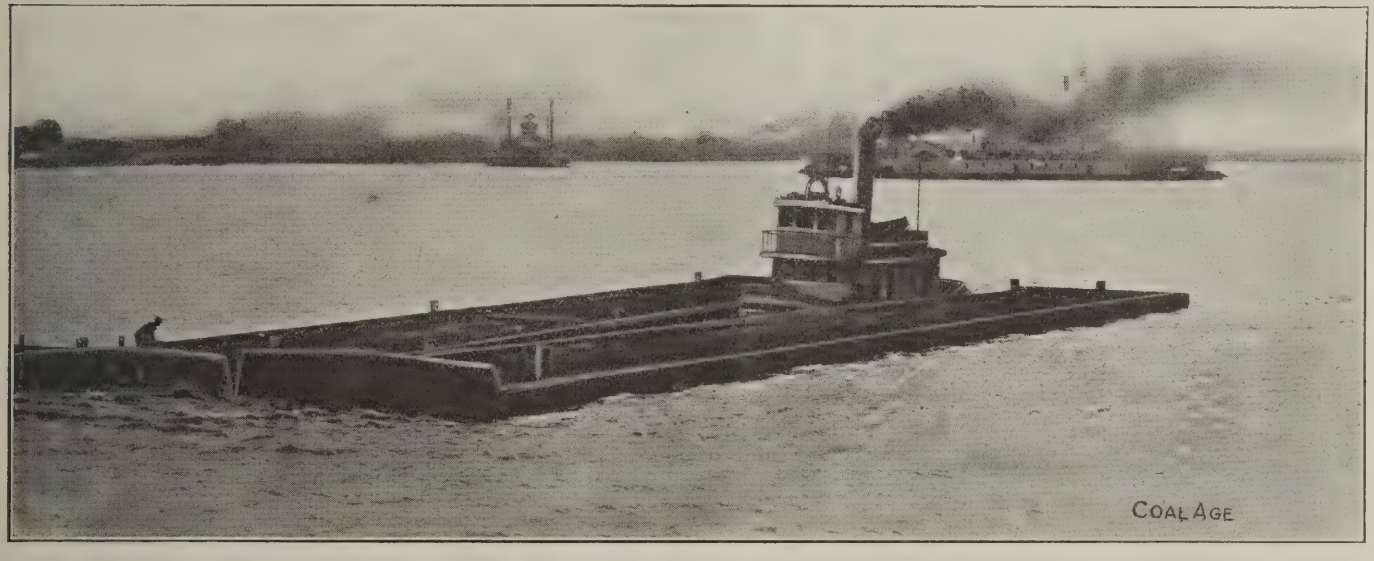
It is practically certain that there will be lower quotations made as soon as Alabama coal begins moving in by the all-water route. This will be met by the other interests without great sacrifice and any probability of a price war is discounted. At present, Pittsburgh coal is trimmed into bunkers on ships at $3.75 a ton. Alabama coal is furnished at $3.25. Pittsburgh coal sells ashore at $3 and the same ratio in price prevails. This represents the general difference in the efficiency of the two kinds of coal.

The retail trade in New Orleans is much lighter than in any other large American city, due to the mild winters. Open grates, for the most part, are used to heat private dwellings and two tons is the amount of coal consumed by the average family during the winter. As there are so many small orders, the cost of delivery is high, which accounts for the abnormal retail price of $6 per ton. Liberal discounts are made from this price, however, where the order is large enough to justify it.

Preparations, made by several oil companies for handling fuel oil to ships here, never have been considered seriously by the coal interests. Any undercurrent of nervousness that may have been felt has been dissipated by the rapid rise in fuel-oil prices in the past year.

New Orleans coal dealers are not depending entirely on the growth of shipping at the opening of the Panama Canal to bring the heavy increase in business that they expect. The export trade to Latin America has assumed proportions that show the increasing importance of this field. As New Orleans is closer to the east coast of Central America and to the entire western coast of South America than any other American port, the city expects to be one of the foremost providers for the commercial wants of this vast territory. Mining operations and other industries are extensive and with the increasing developments the demand for coal has advanced from a negligible amount ten years ago to interesting figures today.

Plans for the increase of facilities in New Orleans are in evidence on the properties of several of the coal companies. Additional room for storage is being provided and heavy expenditures are being made for handling machinery. That New Orleans is to become the greatest coal-exporting port in the country is a view held by many.



HANDLING COAL BARGES WITH A TUG IN THE NEW ORLEANS HARBOR

The First "Strip Pit" Sold

The sale of the first strip-pit or opencut mine to be sold in Kansas by the operators, took place Mar. 20. Also it was the first pit opened in Kansas, and it has been understood that it was the most profitable one.

The pit in question was that of the Miller-Durkee Coal Co., Scammon, Kan. Dan Miller, president of the company and superintendent of the pit, and his son, T. H. Miller, vice-president and assistant superintendent, sold their shares to W. W. Patterson, of Pittsburg, Kan. The latter is a coal operator of 15 years' experience. He will superintend the pit. Eighty acres of coal land went with the shovel and pit.

The Millers will rest for a few months and then, it is understood generally, they will become active operators again, probably in the opencut work, as they possess more than 100 acres of fine coal.

Dan Miller introduced the first steam shovel into the Kansas field to strip the covering from coal. He was the sort of pioneer who didn't hesitate because of his discouraging advisors. He was so successful in a short time that other men—Durkee and Pratt—brought in a shovel. Today his pit—the one he sold—is the "daddy" of 35 great pits in Crawford and Cherokee counties. In the four years which Miller has operated the pit, he has uncovered about 55 acres from 15 to 28 ft. deep.

Officers in the new company are: A. H. Skidmore, Columbus, Kan., president; W. W. Patterson, vice-president; and S. L. Walker, Columbus, Kan., secretary-treasurer.

Gasoline Locomotives in a Pennsylvania Mine

SYNOPSIS—A comparative study of the cost of gasoline-locomotive haulage versus mule haulage in proportion to production at the Hagevo operation of the Shade Coal Mining Co.

The Shade Coal Mining Co. has approximately 1000 acres of seam "A," 5-ft. coal and seam "B" Miller vein, 3-ft. 8-in. coal at Hagevo, Somerset County, Penn.

The operation is complete, with uptodate equipment throughout. The tipple is 285 ft. long, equipped with a Phillips Mine- and Mill-Supply cross-over dump with kick-back for empties, and has a maximum tipple capacity of 3000 tons daily. A Robinson 300-r.p.m., 65,000-cu.ft. fan has been installed, being driven by a 20-hp. Fairbanks gasoline engine.

The coal is hauled in one hundred and eighty-five 1000-lb. mine cars, having a capacity of 2500 lb., all of these cars being equipped with plain bearings. The outside and main-entry track consists of 30-lb. per yd. rail, and back of the first gathering point in the mine, the rail weighs 20 lb. per yd. The minimum radius of the curves is approximately 30 feet.

The first Milwaukee gasoline locomotive was put in operation, Oct. 12, 1911, and was an M-35, 7-ton, 36-in. gage locomotive. It has a vertical, 4-cylinder, 4-cycle engine, 6-in. bore and 6-in. stroke, which develops 35 hp. at 800 r.p.m. The drive wheels are 21 in. in diameter, wheel base 48 in., length overall 140 in., width overall 49 in., height 49 in. The transmission is of the inclosed type with two speeds of four and eight miles per hour in each direction. The gears run in oil and are changed by means of jaw clutches with all gears in mesh. The locomotive has sanders on all four wheels, and is provided with an equalized hand brake, operating all the wheels, and a deodorizing tank for absorbing the engine exhaust.

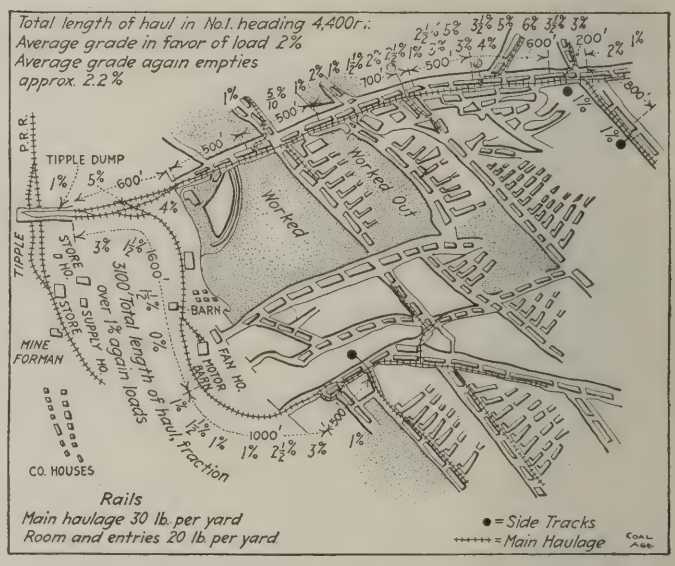
The second locomotive was put in service Mar. 22, 1913, and is a duplicate of the first machine. Before



Motor Hauling Empty Cars from Tipple into No. 1 Mine



View Showing Part of Camp with Commissary on Right



Haulage Layout at the Shade Coal Co.'s Mine



Mine Tipple, Also Showing Loaded and Empty Tracks



Before Locomotives Were Installed, Mules Were Used to Pull the Trips

the installation of the second motor, in October, 1912, 12,544 tons were handled by the first motor, but in view of the development of the work and tonnage proposed eventually at Mine No. 3, the second locomotive was installed.

Mule haulage was used before the gasoline locomotives were introduced and at that time the following conditions prevailed:

OPERATING CONDITIONS

Length of haul one way, 2640 ft.
Maximum grade in favor of loads, 2½ per cent.
Maximum grade against empties, 5 per cent.
Tonnage per month of 24 working days, 9600 tons.

COST OF MULE HAULAGE

10 mules to handle tonnage @ 60c. per day	$6.00
Above day rate includes feed, harness and shoeing expenses.	
Eight drivers @ $2.25 per day	18.00
Investment in 10 mules @ $200 is $2000. Assuming the average life of a mule is 5 years, this gives a 20 per cent. depreciation per year, 24 working days per month, the cost for depreciation per day will be	1.38
Interest on investment at 6 per cent. per annum, per day	0.41
Mule haulage cost per day	$25.79
Total mule haulage cost per month of 24 working days	618.96
Mule haulage cost, per ton	0.064
Mule haulage cost per ton mile traveled by loads	0.128

GATHERING COST USING MULES AT MINE NO. 1

Tonnage per month of 24 working days, 9000 tons		
3 mules for gathering @ 60c. per day		$1.80
Three drivers @ $2.50 per day		7.50
Mule depreciation		0.417
Interest on investment at 6 per cent. per annum, per day		0.125
Total gathering expense per day		$9.842
Total gathering expense per month		$236.208
Gathering expense per ton		0.0262

MAIN ENTRY GASOLINE HAULAGE AT MINE NO. 1

Length of haul, one way, 4400 ft.		
Maximum grade in favor of loads, 6 per cent.		
Average grade in favor of loads, 2 per cent.		
Maximum grade against empties, 5 per cent.		
Average grade against empties, 2.2 per cent.		
Tonnage per month of 24 working days, 9000 tons		
Motorman for 24 days @ $2.75	$66.00	
Triprider for 24 days @ $2.75	66.00	
Total labor		$132.00
384 gal. of gasoline per month @ 15½c	$59.52	
24 gal. engine oil per month @ 30c	7.20	
6 gal. black oil per month @ 15c	0.90	
6 lb. cup grease per month @ 15c	0.90	
Waste per month	1.00	
Total supplies		69.52
Repairs:		
Material	$28.95	
Labor	6.86	
Total repairs		35.81
Depreciation on locomotive at 10 per cent. per annum, per mo.		29.16
Interest on locomotive investment at 6 per cent. per annum, per mo.		17.50
Total operating cost per month		$283.99
Operating cost per day	$11.83	
Operating cost per ton	0.0315	
Operating cost per ton mile traveled by loads	0.0379	

GATHERING COST USING MULES AT MINE NO. 3

Tonnage per month of 24 working days, 3500 tons		
1 mule required for gathering at 60c. per day		$0.60
1 driver required per day		2.40
Mule depreciation per day		0.138
Interest on investment at 6 per cent. per annum, per day		0.0416
Total gathering expense per day		$3.1796
Gathering expense per month	$76.308	
Gathering expense per ton	0.0218	

MAIN ENTRY GASOLINE HAULAGE AT MINE NO. 3

Length of haul, one way, 3100 ft.		
Motorman for 24 days at $3 per day		$72.00
Trip rider for 24 days at $2.75 per day		66.00
Labor		$138.00
120 gal. gasoline per month @ 15½c	$18.60	
4 gal. engine oil per month @ 30c	1.20	
2 gal. black oil per month @ 15c	0.30	
2 lb. cup grease per month @ 15c	0.30	
2 lb. waste per month @ 15c	0.30	
Total supplies		20.70
Repairs:		
Material	$28.95	
Labor	6.86	
Total repairs		35.81
Depreciation on locomotive @ 10 per cent. per annum, per month		29.16
Interest on locomotive investment @ 6 per cent. per annum, per month		17.50
Total operating cost per month		$241.17
Operating cost per day	$10.04	
Operating cost per ton	0.0691	
Operating cost per ton mile	0.1173	

Mine No. 3 is under development, and the motor, as well as the gathering mule and driver, are not working to exceed 40 per cent. of the time. The gasoline consumption, and the amount of sand used, varies with the weather. The gasoline consumption runs from 4 to 7 gal. per day, bad weather causing more wheel slippage and a higher engine speed, and, thereby, increasing gasoline fuel consumption.

SUMMARY BASED ON EXPERIENCE IN MINE NO. 1

Mule haulage cost per ton	$0.064
Gasoline haulage per ton	0.0315
Saving per ton	0.0325
Mule haulage cost per ton mile	0.128
Gasoline haulage per ton mile	0.0379
Saving per ton mile	0.0901

Government Control of Lake Traffic

In line with the movement against all business done on a large scale, is the investigation of the management of the ore-carrying fleets on the Great Lakes. No longer does an owner control a single boat. In the process of evolution, the ownerships have consolidated so that one company or firm now manages a dozen, or a score of vessels.

Rates Are as Low as Half a Mil per Ton Mile

That the new régime has brought down the cost of lake transportation is considered by these investigators as of small account when set beside the fact that in recent years the contract rates for carrying ore have shown a good deal of uniformity. Those who have followed the statistics of lake freights for years know that 40 years ago a charter from Marquette at $5 a ton was not uncommon; that 30 years ago $2 a ton was paid, while 20 years ago the contract rate from Marquette was commonly $1 a ton.

The inquisitors' report omits entirely any such comparisons as the above, which shows how amazing has been the cheapening of lake transportation. Nowhere else on the globe is there a haul that approaches in cheapness the cost of bringing a ton of iron ore nearly 1000 miles from the docks on Lake Superior to the unloading docks on Lake Erie.

The latter-day rates cited by the committee figure out from 1-15 to 1-20c. per ton per mile, yet the only comment of the investigators is that despite these favorable rates the dividends of the leading lake carriers for five years show that the business was a profitable one!

No violation of the Sherman act is alleged in this concentration of lake-vessel interests; nor is any act detrimental to the public interest. Contrary to intimations lately given from the Department of Commerce that the smaller competitive unit in industry is more efficient than large consolidations, the committee finds great improvements in lake transportation, as strong, well managed companies have become the rule. There is no proposal to separate these companies into their elements, as with the large corporations the government is now prosecuting. The great capacity shown for bettering transportation service on the lakes is held to mean also great capacity to exercise the hurtful powers of monopoly; hence, we come to the inevitable proposal of government regulation. For good or for ill, such a development in lake transportation seems not far ahead.—*The Iron Age.*

A Study of Mine Fatalities

Twenty-seven hundred and eighty-five men were killed in the coal mines of the United States during the year 1913, according to a report just issued by the United States Bureau of Mines. This is an increase of 425 deaths over the previous year 1912, and gives a fatality rate of 3.82 in every 1000 men employed as compared with 3.27 in 1912. Six thousand more men were employed in 1913 and the increase in production was between 30,000,000 and 40,000,000 tons.

Dr. Joseph A. Holmes, director of the bureau, in commenting upon the record for the year said:

An examination of the statistics develops the disappointing fact that in our coal-mining operations during 1913, there were killed 425 more men than during 1912. This is an increase of 18 per cent. in fatal accidents, with an increase of only about 8 per cent. in coal production.

We can find little comfort in the suggestion that this increase may in part be accounted for by the occurrence during 1913 of four large mine explosions. Furthermore, while the total deaths from mine explosions was 213 greater in 1913 than in 1912, the number of explosions in which more than five men were killed was only seven as compared with ten explosions in 1912. In fact, the statistics show an increase in fatalities during 1913 from all the underground causes except mine fires and surface accidents.

Some progress has been made, however, in the safety movement as shown by the statistics for the last eight years. In the four years ending Dec. 31, 1909, the average death rate was 3.97 for each 1000 men employed. In the last four years the rate was 3.68. Comparing deaths with production of coal, the number of fatalities for each one million tons mined during the four years ending Dec. 31, 1909, was 5.99, as compared with 5.11 for the four years ending Dec. 31, 1913. These latter figures indicate a general gain of 17 per cent. for safety during the last four years over the four years preceding. But this progress has been small as compared to that which the country will demand during the next few years.

It is unfortunate that the safety inquiries and investigations by the National Government, upon which so much depends, have lagged so far behind the needs of the industry and public demand. It is hoped that this situation may be remedied at an early date.

The states in which the greatest number of deaths occurred are as follows: Pennsylvania, 1227; West Virginia, 337; New Mexico, 272; Ohio, 165; Illinois, 164; Alabama, 124, and Colorado, 108.

The four biggest explosions of the year and the number of deaths at each were: Apr. 23, Cincinnati mine, Finleyville, Penn., 96; Oct. 22, Stag Canon Mine No. 2, Dawson, N. M., 263; Nov. 18, Acton Mine No. 2, Acton, Ala., 24; Dec. 16, Vulcan Mine, New Castle, Colo., 37

Gravity Railroad Yards

The use of gravity or hump switching for the classification of freight cars, in order to group together those for certain destinations or with certain commodities, is increasing in the case of large and busy yards, and is one of the subjects discussed in the report of the Committee on Yards and Terminals of the American Railway and Engineering Association.

One of the most important elements in the design of a gravity yard is the determination of the rate of grade for the descending or accelerating grades from the summit of the hump, upon which the cars acquire the momentum which carries them along the classification ladder and into the classification tracks. It is difficult to determine this with any degree of exactness since conditions vary in different yards, and factors of location and traffic affect the car movement. In colder districts and where the cars are mainly empty, the grades must be somewhat steeper than in warmer climates and where the cars are mainly loaded.

The grades must be sufficiently steep to insure that each car will run readily to any part of the classification tracks (under control of the car rider or brakeman), but not steep enough to result in injury to the cars and loading due to the moving cars striking the standing cars with undue force. Some officials consider that there is more damage of this kind in gravity yards than in flat yards, but this is not general experience or opinion, and there is no good reason why it should be the case.

The arrangement of grades previously submitted by the committee and adopted by the Association as "recommended practice" (with the track scale on the grade) is as follows:

1. Where cars are largely empty: 2% for 60 ft. and 4% for 50 ft., followed by 1% on the ladder and 0.5% through the classification tracks.

2. Where cars are largely loaded: the same grades, but the 4% grade may be shortened (to not less than 25 ft.), and the two following grades should be at least 0.8% and 0.4%, respectively.

3. The grade over the scale not to exceed 2%.

The committee made inquiry as to proposed changes in the above, but most of the replies were to the effect that no changes were desired. One reply, however, suggested rates of grades as shown by the accompanying table, the length of incline being 300 ft. in each case, succeeded by 1% grade along ladder and turnouts.

SUGGESTED GRADES AT UPPER END OF YARD

	Starting	Over Scale	Accelerating
Loaded cars; with scale	3% for 35 ft.	0.5% for 50 ft.	2.5% for 215 ft.
Loaded cars; no scale	3% for 100 ft.	.....	1.5% for 200 ft.
Light cars; with scale	3% for 40 ft.	0.5% for 50 ft.	3 % for 210 ft.
Light cars; no scale	3% for 200 ft.	.....	1.5% for 100 ft.

The principal feature of this arrangement is in reducing the grade over the scale, instead of putting the scale on the 2% grade at the summit. The idea is to check the speed slightly in passing over the scale, the steeper grade above the scale being necessary to start and space the cars. This reduction of grade is followed in many gravity yards.—*Engineering News.*

The Champion Mines of Kansas

By Barry Scobee*

The "champion" coal mine in Kansas, in point of production for 1913, was the Devlin-Miller mine (see Fig. 1) of the Cherokee-Pittsburg Coal & Mining Co. It produced 207,182 tons, according to figures in the office of State Mine Inspector Francis Keegan, in Pittsburg. The mine is seven miles north of Pittsburg in the "north field" of the extreme southeastern Kansas district. Compared to the old "south field," this territory is relatively new.

The southern coal field, which lies mostly in Cherokee County, south of Pittsburg, is practically worked out. This refers to Weir City, Scammon, Chicopee and Mineral, towns well known a few years ago for their big production. However, there still exists in these localities an upper seam of coal, which is being removed by steam shovels in the open-cut process, and which soon will be worked, it is believed, by the longwall method.

*Pittsburg, Kan.



FIG. 1. MINE OF THE CHEROKEE-PITTSBURG COAL AND MINING CO., PITTSBURG, KAN.

Of the four mines in southeastern Kansas which led in production in 1913, and which are here described, only one, "Central 42," is in the south field.

The Devlin-Miller mine is 180 ft. deep, and works a seam averaging 38 to 40 in. in thickness. The coal is mined by the room-and-pillar method, with solid shooting. (This thickness and method are descriptive of practically all mines in the district.) Last year the mine worked 260 days and employed, on an average, 305 men.

The next mine, in point of production, was No. 15 (see Fig. 2) of the Western Coal & Mining Co., which worked 228 days, with an average of 252 men, and took out 174,000 tons of coal. This mine is 200 ft. deep, and is situated near Franklin.

The third mine in the series was the Nevius-Coulter (see Fig. 4), at Radley, with 171,641 tons to its credit. It worked 290 days with an average of 175 men. It is about 175 ft. deep.

Mine No. 42 (see Fig. 3) of the Central Coal & Coke Co., three miles southwest of Scammon, was the fourth, producing 171,339 tons. This shaft is only 60 ft. deep.

In all of these mines the method of firing shots is by lighting the fuse with a torch. A recent report of the state mine inspector showed that 20 shotfirers had been killed in this district in the last three winters, and that deaths usually were due to "windy" shots. Most of these deaths have taken place in the north field, where the mines are deeper and dryer than in the south field.



FIG. 2. MINE NO. 15 OF THE WESTERN COAL AND MINING CO., FRANKLIN, KAN.

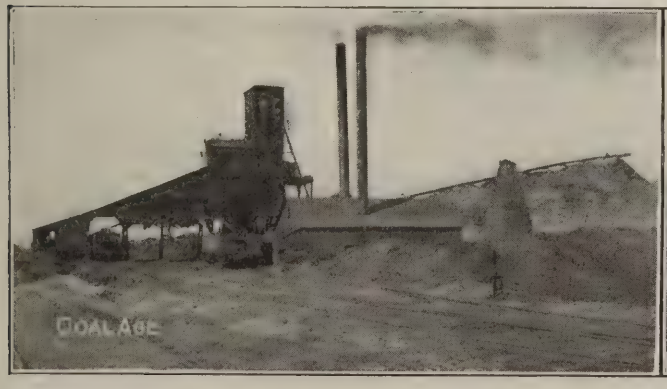


FIG. 3. MINE NO. 42 OF THE CENTRAL COAL AND COKE CO., SCAMMON, KAN.



FIG. 4. MINE NO. 8 OF THE NEVIUS-COULTER COAL CO., RADLEY, KAN.

German Coke Ovens

In a paper before the North of England Institute of Mining Engineers, on Feb. 14, 1 '14, Leo Dorey Ford describes a coke-oven plant he had an opportunity of visiting in Germany. The coke ovens consist of two batteries of 50 ovens each, of the Otto Hilgenstock under-burning regenerative type. The oven chambers are 33 ft. long, 7 ft. high, and have a width of 17½ in. at the pushing-engine side, and of 21½ in. at the discharging side. The charge of an oven is 8 tons of uncompressed small coal, which is hand filled through three charging holes, the coal being brought in 1-ton cars from a central hopper situated between the two batteries.

For the heating of the ovens, the gas from the by-product plant is conveyed through a central main running underneath the entire battery, two small branch pipes being taken off the main directly under the walls of each oven, and connected to nine Bunsen burners which burn in vertical flues in each wall. Each wall is divided into nine separate vertical flues, each of which is divided some distance above the nine burners into two smaller flues. The eighteen main flues are grouped in four sections, the first and the third of which communicate through the second and fourth with a regenerator-flue by way of small openings leading into a horizontal flue running under half of the sole of, say, the left-hand oven. The second and fourth sections communicate in their turn through the first and third sections with another regenerator flue by way of small openings leading into a horizontal flue running under half of the sole of the right-hand oven. These ways form alternately the burnt-gas outlets and the hot-air inlets, according to which set of burners is in use.

The ovens change over every half hour. Taking one wall, for the first half hour, the burners in the first and third sections only are alight, and the burnt gases, after rising to the top of the wall, descend by the dead flues in the second and fourth sections, respectively, passing out through the small openings into the flue under half of the sole of the left-hand oven and so into the dead regenerator flue and up the chimney.

The hot air for ignition comes to the burners of the first and third sections from the live regenerator flue on the other side of the battery by way of the flue under the half of the sole of the right-hand oven with which these sections are in communication.

At the end of half an hour the burners in the first and third sections are extinguished by cutting off the gas and air, which are then admitted to the burners of the second and fourth sections. The burnt gases now, after ascending the flues of these sections, descend the flues of the first and third sections, respectively, and go to the regenerator flue by what was the air-inlet passage for the first half hour. The air for ignition is now admitted from the hot regenerators by what was in the first half hour the burnt-gas outlet.

The two regenerator flues are connected by a common way to the waste-gas chimney and at their junction is a two-way valve, which allows of the closing or opening of either way at will, this automatically opening or closing the other way.

The air burned with the gas is taken from the passage-ways under the ovens, and is regulated by means of sliding shutters placed along the side of the passages.

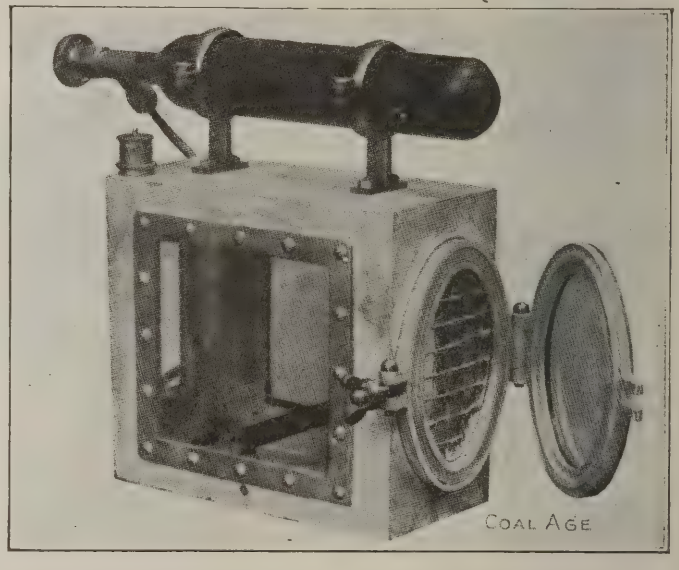
The gas taps of the small branch pipes, and also the air shutters, are all connected, and are opened or closed together. The changing of the ovens can thus be effected in a few minutes.

The time taken for coking varies from 28 to 29 hours, each oven giving a 75 per cent. yield, or six tons of good, hard coke. Of the 50 ovens in each battery, 42 are discharged in 24 hours, and give an output of about 500 tons of coke per day.

The yield of gas may be reckoned as 11,300 cu.ft. per ton of dry coke, or some 5,651,000 cu.ft. per 24 hours. Of the total gas, 50 per cent. is burned under the coke ovens, the surplus being divided in the following rough proportion: Illuminating gas, 12 to 20 per cent.; power gas, 12 to 18 per cent.; and gas for heating boilers, 15 to 25 per cent. These figures, of course, vary considerably, according to temporary requirements.

Cage for Animal Air Tests

Canaries and mice are, as is well known, frequently used in exploration work after an explosion or mine fire to detect the presence of carbon monoxide. Any cage will serve for their transportation either in or outside the mine, but the use of a canary or mouse is entirely lost, if it is once rendered unconscious and if it can only be



CAGE FOR ANIMAL USED IN TESTING FOR CARBON MONOXIDE

revived by taking it for a long time to the surface or to a part of the mine where the air is fresh and brisk.

It is necessary to have a cage which can be rendered air tight and a supply of oxygen which will revive the bird or other animal immediately, presuming it has not been exposed to too deadly an atmosphere. In this way men traveling into places which are dangerously full of noxious gases can retreat and still have an animal in condition to give new indications on a later advance.

The cage is made of metal and has a glass in the back and sides. In front is an oval window with a coarse wire netting and the net is covered when desired by a tight-fitting door. Above the cage is an oxygen cylinder, the contents of which can be gradually discharged into the cage. When the door is closed, a little oxygen admitted to the now air-tight receptacle will soon purify the air

within. Excess pressure is prevented by the escape vent on the top and rear of the receptacle.

The small oxygen cylinder acts as a handle for the cage. As soon as the canary or other animal is overcome it can be revived even if the rescue men have a long way to return in a vitiated atmosphere or find it advisable to go forward, in their helmets, regardless of the indications, leaving the canary behind. This "Animal Air Tester" is made by Siebe, Gorman & Co., of London, England, their agent in America being H. N. Elmer, 1140 Monadnock Block, Chicago, Ill.

Text Book on Safety

An illustrated textbook, principally for the benefit of foreign mine workers who cannot speak English, is being prepared for publication under the auspices of the Young Men's Christian Association workers in the mining districts of West Virginia. The views in the little book will show the mining of bituminous coals at every stage: First, how the work should be done, and second, how it should not be done; the wrong way involving danger and the right way insuring safety.

Some of the pictures that will go to make up this text book have already been shown on the screen at gatherings of foreign mine workers, and they have been explained through interpreters. It is found that this pictorial method is more effectual than any number of printed or spoken warnings.

In recent years, since the English-speaking mine workers began to be supplanted by the immigrants from southern and eastern Europe, the larger companies have undertaken systematic education of their employees. The rules and regulations for safety are emphasized above everything else, and the photographic scheme is simply the latest way to "drive home" these rules and regulations. The official reports of the state inspectors show that most of the accidents are the result of disobedience of rules, either through ignorance or carelessness.

The textbook is so arranged that the pages facing one another will show the way to invite accident and the way to prevent it. The books will soon be ready for distribution by the Y. M. C. A. workers and they will be used generally in educational work throughout the coal region.

Promise and Performance

By Berton Braley

Written expressly for Coal Age.

"When we get on top," said Mike to Bill,
"I'll spill you around like a pail of swill,
I'll smash your face and I'll bust your jaw
So even your wife or your paw and maw,
Won't know the cripple I'll make of you,
I'll mash you into an Irish stew!
I'd do it NOW, but the Boss is 'round
And he hates this fighting underground,
But I sure will make you take a flop,
When we get on top!"





"When we get on top," said Bill to Mike,
"You can start right in as soon's you like,
You'll find me ready to meet you there
And I'll certainly smear you around the place
Till there's nothing left but your hide and hair
And maybe a piece of your ugly face!
You've swelled around here long enough
And I'm the guy who will call your bluff!
I'll show you the kind of a gink I am
When I break your ribs with a right-hand slam,
And hammer your mug till you holler, 'Stop!'
When we get on top!"

They mouthed and muttered and cursed and swore,
They threatened each other with death—or more,
They went way back into history
And roasted each other's family,
And they kept right on in their wrath and rage
As they mounted up on the crowded cage,
But when they stepped into broad daylight
And the gang all followed to see the fight
They both looked sheepish and half afraid
And in spite of the gory threats they'd made,
They both hiked homeward without a stop
When they got on top!



Who's Who in Coal Mining

George R. Wood

George R. Wood, at present electrical and mechanical engineer for the Berwind-White Coal Mining Co., and allied companies, was born at Martin's Ferry, Ohio in 1872. Mr. Wood's ancestors were among the early settlers in Ohio, Absalom Martin, his grandfather, having located on a tract of land granted him by the British Governor Dunmore, of Virginia, for service in the Indian wars. Another, Joel Wood, a Quaker and Abolitionist, prior to the Civil War operated a station on the "Underground Railroad" for runaway slaves.

Mr. Wood received his technical education at the Rose Polytechnic Institute, Terre Haute, Ind., graduating from that institution with the degree B. S. in Mechanical Engineering, 1892, and B. S. in Civil Engineering, 1893.

After leaving college he was in the employ of the General Electric Co., leaving them in 1899 to accept a position with the Pittsburgh Coal Co. He remained with this latter corporation until 1902, when he engaged in the practice of consulting electrical engineering, which work he continued until 1912, at which time he became chief electrical and mechanical engineer for the Berwind interests.

Mr. Wood is a member of the Racquet and Manufacturers' Clubs of Philadelphia, University Club of Pittsburgh, American Institute of Electrical Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, American Mining Congress, Franklin Institute and Engineering Society of Western Pennsylvania.



GEORGE R. WOOD

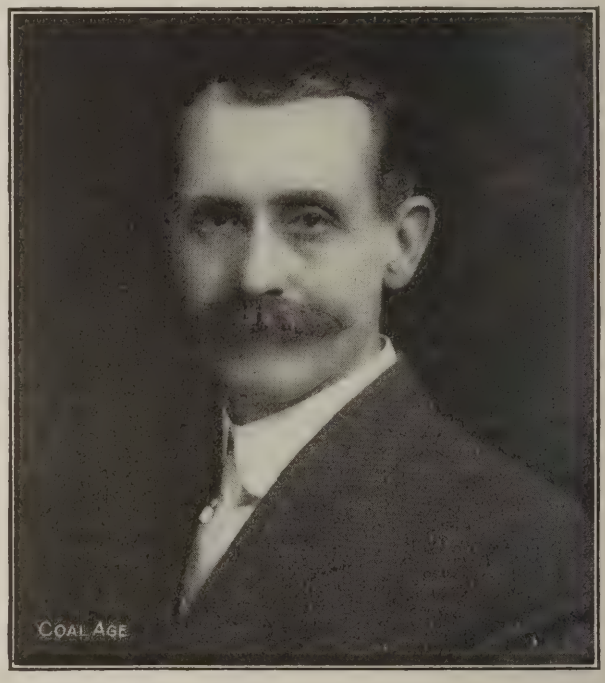
Oscar Cartlidge

Oscar Cartlidge, manager of the Illinois State Mine Rescue Station, is a native of Illinois, having been born in that state at Shelbyville, Aug. 12, 1870. His education was received in the common schools of Illinois.

Mr. Cartlidge started life as a miner, soon advancing to the position of mine foreman for the Raymond Coal Co. of Illinois. Later he held a like position with the West Virginia Coal Co., the Johnson City Coal Co. and the Benton Coal Co., all of Illinois. After this, he was foreman for the Kansas and Texas Coal Co. in Arkansas. His next position was as superintendent of the Egyptian Coal Co., of Illinois, after which he again allied himself with the Johnson City Coal Co., filling the position of assistant superintendent.

Taking up engineering work, Mr. Cartlidge was then appointed mine engineer for the Benton Coal Co., and the Hart-Williams Coal Co., both of Illinois; after this he was made county mine inspector, Franklin County, Illinois, and then state inspector of mines for that state. At the present time, he is manager of the Illinois mine-rescue stations. Under his management, these stations have done a most acceptable work in the actual recovery of mines after fires and in training men for rescue work. It may be added that Mr. Cartlidge has contributed some valuable articles to technical literature.

Oscar Cartlidge is a member of the American Institute of Mining Engineers, American Mine Safety Association, Mine Inspectors' Institute of America and the Illinois Mining Institute.



OSCAR CARTLIDGE

Editorials

The Lockout

We are not a little disappointed that in face of a national business depression, the operators in central Pennsylvania and Ohio have declared for a lockout. It is true that there is but little demand for coal and that all the fuel which is needed can be secured by the purchase of coal from competing districts. But the suspension of work is hard to describe otherwise than as unfortunate and ill-advised.

In Pennsylvania particularly there was no need for such action. The operators and miners both desired the renewal of the scale with the exception that the miners sought the abolition of car pushing, and a closed shop. Any one acquainted with the conditions realizes that the operators could not grant the former concession demanded without a reduction in the wage scale because the competition of the Pittsburgh district, already severe, would thrust the operators of District No. 2 out of the market. This the miners would have seen sooner or later.

Meanwhile they were willing to continue working during the discussion and what could possibly be gained by a lockout? Clearly the miners stand in a position to gain public sympathy by their much more rational behavior and the operators cannot but place themselves in a laughable position in that they have condemned the Union for preparing for a strike, whereas they were themselves contemplating a lockout.

The Ohio situation is not so simple as that in central Pennsylvania. The new anti-screen law goes into effect May 20. By that time the agreement must be made or the operators must close their mines down, for if they try to establish a run-of-mine scale not suited to the miners, the latter will refuse to work, while if they continue at the old lump-coal scale, they will be subject to a suit with uncertainty as to the outcome should the law be proved of force. They would be liable to have to pay their men at the order of the court a differential which would bankrupt the companies.

This perhaps is the reason why they are anxious to make a settlement without delay. They desire to be idle when coal can be bought without trouble and markets can be kept. No one knows how business may be later in the year.

But let us again urge that the only way to obtain reasonable unions is by being reasonable operators. The only way to get public approval is by abandoning the tactics which the people disapprove, and however crooked the public may be in its own business, it has a book of ethics written for the mine operator far more lengthy, detailed and stringent than Deuteronomy and the Twelve Tables.

We do not blame the "dear public" if they condemn the operators for doing those same things for which the mine owners have condemned the Union. If it is wrong, when a settlement is in sight, for the Union to hold the strike club over the operator even when there is no contract, it is at least equally wrong for the mine owner to try to drive the miner into line with an actually consummated lockout.

The country needs that as much work shall be supplied to workingmen as possible. This can only be assured by dividing what work is needed over the whole country as evenly as may be. This will give everyone some work and some purchasing power and everyone will be buying something. Times will then not be so bad as if large parts of the country are idle where the workers can buy nothing and other parts are more busy, but the men are hoarding against the possibility of bad times. For it is the purchases of the workingmen which give us prosperity.

Every operator who can, should work. The men will ultimately yield in the districts where there are disputes We are disposed to believe that the fields made idle by lockouts are likely to lose business in their desire to inflict a loss on their mine workers. This year should be one of victory for the operators, because of the depressed business conditions. Let them not mar their reputation by unreasonableness.

For the miners are likely to model themselves after their employers, and stubborn, suspicious, disaffected men are usually found to be the employees of unreasonable, uncharitable and embittered mine owners.

Is the Ohio Screen Law Constitutional?

The Ohio Coal Operators' Association have finally instituted proceedings to test the validity of the new legislation governing mining operations in that state. The initial move is in the form of a suit, filed in the United States District Court, restraining the State of Ohio from putting the new screen-coal law into effect. If possible, it will take the form of an injunction in the name of the Ohio Coal Operators' Association, but in event of such a move not proving legal, the suit will be transferred to some one of the concerns doing business in Ohio, but incorporated and having its principal offices outside of the state.

More than a year ago, the people of Ohio voted upon some articles in the Constitution, in which a certain conservation clause was embodied. It now appears that this was written into the constitution in the form of a "joker" in order to legalize the mine-run law, which followed it later. The advocates of this latter measure, in order to avoid any possibility whatever, of evasion, overstepped the legal prerogatives of a state constitution, and it now develops that the rights of contract have been so abrogated that the law is not constitutional.

That part of the constitution legalizing the conservation measures, also provides that the Supreme Court of of the state can only declare an act invalid when six of the seven judges concur in the opinion. The coal operators are, therefore, overcoming this phase of the situation by entering suit in the United States courts—a move

which is to be commended in view of the fact that Hugh McNichols, who was lieutenant governor under Cox, during the time the screen-law was enacted, has since been appointed Chief Justice of the Ohio Supreme Court.

With these proceedings now underway, and negotiations pending for another conference with the Ohio miners, the situation there has materially clarified. A more optimistic feeling prevails generally among the operators, and there is a general belief in all quarters that the present negotiations of the operators will be successfully consummated in time for the local producers to participate in the Lake trade.

Conservation

We are disposed to think that serious attention should be given to the legislation about to be passed on the Western coal lands. And here we pause, because after all is that legislation likely to find place on the statute books at present? Little has been heard of the need of it since Franklin K. Lane declared its necessity, and only George Otis Smith seems to have remembered how essential is a new law to the progress of the West.

Pressure should be brought to bear or the matter will be allowed to drift in favor of less important measures which are backed by more importunate interests and which appeal more forcibly to the imagination of the public.

We wish to draw attention to one form of conservation—that of human effort. What shall be done with land containing coal at a depth of 1000 or 2000 ft. below the surface, which has been approached by the workings of some corporation and left because it is a part of the unprocurable domain of the United States?

The point of approach is secured and the coal has been tested along the property line far better than any drilling could test it. The coal can be delivered to a point on the surface suited for railroad delivery. On the other hand, if the old mine is abandoned, the deeper coal is shut off and must be developed by a deep shaft at much expense. The coal to be exploited must be proved first to be worthy of the expenditure not merely on the border line, but throughout an extensive area because a large sum of money has now to be expended before any return can be anticipated, whereas in the event of the extension of an old mine the extra expense would be negligible.

And possibly in many cases not only is the depth of the shaft a disadvantage, but the location for a tipple and railroad tracks may also be bad.

The worst feature is the fact that the operator must feel assured from the first that the coal is not only of chemical quality suited for profitable merchandizing and of necessary thickness for remunerative mining, but must also know that it is of sufficient strength to make it possible for him to mine it at all. Some of the Western coal is of an extremely friable character.

In some places the coal not only is abandoned at a depth of 1000 to 2000 ft., but dips further to several thousands of feet. Would it not be best to let the companies mining the coal go on down with the seam as far as they can do so profitably and with due conservation?

If, being placed under careful supervision, they extract a large percentage of the coal, it seems that the royalty charge should be small. The coal if left would be lost for generations and when extracted by a shaft would be as expensive as that produced in Great Britain, Germany and Belgium.

Conservation is saving for future generations, and we must be careful that when we lock up coal wealth for our children, that we do not seal it in a safe so inviolate that the cost of recovery will be greater than the value of the fuel. It would, indeed, be better to give it away for the use of the present consumer than to cache it in a place where no hand could ever reach it.

Straightforwardness

In the last issue of COAL AGE, a contributor discussed, in a frank manner, the straightforwardness that the public have a right to expect of men intrusted with the important duties of mine inspection. Attention was called to the fact that the "court of public opinion" is far more powerful than the law itself to eradicate evil, lessen danger and reduce the accident list. It was claimed that the "hush" policy is wrong in principle, inasmuch as it obstructs the formation of correct public opinion.

We desire, briefly, to indorse these sentiments in their general application to mine-inspection work, with the simple modification that *statements made or information given must concern the parties thus informed.*

The mine inspector is, unquestionably, the servant of the people. He is intrusted with a sacred duty, involving the public health and life. We grant that occasion may not always demand the publication of facts and information in the knowledge of the inspector, and that to avoid unduly exciting public opinion in a matter wholly in control by the inspector, he may, in the absence of immediate danger to others, refrain from giving publicity to some facts in hand. It is a broad principle of equity, however, that *the people have a right to facts concerning their own health and safety, the moment a situation passes beyond the control of the duly authorized officer of law.*

We opine that a mine inspector, in the conscientious performance of his duty and obligation to the people, may withhold any and all information and facts in his knowledge, so long as his silence will assist the ends of justice and does not tend to greater loss and danger to life and property.

There are, on the other hand, just as truly, facts and information in the knowledge of the inspector, that concern only the companies mining the coal, and do not affect public life or property. To divulge such facts and information would be as great a breach of trust on the part of an inspector as to keep silence on matters requiring publicity in order to properly mold public opinion. Truly it may be said, in a broad and general sense, that *the court of public opinion is a court of last appeals, and is incapable of doing an injustice, because it is so constituted that the equal rights of all men, ultimately, find there like recognition.*

Much good would result if coal companies would make compulsory a weekly meeting of superintendents, firebosses, mine foremen, master mechanics, stable bosses, hoisting engineers, etc., of each plant for the discussion of working conditions, general operation and all other topics vital to the work in their charge. The plan has been adopted with success by several companies.

Legal Department

Damages for Wrongfully Mining Coal

By A. L. H. Street*

SYNOPSIS—Recovery is measurable by value of the coal at the mine mouth, less the cost of production, unless the taking was willful, in which case no allowance is made for expense in mining and removal. Qualifications of the rule noted.

When one mines coal on the land of another and removes it, his liability in damages is limited to the value of the coal in place, on it appearing that he had no title to it, provided he acts in good faith. But, if he acts in willful or reckless disregard of the rights of the true owner, he becomes legally liable for the full value of the coal taken, without deduction for expense incurred in mining and removing the same. And when it is shown that coal has been wrongfully taken from land, the courts will presume that the taking was intentional, in the absence of proof to the contrary. These rules, which were announced by the United States Circuit Court of Appeals for the Eighth Circuit, in the case of Central Coal & Coke Co. vs. Penny, 173 Federal Reporter 340, have been substantially followed by all the higher courts of the country. But, although the Illinois Supreme Court recognizes the rule that, in case of an innocent trespass, the aggrieved landowner's damages should be measured by the value of the coal at the mouth of the pit, less the cost of carrying it there, with allowance for mining, that tribunal holds that punitive damages are properly assessed when it is established that the trespass was willful. (Illinois & St. Louis Railroad & Fuel Co. vs. Ogle, 92 Illinois Supreme Court Reports 353.)

Important Court Decisions Cited

In computing the damages which must be paid for an innocent trespass, the trespasser is not entitled to an allowance for cost of "knocking down" the coal in mining it. (Alabama Supreme Court, Ivy Coal & Coke Co. vs. Alabama Coal & Coke Co., 33 Southern Reporter 547.)

The Iowa statute which makes a coal operator liable in double damages for taking coal from adjoining lands without the owner's permission, creates a double liability for injury done the surface in commission of a trespass. (Iowa Supreme Court, Mier vs. Phillips Fuel Co., 107 Northwestern Reporter 621.)

An operator, in mining coal near the boundary line of an adjoining landowner, is under a legal duty to make surveys to prevent encroachment upon the latter, and to keep accurate accounts of coal mined near the line; and, if he fails to do so, evidence as to the quantity of coal removed from the adjoining land will be construed most strongly against him. (Tennessee Supreme Court, Coal Creek Mining & Manufacturing Co. vs. Moses, 15 Lea Reports 300.) In this case it was decided that the measure of damages for an unintended trespass is the value of the coal in place before the trespass, plus any incidental damage to the land by the taking of the coal or the mode of taking. This same rule was applied by the same court in a case where the trespass was committed under an honest dispute as to title. Ross vs. Scott, 15 Lea Reports 479.) Injury to the land, as an element of recoverable damage, was recognized by the Pennsylvania Supreme Court in the case of Forsyth vs. Wells, 41 Pennsylvania State Reports 291.

Rights and Liabilities of Third Parties

In a Colorado case, in which the land from which the coal was improperly removed was under a mining lease given to a third person, it was decided by the Supreme Court that the lessee properly joined with the landowner in a suit to compel the trespasser to account for the coal taken. (United Coal Co. vs. Cañon City Coal Co., 48 Pacific Reporter 1045.) But in similar circumstances it was held by the Missouri Supreme Court that a lessee who had never attempted to operate under his lease, and who manifested no purpose to do so, was not a necessary party to the suit; the landowner being entitled to recover the full value of the coal wrongfully taken by defendant. (Lyons vs. Central Coal & Coke Co., 144 Southwestern Reporter 503.) And the Kansas Supreme Court has decided that a lessee, who had the exclusive right to conduct mining operations upon a tract of land for a stated period, could not recover more than nominal damages from one who wrongfully removed a part of the underlying coal, where it appeared that the lessee could not have reached the particular coal during the term of his lease. (Chappel vs. Foster, 123 Pacific Reporter 870.) In a suit by a landowner for wrongful removal of his coal, it was held by the Missouri Supreme Court to be no valid defense that defendant had settled with a third person, who held a lease on the land, for the value of the coal taken. (Austin vs. Huntsville Coal & Mfg. Co., 72 Missouri Reports 535.) Where one who owned one tract of land and the surface of an adjoining tract purported to lease the right of mining under the latter tract, the Illinois Supreme Court held him responsible for the value of coal taken by the lessee, at the mouth of the pit, less the cost of elevation. (Donovan vs. Consolidated Coal Co., of St. Louis, 58 Northeastern Reporter 290.)

Early Maryland decisions support the rule that if the trespasser, by bad mining or otherwise, leaves the remaining coal in such situation that it cannot be profitably mined, or makes its production more expensive, the landowner can have this injury considered in the assessment of his damages. (Barton Coal Co. vs. Cox, 39 Maryland Reports 1, and Franklin Coal Co. vs. McMillan, 49 Maryland Reports 549.)

Assumption of Risk of Injury on Ladder—An adult employee being presumed to know every fact which a person of ordinary prudence for his own safety would observe, an engineer at a coal elevator must be deemed to have assumed the risk of being injured through breaking of a defective ladder, if he knew it was worn and old. (Indiana Appellate Court, Beard vs. Goulding, 103 Northeastern Reporter 875.)

*Attorney-at-law, St. Paul, Minn.

Lockout in Central Pennsylvania

A large majority of the members of the Association of Bituminous Coal Operators of Central Pennsylvania, District No. 2, representing over 85 per cent. of the total tonnage of the Association, met in Philadelphia, April 11.

The following operators were present:

Allegheny River Mining Co., Buffalo & Susquehanna Coal & Coke Co., Cascade Coal & Coke Co., Cherry Tree Coal Co., Clark Brothers Coal Mining Co., Clearfield Bituminous Coal Corporation, Clearfield Colliery Co., Duncan-Spangler Coal Co., Empire Coal Mining Co., Falls Creek Coal Co., Jefferson Coal Co., Jefferson & Clearfield Coal & Iron Co., Kettle Creek Coal Mining Co., Madeira, Hill & Co., Inc., Martin's Branch Coal Mining Co., Moshannon Coal Mining Co., Northwestern Mining & Exchange Co., Peale, Peacock & Kerr, Inc., Pennsylvania Coal & Coke Corporation, Pioneer Coal Co., Portage Coal Mining Co., Potts Run Land Co., Punxsutawney Coal Mining Co., Rich Hill Coal Co., Rochester & Pittsburgh Coal & Iron Co., Seneca Coal Mining Co., Shawmut Mining Co., Trout Run Coal Mining Co., Watkins Coal Co., and other operators.

The following preamble and resolution was unanimously adopted:

Whereas, the representatives of the United Mine Workers of America and the representatives of the Bituminous Coal Operators Association met in joint conference of their respective scale committees at Du Bois on the 3d of March, 1914, to negotiate a wage scale to cover the period of two years next ensuing after Apr. 1, 1914:

And whereas, the conference, after several days' deliberation, adjourned to meet in Philadelphia on the 23d day of March:

And whereas, the Operator's scale committee offered to renew, for a period of two years, the scale of wages and conditions covered by the scale agreement signed in April, 1912, which is on a higher basis than that paid in competitive districts;

And whereas, after two weeks of continuous negotiation, the representatives of the United Mine Workers of America declined said offer;

And whereas, the representatives of the United Mine Workers of America refused to consider a wage contract that did not carry with it a provision that placed upon the operators the impossible burden of pushing cars, together with closed shop and other conditions which entail a prohibitive expense, the result of which would place the cost of producing coal in the Central District of Pennsylvania beyond the plane of competition;

And whereas, the United Mine Workers of America admitted their inability and refused to make a definite contract until after the policy announced at Chicago by their policy committee had been finally submitted to a referendum vote and ratified;

And whereas, many operators of the Central District of Pennsylvania find that in offering work and in attempting to run their mines at the present time, the majority of the men refuse to work and in fact are on strike;

And whereas, if the operators could succeed in worknig their mines in whole or in part, they would be working without a contract with the United Mine Workers of America, and consequently upon an unknown wage basis, and, therefore, would be left in the position of not knowing what their coal would cost them f.o.b. cars;

And whereas, the operators, because of the foregoing facts and in the absence of a definite contract with the United Mine Workers of America find themselves in a position where they are unable to promise deliveries, either as to time or amount, and thereby are prevented from entering into the usual annual contracts;

Now, therefore, be it resolved that in view of the foregoing facts and the attitude of the United Mine Workers of America, that we, the operators, today here associated, find it impossible to operate our mines until such time as the United Mine Workers of America, District No. 2, find themselves with authority and willingness to enter into a contract that renews for a further period of two years the wage-scale agreement, which expired Mar. 31, 1914;

Resolved, that the foregoing preambles and resolution be posted at the mines of the operators herein assembled as notice to their employees that it will be impossible to operate their respective mines after Saturday, Apr. 11, 1914, until an agreement has been reached.

The action taken was not by the association members, but by the individual operators who were in favor of shutting down.

Under the by-laws of the association, it requires a two-thirds vote of the entire membership to order a shut-down. At the meeting of the association where action was taken, there were 46 members present of a total of 60. It required a vote of 40 to pass the resolution for a suspension. It was lost by vote of 39 to 7, just lacking one vote to make the shut-down effective as a resolution of the body as a whole.

The sentiment was almost unanimous that a shut-down should be established, the only difference of opinion being that it was not wise to do so while the miners were powerless to make a scale agreement, full powers being withheld from them, until after the referendum vote of the Policy Committee's report has been taken and counted. This vote was taken on the 14th and will doubtless be counted by the 22d.

Had the vote of the association been taken on the advisability of a shut-down to begin after the 22d, or on May 1, if a new scale agreement were not effective by that date, it seems likely that the vote to suspend would have been adopted practically unanimously.

Two West Virginia Mines Have Made New Records

To have operated coal mines ten years or more and in all that time to have but one fatal accident, is a record that few operators can come anywhere near equaling. That is what has been done, however, at two West Virginia mines, according to the state records. One of these mines is that at Logan, W. Va., of which H. S. Gay is general manager, and the other that of the Columbus Iron & Steel Co., at Marting, W. Va., of which W. M. Gilly is superintendent.

The Gay mine has been in operation for a decade and during that time it has produced 805,000 tons. Only one death has occurred, and that was due to carelessness on the part of the man who lost his life.

So far as the records show, the highest tonnage per fatality in this country belongs to the Mine No. 1 of the Columbus Iron & Steel Co., at Marting, W. Va. This mine has been operated for 13 years and in that time it has produced 1,816,583 tons of coal. The records of the Federal Bureau of Mines and of the several state bureaus, do not show any coal mine in the country where the tonnage for each death has been higher. The facts show that if the victim had obeyed the orders of his mine foreman he also would not have been killed.

Both Mr. Gay and Mr. Gilly declare that the good records of their mines are, in no small measure, due to the care with which the miners have obeyed the state laws and the company rules and regulations governing the operations.

Mr. Gay has made a careful study of working conditions for the company at Logan, and he has been one of the leaders of the safety-first movement in that section. Col. J. G. Battelle and J. H. Frantz, president and vice-president of the Columbus Iron & Steel Co., have always insisted upon the principle of safety-first.

Discussion By Readers

Safety or Refuge Chambers in Mines

Letter No. 2—I read with much interest Charlton Dixon's remarks relative to establishing "safety" or "refuge chambers" in mines, with the idea of providing a means of escape from the deadly afterdamp of explosions, by those who have survived the blast, COAL AGE, Mar. 21, p. 498.

I am sorry to say that this suggestion does not appeal to me as altogether practicable, for more reasons than one. In extensive mines, to be available, many such chambers would be required; and as the development of the mine progressed the location of many of these would be inconvenient. In deep mines the expense of boring holes to these several chambers would be considerable. Since no one can foretell the origin or path of an explosion, which may or may not occur, the proper location of such chambers would not be easy to determine. Too often the path of the explosion would cut off the survivors from reaching such places of refuge.

Though much thought and attention have been given to the study of the causes and prevention of mine explosions, and much valuable knowledge has been acquired, explosions still occur, and, at times, we are tempted to think that these dread occurrences are beyond our control and power to prevent. In view of this fact we may ask: Are mine officials, generally, making use of the knowledge thus gained? Knowing that both gas and dust or either are capable of explosion, we ask further: Is every effort being made to remove these dangerous elements from the mines, and adopt such precautions as the use of permissible explosives, clay tamping, the employment of practical shotfirers, the humidifying of the air current with steam from the exhaust of the pump, spraying or sprinkling the roadways, testing the effectiveness of stone dust to prevent the spread of a local explosion and other well known means and methods?

Too often these precautions are disregarded; the mine becomes excessively dry and the dust is allowed to accumulate everywhere. Mines generating gas and, at times, those subject to frequent outbursts of gas continue to operate on open lights or mixed lights. It causes no surprise that explosions continue to occur, when one considers the flagrant disregard of simple necessary precautions that are well known but too often ignored.

We must all acknowledge that many good suggestions are made in respect to greater safety that are not sufficiently tried out in practice. Knowledge without practice is about equivalent to no knowledge at all. It is not so much what we know as what we do that counts for safety; we may know very much and do very little. If mine officials would make a judicious use of the suggestions made and put forth every effort to remove or render harmless elements known to invite explosion, great mine disasters would be less frequent. In dealing with the yellow-fever epidemic in the South, the Government pursued a wise policy in removing the cause by destroying the mosquito, instead of erecting hospitals and compounding remedies to cure the disease contracted.

Let us, in like manner, make every effort to remove the cause of mine disasters, and the need for safety chambers and other such "after aids" will soon vanish. If the same thought and attention were given to the prevention of disasters, that is now being given to the training of rescue corps and first-aid work, the result would be a more rigid discipline in the mine and a more persistent practice of the known means of safety.

JOHN ROSE,
District Mine Inspector.

Dayton, Tenn.

The Certificate Law

Letter No. 27—Referring to the interesting discussion concerning the mine foreman's certificate, there is one point that, if brought out in previous letters, has escaped my notice. I refer to the ability of the mine foreman to handle men. All the technical education and certificates in the world will not make a man a successful foreman unless he has this essential qualification.

I know an experienced educated man who holds a certificate and, as far as theoretical requirements are concerned, is one of the most competent men in the business; but, as a mine foreman, this man is an absolute failure, because he lacks tact and the ability to get along with his men. It is clear this is a qualification not revealed by the examination, and yet one that must be possessed in full measure by the man who hopes to make a success as a mine foreman.

Other men, again, have no judgment in the hiring of men. The foreman has nothing to guide him in the selection of his men but his knowledge of human nature, which is intuitive, and which some men possess more than others. A group of, perhaps, a dozen men, wait at the top of the shaft for the mine foreman's appearance from below. He has not places for all and must use his best judgment in selecting the most efficient workers and avoiding troublemakers, which are the pests of all mining camps. The mine foreman who lacks this insight into human nature soon fills his mine with a class of men who cause him endless worry and trouble. In the selection of men, the mine foreman should bear in mind the fact that although all men were created free and equal, no two are alike. The foreman must learn to study his men. A frank, open countenance is often a more valuable index of efficiency than a pair of brawny shoulders. Such countenances can be recognized in all races and nationalities.

Again, many a foreman is indifferent to the best interests of the work and will allow personal prejudice, like or dislike, to blind him to the virtues or shortcomings of the men in his charge. Such a foreman will often retain a lazy, inefficient fellow whom he happens to like, and find cause to let a hard-working, industrious man go because he does not like his manner. Men should be judged by

their work, and prejudice should not be allowed to control the judgment of a good foreman.

It must be allowed, however, that in these days of unions, it is not always possible to weed out the inefficient, careless workmen; but when work slackens in the summer a good foreman will not lose the opportunity thus offered to let such men go first. It is my belief that this lack of judgment on the part of the foreman, in the hiring of his men, is more often the cause of failure than any other one thing. Some men, it must be acknowledged, can never acquire the habits that others possess naturally. The question presents itself: Can an examination be devised that will determine whether or not the applicant or candidate for a mine foreman's certificate possesses this supreme qualification?

MINE SUPERINTENDENT.

————, Wyo.

Fan Ventilation

Referring again to my previous inquiry, COAL AGE, Feb. 7, p. 258, I am still of the opinion that the answer given to Mr. Hopkins' question, COAL AGE, Jan. 24, p. 180, may prove misleading, owing to the fact that Mr. Hopkins does not give sufficient data in stating his question. His proposition is to install a second fan on the left side of the mine, the present fan being located on the right side of the mine but not furnishing sufficient air for the ventilation of the entire mine.

Mr. Hopkins states that both of these fans will blow air into the mine by separate air courses, the one on the right and the other on the left side of the mine, the two air currents uniting at a point about a mile from the mouth of the mine and using the same return airway for this distance. He does not give the distance between the fan now in use and the location of the proposed fan; nor does he state the size of either fan, the quantity of air in circulation, or the water-gage readings.

In my inquiry, Feb. 7, I suggested that we assume that the present circulation, under the conditions described by Mr. Hopkins, in a level seam, is 80,000 cu.ft. of air per min., passing under a water gage of 3.5 in. and produced by a 12-ft. fan. I assumed, further, that the resistance of the return airway is equivalent to a 1.5-in. water gage, and asked how much would the circulation in the mine be increased if a 6-ft. Stine fan was now installed at the back entrance 1¾ miles from the present fan, assuming that this second fan was capable of producing 20,000 cu.ft. per min. against a 1-in. water gage.

This is a practical question, as there are 12.5-ft. fans installed at mines in this vicinity, which are producing 78,000 cu.ft. per min. against a 3.8-in. water gage, and 76,000 cu.ft. per min. against a 3.5-in. water gage. I may say that, under the conditions described, I would not consider it practical to install a small disk fan, as suggested.

CONSTANT READER.

Punxsutawney, Penn.

[We quite agree with our correspondent in his conclusions; but must insist, as we stated before, COAL AGE, Feb. 7, p. 258, in answer to this inquiry, that Constant Reader has assumed conditions not involved or suggested in the previous question of Mr. Hopkins.

Mr. Hopkins clearly states that both fans are to operate as blowers, ventilating separate sections of the mine but using a single return airway for a distance of a mile. Constant Reader wants to install a 6-ft. Stine fan, which is a disk fan, at a "back opening" 1¾ miles distant from the first fan. There may be some doubt as to this proposed arrangement; but, from the statement, it would naturally be supposed that the 6-ft. disk fan is to be installed at the return opening, and is to operate as an exhaust fan, the distance between the two fans being 1¾ miles. It is not clear, however, what is meant here by the "return airway." It is impossible to state how much, if any, the circulation in the mine would be increased by the installation of this fan.

In this connection, we would draw attention to a similar question, COAL AGE, Mar. 28, p. 539, which suggests installing a 6-ft. disk fan to ventilate a portion of a mine requiring more air. The present circulation, in this mine, is 78,000 cu.ft. per min., passing under a 3.4-in. water gage. This question clearly states that both fans will use the same return airway for a distance of 1 mile, but does not speak of a "back opening."

In answer to this last question (p. 539), we have assumed that both fans are operated as blowers. These fans, as in Mr. Hopkins' case, are thus assumed to work in parallel on two separate sections of the mine, using a common return air course; but, as stated in answer to each of these questions, it will be necessary to regulate or balance the two circulations. On the other hand, we understand the proposition of Constant Reader to refer to a tandem system of ventilation, the one fan blowing and the other exhausting, which has reference to the second fan acting as a "booster." The success of such a system will depend on two principal conditions, as previously stated (p. 259), namely, a possible shortening of the distance of air travel; and a possible condition of dead air in a portion of the workings, owing to leaky stoppings or dispersion of the air current in the mine and possible escape through other openings.—ED.]

The Mine Foreman

I was greatly interested in the article by Mr. Srodes, entitled "A Plea for the Mine Foreman," COAL AGE, Mar. 14, p. 458, inasmuch as I have long viewed the subject from the same point of compass as Mr. Srodes and can endorse all that he has said.

I feel sure that there is not a competent mine foreman in the state of West Virginia who does not feel the need of protection from some source. The state mining law gives him no protection but makes him responsible for the safe operation of the mine, requiring many things of him in his official capacity that he has no power to perform.

As far as the operation of the mine is concerned, that, in almost every case, is in the hands of the superintendent or manager, who, though he regards the mine foreman as a mere timekeeper, blames him for any mishap or accident that may occur in and around the mine.

Although the mine foreman is not permitted to choose, much less to dictate the manner in which the work should be done, and the means and methods employed are not such as he would adopt, he is held accountable for any undue increase in the cost of operation. The expense sheet may grow under the protest of the foreman, who desires certain changes in order to reduce the cost of operation which, however, the superintendent in charge

does not regard favorably, because of the necessary outlay required to make such changes.

The superintendent is often too far removed from the actual work underground to fully realize and appreciate the need of what the mine foreman recommends. Under these conditions, it is easy to see that there is too often a lack of coöperation between the office and the underground work. As a result, not infrequently, the office decides that it is necessary to change the mine foreman; and the latter is notified, as I have known to be the case, Saturday night that there would be another man to take his place Monday morning. No one will say that this is good business or right. It is, nevertheless, one of the hardships the mine foreman must endure.

Because the mine foreman is the man in direct charge and responsible for the performance of the work, the law, in many states, requires that he must pass a rigid examination to prove his competency to assume that position. The superintendent is not required to pass such an examination, but is the one who practically controls and directs the work. The mine foreman must spend much time and money to prepare himself for examination. He must continue to spend time and money for books and mining papers that will enable him to keep in touch with the best means and methods of mining. Notwithstanding this, as Mr. Srodes has stated, the pay of the mine foreman is inadequate to enable him to maintain the standard required.

The mine foreman must have practical experience. The most successful foremen are those who have worked their way from trapper boy up to that position, stimulated by the ambition to become foreman of the mine. When, at last, he realizes this hope, he finds that his authority and usefulness are limited while his responsibilities have increased. Before, he regarded only his own safety, now he is held responsible for the safety of every man in the mine, besides being blamed for any financial loss arising from the carrying out of plans made in the office, and which prove ill suited to conditions existing in the mine.

The foregoing are facts with which every mine foreman is well acquainted. The question is: "What can be done to lighten the burdens of the mine foreman? Is it not a case similar to that of "taxation without representation?" He is expected to carry out plans that his practical judgment pronounces difficult or wholly impossible without loss, for which he will be blamed. Let this question be carefully considered and discussed, in the hope that suggestions may be made that will be practical and helpful.

MINE FOREMAN.

———, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

PROPORTIONATE DIVISION OF AIR

Every large and well managed mine is, now, divided into two or more separate ventilation districts. The natural division of the air current between these several districts is not generally in proportion to their respective needs.

The longer entries, working more men and requiring the most air for their ventilation are the ones that have the greater resisting power, and, as a result, receive a lesser proportion of the air, in natural division; while, on the other hand, the shorter air courses where fewer men are working and less air is required, have a smaller resisting power and naturally pass the larger quantity of air.

To Regulate the Air—In order to overcome these natural conditions, in mine ventilation, and divide the main air current so as to give each district of the mine the required proportion of air, it is necessary to employ some means that will produce this result.

Two methods have been used to divide the air proportionately; they are as follows:

1. The flow of air is obstructed in those airways that take naturally more than the desired proportion.

2. The power on the air, at the month of each split, is proportioned to the work to be performed in that split.

The former of these two methods has been in common use for many years; the latter was suggested (Mine Ventilation, Beard, 1894, p. 93) as an improvement and has been put in use since in many mines.

The Box Regulator—This form of regulator is shown in Fig. 1, and consists of a brattice built in the return airway or haulway. As shown in the figure, an opening is provided in the brattice and a sliding shutter is used to regulate the size of the opening so as to control the flow of air in that airway or split. If more air is needed the shutter is pushed back so as to enlarge the opening; or the shutter can be partially closed to decrease the quantity of air passing in the split.

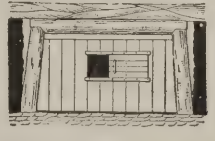


FIG. 1. THE BOX REGULATOR

The Door Regulator—Wherever the conditions will permit this form of regulator to be employed it will be found an improvement over the common "box regulator," just described.

As shown in Fig. 2, the door regulator consists of a door hung at the month of an entry or split and swung into the wind. The door should be arranged so that it will fall naturally against a set-stop, and when not in use will assume a position whereby the air current will be divided in the desired proportion, between the two airways or splits.

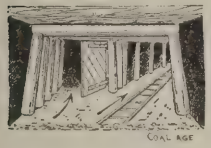


FIG. 2. THE DOOR REGULATOR

The Coal Age Pocket Book

Effect of Regulator—Any regulation of the air current in a mine, to accomplish a distribution of air other than what is natural, causes an increase of both the power producing the circulation and the resulting pressure or water gage. This is true in every case, whatever form of regulator is employed, provided the total quantity of air in circulation is not decreased. The reason that an increase of power is necessary in proportionate splitting, is that an increase in the circulation in any split causes a corresponding increase in pressure; and this pressure is the same for all splits starting from the same point in the mine. To circulate the same quantity of air against this higher pressure requires a corresponding increase of power.

Illustration—Let it be required to find the horsepower and the pressure per square foot, in the following distribution of the air current between the given four splits; the natural distribution of air, as previously calculated, being also given for sake of comparison:

		Nat. Div. (*cu.ft. p. m.*)	Reqd. Div. (*cu.ft. p. m.*)
Split A,	8 × 12 ft., 6000 ft. long,	23,710	20,000
Split B,	6 × 20 ft., 12,000 ft. long,	16,450	40,000
Split C,	6 × 12 ft., 8000 ft. long,	18,750	30,000
Split D,	4 × 6 ft., 1000 ft. long.	41,090	10,000
Total circulation,		100,000	100,000

Solution—The first step is to calculate the natural pressure for each split when passing the required quantity of air per minute, by substituting the following values for the area, perimeter and length of each split, in the formula for unit pressure:

Split A,	$a = 96$ *sq.ft.*;	$o = 40$ *ft.*;	$l = 6{,}000$
Split B,	$a = 120$ *sq.ft.*;	$o = 52$ *ft.*;	$l = 12{,}000$
Split C,	$a = 72$ *sq.ft.*;	$o = 36$ *ft.*;	$l = 8{,}000$
Split D,	$a = 24$ *sq.ft.*;	$o = 20$ *ft.*;	$l = 1{,}000$

The natural pressure for each split is then,

Split A, $$p = \frac{0.00000002 \times 6000 \times 40 \times 20{,}000^2}{96 \times 96 \times 96} = 2.17 \text{ lb. per sq.ft.}$$

Split B, $$p = \frac{0.00000002 \times 12{,}000 \times 52 \times 40{,}000^2}{120 \times 120 \times 120} = 11.55 \text{ lb. per sq.ft.}$$

Split C, $$p = \frac{0.00000002 \times 8000 \times 36 \times 20{,}000^2}{72 \times 72 \times 72} = 13.89 \text{ lb. per sq.ft.}$$

Split D, $$p = \frac{0.00000002 \times 1000 \times 20 \times 10{,}000^2}{24 \times 24 \times 24} = 2.98 \text{ lb. per sq.ft.}$$

The highest natural pressure is developed in Split C, by the required distribution of air, and this is, therefore, the "open" or "free" split, regulators being necessary in each of the other splits, to raise the pressure to that amount.

The horsepower producing this circulation is then,

$$H = \frac{100{,}000 \times 13.89}{33{,}000} = 42.09 \text{ hp.}$$

Inquiries of General Interest

Study Questions--Ventilation

A question that has given us considerable trouble and aroused much interest and discussion is the following:

What must be the area of an airway that will pass 10,000 cu.ft. of air per minute, under a water gage of 1.7 in., the length of the airway being 5000 ft.?

X.

Pittsburgh, Penn.

The only way this question can be worked is to assume that the airway is circular, or square, or has a known ratio of height to the width of airway. The formula for water gage, in terms of the quantity of air in circulation in an airway, is

$$w.g. = \frac{klo q^2}{5.2\, a^3}$$

But the perimeter o and the area a of a circular airway may be written in terms of the diameter of the circle; thus,

$$\frac{o}{a^3} = \frac{\pi d}{(\pi/4, d^2)^3} = \frac{64}{\pi^2 d^5} = \frac{6.484}{d^5}$$

Substituting this value in the previous formula for water gage, and solving with respect to the diameter d,

$$d = 0.03 \sqrt[5]{\frac{lq^2}{w.g.}} = 0.03 \sqrt[5]{\frac{5000 \times 10{,}000^2}{1.7}} = 5.9\ ft.$$

The sectional area corresponding to this diameter is

$$a = 0.7854 \times 5.9^2 = 27.34\ sq.ft.$$

In a similar manner, for a square airway,

$$\frac{o}{a^3} = \frac{4d}{(d^2)^3} = \frac{4\,d}{d^6} = \frac{4}{d^5}$$

Then substituting this value in the formula for water gage, and solving again with respect to d,

$$d = 0.0274 \sqrt{\frac{5000 \times 10{,}000^2}{1.7}} = 5.4\ ft.,\ nearly$$

This being the length of one side of a square airway, the area is

$$a = d^2 = 5.4^2 = 29.16\ sq.ft.$$

For a rectangular airway, in which the ratio of the height to the width of the airway is r,

$$\frac{o}{a^3} = \frac{2\,d\,(1 + r)}{(r d^2)^3} = \frac{2\,(1 + r)}{r^3 d^5}$$

Then substituting this value in the formula for water gage and solving with respect to d, gives, for the width of the airway,

$$d = 0.0238 \sqrt[5]{\frac{lq^2}{w.g.} \frac{1 + r}{r^3}}$$

For example, assuming that the ratio of the height of the entry to its width is 0.6, the width of entry required to pass 10,000 cu.ft. of air against a 1.7-in. water gage is

$$d = 0.0238 \sqrt[5]{\frac{5000 \times 10{,}000^2}{1.7} \left(\frac{1 + 0.6}{0.6^3}\right)} = 7.0\ ft.$$

The height of this airway is, then, $0.6 \times 7 = 4.2$ ft. The area of the airway is

$$a = r d^2 = 0.6 \times 7^2 = 29.4\ sq.ft.$$

::

Cubic Capacity of Anthracite Sizes

Kindly advise me, through the columns of COAL AGE, how many cubic feet per ton there are in the following sizes of anthracite: Egg, stove, chestnut and pea.

H. G. M.

Seneca Falls, N. Y.

The cubic capacity of coal varies with its specific gravity; and, for all accurate determinations in this regard, it is important to ascertain the average specific gravity of the coal in question. For purposes of estimate, however, it may be stated that the specific gravity of anthracite may vary from 1.3 to 1.75, depending on the quality and hardness of the coal and the impurities contained therein. The specific gravity of bituminous coal varies from 1.25 to 1.40, depending on the same characteristics. The average specific gravity of anthracite may be taken as 1.45; and of bituminous coal, 1.3.

Except in special cases, where great accuracy is required, the cubic capacity of the sizes known as egg, stove and chestnut varies so slightly that the difference can be safely ignored, it seldom amounting to over 1 per cent. The difference in cubic capacity per unit weight of sized coal varies mostly with the treatment. In some cases, the sizes, stove and chestnut weigh heavier per cubic foot than the larger egg coal; but, in general, the larger sizes of coal weigh slightly in excess of the smaller sizes, per unit volume. In almost every case, pea coal weighs less per unit volume than the larger sizes. This is due, in part, to the fact that coal is more friable than its impurities and crushes to a finer state. For this reason, the larger sizes naturally contain a greater percentage of impurities than the smaller sizes. However, the market specifications for anthracite are such as to demand special treatment to eliminate these impurities, with the result that the larger sizes of anthracite screenings thus treated, generally, contain less impurities and weigh lighter than the smaller sizes of pea, buckwheat, etc., which are not subject to the same rigid specifications.

As far as cubic capacity is concerned, however, as previously stated, the differences due to size, of screenings may be ignored, as this seldom exeeds 1 or 2 per cent. The general practice in the anthracite region of Pennsylvania, in the sale of coal, is based on the long ton (2240 lb.); while the sale of bituminous coal is always based on the short ton (2000 lb.). A common rule, in practice, based on this fact, is the following:

RULE—*A long ton of anthracite or a short ton of bituminous coal broken to market sizes occupies 40 cu.ft. of space.*

This rule will be found to give practical results.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—An air current of 140,000 cu.ft. per min. divides at the shaft bottom into three splits, as follows:

Split *A*, 6x9 ft., 9000 ft. long;
Split *B*, 6x9 ft., 12,000 ft. long;
Split *C*, 6x8 ft., 6000 ft. long.

Find the natural division of this current of air.

Ans.—Since the unit pressure is the same for all splits starting at the same point in the mine, the first step is to calculate the pressure potential for each split, by substituting the lowest relative values for the several areas, perimeters and lengths of the airways, in the formula

$$X_p = a\sqrt{\frac{a}{l\,o}}$$

The areas (a), perimeters (o) and lengths (l) of the several splits are as follows:

Split *A*, $a = 54$ sq.ft.; $o = 30$ ft.; $l = 9000$ ft.
Split *B*, $a = 54$ sq.ft.; $o = 30$ ft.; $l = 12{,}000$ ft.
Split *C*, $a = 48$ sq.ft.; $o = 28$ ft.; $l = 6500$ ft.

Reducing these to the lowest relative values, by canceling the common factors in the areas, perimeters and lengths, gives the following:

Split *A*, $a = 9$; $o = 15$; $l = 18$
Split *B*, $a = 9$; $o = 15$; $l = 24$
Split *C*, $a = 8$; $o = 14$; $l = 13$

The relative split potentials are then found as follows:

$$X_a = 9\sqrt{\frac{9}{18\times 15}} = 9\sqrt{\frac{1}{30}} = 9\sqrt{0.0333} = 1.6432$$

$$X_b = 9\sqrt{\frac{9}{24\times 15}} = 9\sqrt{\frac{1}{40}} = 9\sqrt{0.0250} = 1.4230$$

$$X_c = 8\sqrt{\frac{8}{13\times 14}} = 16\sqrt{\frac{1}{91}} = 16\sqrt{0.0110} = 1.6773$$

Sum of relative potentials 4.7435

In splitting, the ratio of the quantity of air passing in each split to the total quantity of air in circulation is equal to the ratio of the corresponding split potential to the sum of all the potentials. This rule gives for the quantity of air passing in each split as follows:

$$q_a = \frac{1.6432}{4.7435}\times 140{,}000 = 48{,}500\ cu.ft.\ per\ min.$$

$$q_b = \frac{1.4230}{4.7435}\times 140{,}000 = 42{,}000\ cu.ft.\ per\ min.$$

$$q_c = \frac{1.6773}{4.7435}\times 140{,}000 = 49{,}500\ cu.ft.\ per\ min.$$

Total . . . . . 140,000 cu.ft. per min.

Ques.—What dangers may arise from the use of electricity in mines? Give your recommendations for avoiding these dangers.

Ans.—Briefly stated, the dangers arising from the use of electricity in mines are as follows: 1. The liability of contact of men or animals with live wires, with the possibility of fatal results. 2. The liability of ignition of gas or other combustible material by sparking of the contacts or the short-circuiting of the current.

When proper care is taken in the installation and due precautions are observed and strict regulations enforced, these dangers are minimized. All medium-voltage or high-voltage conductors should be properly insulated and should not be installed on haulage roads and manways. All conductors and trolley wires should be properly safeguarded at partings or crossings where men or animals are liable to contact therewith. All installations of electric wires and other apparatus should be made by a competent electrician. Fuses, switchboards and other dangerous parts should be protected, and inspected regularly.

Ques.—A pressure of 1.5 in. of water gage gives, in an open airway, 24,000 cu.ft. of air per min. It is desired to reduce this quantity of air in circulation, to 6000 cu.ft. per min., by introducing a regulator in the airway. (a) What will be the required pressure, after the regulator is in place? (b) Assuming the velocity in the open airway was 600 ft. per min., find the velocity of the air current after the regulator is introduced.

Ans.—(a) The question does not state whether the power or the pressure remains constant. Assuming a constant power on the air, the unit pressure (p) will vary inversely as the quantity of air in circulation. In other words, the pressure ratio is equal to the inverse quantity ratio. The unit pressure coresponding to a 1.5-in. water gage is $1.5 \times 5.2 = 7.8$ lb. per sq.ft.; and, calling the required pressure x,

$$\frac{p_2}{p_1} = \frac{q_1}{q_2};\quad \text{and}\ \frac{x}{7.8} = \frac{24{,}000}{6000} = 4$$

$$x = 7.8 \times 4 = 31.2\ lb.\ per\ sq.ft.$$

(b) For the same sectional area of airway, the velocity of the air current will vary as the quantity of air in circulation. The quantity of air being reduced one-fourth, the velocity is reduced in the same ratio, and is, therefore, $600 \div 4 = 150$ ft. per min.

The above solution assumes that the *power* on the air remains constant and the quantity is reduced to one-fourth the original quantity, by means of a regulator. In such case, when the regulator is put in place, the power on the air remaining unchanged, the pressure will be increased four times, giving a $4 \times 1.5 = 6$-in. w.g.

On the other hand, if the question means to ask for the pressure due to the regulator, for a constant *pressure* on the air, it is necessary to calculate, first, the natural pressure due to friction when the quantity is reduced one-fourth. In such case, the pressure varies directly as the square of the quantity; or the pressure ratio is equal to the square of the quantity ratio. The quantity ratio being $\frac{1}{4}$, the pressure ratio will be $(\frac{1}{4})^2 = \frac{1}{16}$. The natural pressure due to friction is, therefore, $1.5 \times \frac{1}{16} = 0.09+$ in. Subtracting this natural pressure from the original pressure gives, for the pressure due to the regulator, $1.5 - 0.09 = 1.41$ in.

Coal and Coke News

Washington D. C.

The Federal Industrial Commission is devoting considerable attention to the question of whether the present situation in coal mining is satisfactory or not and the methods that should be employed if the government determines to interfere in any way between operators and employees. Several hearings have been had during the past week with respect to this question, among the witnesses being John Mitchell, who has revived the suggestion frequently made during the past year or two that there be a commission or counsel of some kind established by the government for the purpose of fixing prices and regulating wages or overseeing both.

This step Mr. Mitchell thought was desirable also from the conservation standpoint, because at present much coal was wasted in the United States, owing to the inability of operators to dispose of it at a profit. The amount which thus went to waste he thought might run as high as 40 per cent. of the total output.

The necessity or at all events desirability of miners' wages being overseen by the government was indicated, Mr. Mitchell thought, by the improved conditions since 1897, there having been much arbitration and conciliation in the industry since that time.

Mr. Mitchell thought the miner was entitled to as good pay as any industrial worker in the country and urged that he should be definitely recognized through some kind of government conciliation process. The commission has evidently been disposed to give careful attention to this phase of the argument and other witnesses have been summoned who will testify along the same general lines. It is understood that the reports of the commission will contain a good deal of discussion of the general question of arbitration and conciliation and that recommendations will be made on that topic.

The attempt is now being made to secure in the pending anti-trust legislation which the administration plans to support some provision that will call for special attention on the part of the trade commission which is expected to be named, to questions of mining and to mine operators' agreements of various kinds. If this could be done, it is thought, there might be less demand for the creation of a special industrial counsel to look after miners' disputes as recommended by Mr. Mitchell and others.

A Decision Is Early Expected

The Interstate Commerce Commission, it is now practically certain, will at an early date announce a decision in the advance rate cases which have been pending before it for some months past. The prevalent expectation is that this decision will provide for some increases in rates, although probably not for advances on the heavier and bulkier commodities which are believed to be bearing at the present time about all of the burden that is properly to be attributed to them.

Among the items on which no advances are expected are coal, cement and other goods in the same general classification. As is well known, Louis D. Brandeis, who has been acting as counsel for the commission, was counsel for the bituminous operators in the Boileau case some two or three years ago, and at that time became firmly convinced that with coal prices at their present figure the producers could not afford to pay a heavier rate for transportation than they are now expected to stand, particularly in the Middle-western region.

During the hearings before the Interstate Commerce Commission the bituminous men have made strong pleas against being subjected to any advance in rates on the ground that they could not keep in business if they were to have to pay more for shipping their coal to lake ports particularly, and probably not if they were required to pay heavier freight rates on coal going to other points.

This decision, while pleasing to coal men, will be much less satisfactory to others, because of the fact that it will necessarily involve the placing of such advances as may be granted entirely upon the other commodities so that the more relief there is for shippers of coal and other bulky commodities the more severe will be the rate advances that must be allowed if there is to be any real concession to the roads on the freight that is less bulky and bears a higher classification.

It is, however, believed that the action of the commission may involve some important announcement concerning the question of cars and practices on the part of shippers who are now receiving special services from the roads free or nearly so.

HARRISBURG, PENN.

The coal situation in the central Pennsylvania, or Clearfield district, where work was suspended on Apr. 11, by order of the operators who control about 85 per cent. of the tonnage output, has been resolved into speculation as to what will be the outcome of the vote to be taken by the miners of the district, and which will be determined by about Apr. 22. By this action the operators have put the matter of settlement squarely up to the men.

The greatest concern has been felt over a possible shortage of coal, but there seems little possibility of such a contingency until the expiration of about six weeks to two months. The operators, foreseeing the present status of affairs, have been shipping heavily from the mines for some time, and they state that there is abundant coal in hand to meet all demands for the time named. In the meantime, hope is expressed on all sides that the differences between the operators and men will be settled before it becomes necessary to call on other fields for shipments, which will be necessary should the deadlock continue longer than about two months.

Hope is the present chief asset of both operators and miners. Representatives of the latter will not venture predictions as to what will be the referendum decision of the miners in their vote. But are of the opinion that the operators are taking this method to bridge over the present slump in the market, as the miners themselves would not have voted to stop work. The operators content themselves with saying that they hope all matters of dissension will be settled amicably long before there is necessity to call outside aid in relieving an imminent shortage.

Reports from the Central district, which comprises Armstrong, Bedford, Blair, Cambria, Centre, Clarion, Clearfield, Elk, Huntington, Indiana and Jefferson Counties, say there is no immediate prospect of coal shortage and that the miners are equipped financially for a long struggle, should that eventuality arise, although there may be suffering in some sections.

The Government Losses a Dissolution Suit

Judges Gray, Buffington and McPherson in an opinion filed on Apr. 7 in the United States District Court dismissed the suit brought by the United States Government against the Delaware, Lackawanna & Western R.R. Co. and the Delaware, Lackawanna & Western Coal Co., for an alleged violation of the commodities clause of the United States statute. This forbids railroad companies engaged in interstate commerce traffic to transport, after May 1, 1908, any article other than timber and its products which may have been manufactured, mined or produced in whole or in part under the authority of such railroad company either directly or indirectly.

The case was considered of the highest importance by the government, as it was one of the steps planned in an effort to break up what it alleged to be a monopoly of the anthracite-coal trade.

The government's contention in the suit was that the Delaware, Lackawanna & Western R.R. Co. and the Delaware, Lackawanna & Western Coal Co. were practically one and the same corporation, and that they were violating the law referred to for the reason that the railroad company was admittedly engaged in transporting a large quantity of coal shipped by the coal company.

It was admitted at the hearing of the case in Philadelphia that the stock of the coal company was largely, if not entirely, owned by stockholders of the railroad company, but it was contended on the part of the defendants that there was a bona fide distinction between the two concerns.

It was contended on the part of the government that the maintaining of the two companies with the stock of the coal company, owned by the stockholders of the railroad company, was a mere subterfuge to evade liability under the statute.

The opinion filed by the judges goes extensively into former decisions in the United States courts, including the Supreme Court, in which the defendant companies, with other firms were involved. It is pointed out that after these decisions, which were adverse to the defendants, the Delaware, Lackawanna & Western R.R. Co., which at the time owned the stock of the Delaware, Lackawanna & Western Coal Co., placed the stock of the coal company on the market, giving preference in the sale to the stockholders of the railroad company.

The court holds that the method of the railroad company in divesting itself of the stock of the Delaware, Lackawanna & Western Coal Co. to have been a substantial compliance with the decision in the former cases.

The decision goes on to say: "No act of Congress, or judicial decision, has declared it to be illegal for any individual citizen to invest his money in two enterprises merely because the two enterprises may be closely connected."

The decision also says further that the facts before the court are to the effect that the two companies are entirely distinct and that the railroad company, which owns the mines and sells coal to the coal company, has no interest in that coal after it is mined, except the interest that it has in the business of transportating the same when it is supplied to it for transportation.

Dealing with another phase of the case, alleged violation of the anti-trust act, the opinion says there was a formal charge against both defendants under said anti-trust act, but that the oral argument left the court under the impression that these charges were not much insisted on by the government. The court's understanding was that what was desired was decision on the alleged violation of the commodities clause, upon which the dismissal was based.

The opinion concludes by saying that a decree may be entered dismissing the bill, but that the dismissal will be without prejudice to the government's right to begin a second proceeding, if the situation changes in the future, and affords the government grounds to assert that the affairs of the two corporations have become unlawfully identified.

A somewhat similar suit was recently instituted against the Lehigh Valley R.R. and its subsidiaries in the Federal Court at New York, and another government action against the Reading to separate it from the Jersey Central R.R. and other interests is in the United States Court in Philadelphia.

PENNSYLVANIA

Anthracite

Wilkes-Barre—When Charles Pamotis rode to his work upon a dangerous plane, thereby violating a rule of the Lehigh & Wilkes-Barre Coal Co., and was discharged, 1200 men and boys at the Maxwell No. 20 colliery declared a strike.

Buttonwood—The recent flood has caused idleness at the Parrish colliery since Mar. 28. The water from the Susquehanna River filled the boiler room outside, necessitating drawing the fires and consequently stopping the pumps inside, allowing such a quantity of water to accumulate that the mine has just recently been cleared sufficiently to allow a resumption of operations.

Bituminous

Uniontown—The nine coke plants and all the coal holdings of the Sunshine Coal & Coke Co. will be sold within the next few weeks. The first plant to be sold is the Cyrilla plant at Lynn Station, consisting of 140 coke ovens and 140 acres of undeveloped coal land. The date for this sale is set for May 1, and the sale of the various other plants will follow.

Washington—Fire of incendiary origin recently destroyed the fan house of the Cherry Valley mine of the Pittsburgh & Eastern Coal Co., located near Burgettstown.

Summerville—It was recently announced that Mines Nos. 5 and 6 of the Pennsylvania Coal Co. would reduce operations to three days per week until further notice. It is expected that this arrangement will cause a number of men to seek employment in other fields, as they will be unable to stand the cut in working hours. A new tipple and other improvements are to be made at No. 6 mine.

Philadelphia — Bituminous coal operators representing about 85 per cent. of the output of central Pennsylvania on Apr. 10 decided to close their mines pending the signing of a new wage agreement. Efforts to arrange a new wage scale to take the place of the one that expired Mar. 31 have been under way for several weeks.

Bernice—Activity in the recently organized mine workers' union at this place has resulted, it is said, in the discharge of a number of men. The matter threatens to create trouble in the district.

Somerset—The Berwind-White Coal Co., which conducts some of the most extensive mining operations in Somerset County, intends to comply with the demands of the miners that motors or other means be supplied so that it will not be necessary for the men to push coal cars about in the mines. To this end the company has ordered 25 motors which will be distributed throughout the several mines to be used for the purpose asked for by the miners.

Greensburg—The Jamison Coal & Coke Co., recently purchased the old Hackley homestead, containing 53 acres of coal and surface. This property is in Salem Township and adjoins the Crabtree mines.

Johnstown—First-Aid Instructor Gomer Phillips, of the Cambria Steel Co., has started the training of 10 men in mine-secure and resuscitation work. Mine-rescue stations with modern equipment have been placed in the Rolling Mill mine and in the Franklin mines of the mining department. Twenty-five miners will take the training in the use of the oxygen helmet and the pulmotor. In addition, men in the blast-furnace and other departments will be given similar instructions.

South Fork—Considerable excitment was caused on Apr. 9, when a section of Lake St., one of the most important thoroughfares of the town, dropped 9 ft. The slip, it is said, was caused by the subsidence of the surface over the workings of the Rockville Coal Co.'s mines. Other causes than that of subsidence were assigned by those connected with the coal company.

WEST VIRGINIA

Wheeling—Coal operators in West Virginia are working their mines to the fullest capacity in order to fill the general demand for fuel coming in from all sections of the country as the result of the suspension of coal production in other states. Manufacturers who were dependent on Ohio and Pennsylvania mines to supply their fuel have been forced to look to West Virginia to fill the deficiency. The principal obstacle the West Virginia operators have to overcome at the present time is an inability to secure sufficient cars to carry away their full production.

Gary—It is announced that a Fourth of July celebration will be held at Gary, which will far excell any holiday jubilee to ever take place in the Pocahontas coal field. The program is already being discussed and plans are on foot for an occasion which promises to eclipse any other independence day celebration in the coal field. It is expected that special trains will be operated to take care of the crowds. Baseball, tennis and other outdoor games will be provided, and fireworks in the evening will form a special feature of the celebration.

KENTUCKY

Madisonville—The strike of the miners at the Kington mine continues, and the mine has now been idle for some time. W. W. Kington, manager and principal stockholder of the mine, conferred recently with city officials regarding the strike, but has announced nothing concerning the course which will be pursued. About 350 miners attended a meeting at Morton's Gap, near here recently, at which the management of the Kington Coal Co. was criticised.

Middlesboro—T. S. Webster & Co. have closed a contract to supply the Southern Mining Co. with the complete equipment needed for the new mine, incline and tipple of the Golden Ash Coal Co., at Neubert, in Harlan County, including screens, dumps, cars, drum, cables, etc., all from the Webster Mfg. Co., Tiffin, Ohio.

Greenville—Reports of lawlessness by a band of night-riders who have been dubbed "Possum Hunters" are persistent, and it is said that various acts of intimidation, all directed against nonunion miners and operators, have been committed. It is declared by nonunion operators that the object of the night-riders is to coerce them into unionizing. Union miners, however, declare that the reports of the trouble have been greatly exaggerated, and that no union man has been guilty of intimidating acts. That the trouble-makers believe themselves to be acting for the interests of the union miners is fairly apparent, although the miners themselves have declared against violence of any sort.

OHIO

Shawnee—The announcement is made that the Peabody mine, at Shawnee, which is owned by Chicago interests, has been permanently closed and the tipple and power house are being dismantled.

Columbus—According to the statement of the Ohio Board of Awards, there is no likelihood of a decrease in the rates on

premiums charged operators for their employees under the employees compensation law. It is claimed the present rates are at the lowest possible figure when the danger of the occupation is taken into consideration.

Ohio coal-mine operators in conference on Apr. 10 decided to test the constitutionality of the Green antiscreen law by filing injunction proceedings in the Federal Court to restrain state officials from enforcing the law which, the operators declare, is the cause of the suspension of work in the Ohio mines. It is expected that the suit will be filed as soon as the committee appointed and attorneys in charge can arrange it.

Steubenville—The Dexter Coal Co.'s mine at Brilliant employing about 150 men resumed operations Apr. 6 after being shut down since Mar. 31. This was the first commercial mine in the state to resume since the state-wide shutdown. The men are, however, working under the old scale, pending the referendum vote.

INDIANA

Brazil—The block-coal miners at a meeting here prepared their demands on the operators, including the weighing of coal before dumping, an advance of 5c. a ton, mine-run basis, an advance of 10 per cent. for all dead work, yardage and day work and changes in the scale of wages for machine mining and for the mining of clay.

Terre Haute—Six of the 16 demands presented by the scale committee of the miners were rejected by the Indiana operators in joint conference here. Action was deferred on the demand that operators deliver powder from magazine to working place. The demands rejected were for a differential of 7c. between pick and machine-mined coal; union-made powder at a fixed price of $1.25 a keg; companies to pay for break-throughs, exemption of machine men from payment of blacksmithing, uniform scale for slate and dirt and payment of wages weekly. The operators opposed all demands that would increase the cost of production.

ILLINOIS

Harrisburg—The first annual first-aid contest of the Saline County Mine Safety Association will be held at Harrisburg, Ill., May 2, 1914. This meet will be of large proportions, and it is anticipated that many spectators will be present. Both single and team contests will be participated in, and the prizes will consist of medals and a silver loving cup. Hotel accommodations should be secured in advance.

Springfield—The State Mining Board of Illinois will hold a meeting at the State House, Springfield, commencing Monday, Apr. 20, for the purpose of examining candidates applying for certificates as mine managers (first or second class), mine examiners and hoisting engineers. Registration of candidates for these examinations will close at 5 p.m., Monday, Apr. 20, at the office of the Mining Board.

ARKANSAS

Fort Smith—A crowd made up of about 1000 union miners and sympathizers on Apr. 6 took possession of the Bache-Denman Co.'s mine near Midland, beat the pitboss into insensibility, roughly handled two guards and a fireman at the mine, pulled the fire from the boilers, chased away the workmen, and after raising an American flag and a banner inscribed "A Union Man's Country" from the tipple marched away led by a band. The mine had upon that day begun operating on an open-shop policy, heretofore having employed about 200 union men. It is announced that the company intends to institute the open-shop policy at its six other mines in western Arkansas and eastern Oklahoma during the coming summer and fall.

OKLAHOMA

McAlester—The state has begun taking legal steps for the purpose of mining coal with convict labor upon the penitentiary farm, the attorney-general having filed condemnation suit covering forty acres against the Choctaw and Chickasaw nations. Coal thus mined will not be sold on the open market, but will be furnished to the state for other institutions, and the money thus raised will be used in maintaining penal institutions.

KANSAS

Breezy Hill—The Sheridan Coal Co. has completed a shaft at Breezy Hill, in the Pittsburg district, and has begun operating. The shaft runs 240 ft. below the ground and is one of the deepest in the Pittsburg field.

Lyndon—Operators of Osage County have filed a complaint with the Kansas State Public Utilities Commission at Topeka, alleging discrimination by railroads entering that field in freight rates as compared to the rates from the Pittsburg field to Kansas points. The Osage mine owners stated the rate on coal mined in that section is about 10c. higher to practically all Kansas points, where a corresponding amount of mileage is involved.

COLORADO

Denver—The supreme court on Apr. 8 issued a writ of Habeas Corpus for the release of "Mother Jones" then held a military prisoner at Walsenburg. This action was a result of a petition presented by Horace N. Hawkins attorney for the striking coal miners. This was the third application for a writ.

MONTANA

Bridger—It is announced that the resumption of commercial coal-mining operations under lease and a complete change in the management of the Bridger Coal and Improvement Co's. properties, will take place within a short time. This is hailed as good news by residents of Bridger since the mines have been shut down for about two years.

Red Lodge—Improvements in the way of new buildings to the value of about $50,000 are to be made at the East mine of the Northwestern Improvement Co. during the course of the next two months. These include a machine shop 36x34ft., a blacksmith shop 30x30 ft., an electrical shop 20x30 ft., and a carpenter shop 30x30 ft., all of which will be located on the south side of present carpenter shop which will be used as a car repair shop. It is expected to commence work on the new mine to be opened under the east bench the first part of June.

PERSONALS

B. F. Fluker, who recently discovered promising beds of coal on his 200-acre tract, near Malakoff, Tex., will develop that field. The vein is said to vary from 6 to 12 ft. in thickness and is from 20 to 40 ft. in depth.

James Martin has severed his connections with the State Mining Department of West Virginia to accept the position of general manager of the Paint Creek Colliery Co., and will make Mucklow his headquarters in the future.

C. L. Patterson is the new superintendent at the W. J. Rainey works at Revere, succeeding Robert Hogsett who was transferred to Grace coal plant. Mr. Patterson was formerly superintendent of the H. C. Frick Coke Co., at the Dearth plant.

Grenville Lewis, of Knoxville, Tenn., has resigned the presidency and general managership of the Ideal Block Coal Co., of Lily, Ky. He will be succeeded on or about Apr. 21 by Edward H. Coxe who until recently has been manager of operations for the receiver of the La Follette Coal Iron & Ry. Co. Mr. Coxe will probably reside at Corbin, Ky.

H. H. Pinkney, general superintendent of the Flat Top Coal Mining Co., has tendered his resignation from this position in order to take the general managership of the International Coal Co. of Montana, with headquarters at Bear Creek. Mr. Pinkney has held positions as superintendent and mine inspector in West Virginia for the past 14 years, making many friends and winning the respect of both operators and miners by his straightforwardness and kindly manner. It is the wish of his many friends throughout the state that he be as successful in his present undertakings as he has been in the past.

OBITUARY

James B. Davis, of Plymouth, Penn., died of heart trouble on Apr. 8 after an illness of several months. Born in Brecknonshire, South Wales in 1840, Mr. Davis came to this country when 28 years of age and soon accepted the position of outside foreman at the Nottingham colliery of the Lehigh & Wilkes-Barre Coal Co. Nine years later he accepted the general superintendency of the Plymouth Coal Co., which position he occupied until he retired to private life five years ago.

Mr. Davis was recognized both in this country and abroad as an efficient executive and as a pioneer in the practice of flushing for surface support. Upon this subject he wrote several articles for the technical press of this country and Germany. He is survived by his wife and nine children.

Andrew J. Dull, a well known citizen and pioneer coal

operator of Pennsylvania, died at his home in Harrisburg, Apr. 8, from general breakdown due to old age, he being at the time of his death in his 85th year.

After his graduation from Princeton University in 1852, Mr. Dull was engaged in the construction of public works later becoming interested in the iron industry and the construction of iron mills. He also became indentified with the coke industry of the Pocahontas region of W. Va. During his latter years, however, Mr. Dull gave less attention than formerly to the iron and coal business proper and as president of the Electric Ore Separator Co. gave much of this time and thought to the separation of magnetic and non-magnetic minerals. He is survived by his wife who before marriage was Judith Reynolds, of Kittanning.

CONSTRUCTION NEWS

Mater, Ky.—Work has been begun on an electrically equipped coal plant by the Elkhorn Coal Co. It is expected that from 800 to 1000 tons of coal will be shipped per day, the shipments to begin about July 1.

Greensburg, Penn.—Byrne Bros., who purchased the Mathias farm, near Malison, last year, together with several small additional tracts of coal, have a force of men erecting a tipple for the development of this field.

Viper, Ky.—The Lexington & Eastern R.R. will build five miles of branch line from Viper into the coal and timber fields of Mason Creek to reach coal and lumber developments now under way. It is stated that work will start at once.

Stone, Ky.—The Island Creek Coal Co., operating in West Virginia, has announced its intention of entering the Kentucky field. It will operate and develop several thousand acres along Pond Creek, work upon which will start within a few weeks.

Shelby, Ky.—It is announced that the Shelby Coal Co. recently organized with a capital of $60,000, will start work immediately on a first-class coal-mining plant just up Shelby Creek, on the Sandy Valley & Elkhorn R.R. Active preparations are being made to start the initial work.

Lexington, Ky.—In an effort to rush the construction of the Yount's Fork branch of the Lexington & Eastern Ry., Brady & Mundy, the contractors, have put 200 extra men on the work in the Boone's Fork coal field. The Mineral Fuel Co. is preparing for extensive coal operations in that section.

Pikeville, Ky.—Development work is well under way on the new plant of the Sharon Coal & Coke Co. on Blackberry Creek on the Pond Creek branch of the Norfolk & Western R.R. Several million dollars will be expended in this development and the building of a first-class mining and industrial city will be a feature of the undertaking.

Whitesburg, Ky.—Another railroad line to tap the rich Boone's Fork and Elkhorn coal fields of Letcher County has been announced. This will be known as the Beaver Creek branch of the Chesapeake & Ohio, starting from Steels Creek and passing through the head waters of Beaver and Rockport creeks, penetrating rich coal and timber sections.

Hazard, Ky.—Five hundred acres of coal land have been leased from the Slemp Consolidated Coal Co. by W. N. Heath and J. G. Davis. A first-class electrically operated plant will be installed five miles north of Hazzard on the Lexington & Eastern R.R., and it is expected to soon have a daily capacity of from 700 to 800 tons, and that shipments of coal will be started by June 15.

Elkhorn City, Ky.—The construction work on the 30-mile line of the Carolina, Clinchfield & Ohio R.R. from Dante, Va., through "the Breaks" of the big Sandy River to this city is being rushed with all possible speed. Owing to the trouble with the long tunnel work it is feared that traffic will not be established on this line before Aug. 1, although completion was expected to be made by May 1. This is one of the most expensive pieces of railroad ever undertaken in the South.

NEW INCORPORATIONS

Palmer, W. Va.—The Blacksburg Coal Co. has been incorporated with a capital stock of $200,000 to develop coal land.

Charleston, W. Va.—The Griffith Coal Co. has been incorporated with a capital stock of $1,000,000 to develop coal mines in the Sherman district.

Cullman, Ala.—The South Brilliant Coal Co. has been organized with a capital stock of $10,000 to develop mines in Marion County. The president is Geo. H. Parker, of Cullman, Ala., the other incorporators being A. A. Griffith and O. S. Goodwin.

Uniontown, Penn.—The Ten Mile Coke Co. has been incorporated under the laws of Pennsylvania with a capital stock of $5000. The purpose of this firm is to manufacture, sell and otherwise deal in coke.

Bowling Green, Ky.—The Premier Products Co. has been organized with a capital stock of $300.000. The incorporators are Arthur Cobb, F. C. Mills, B. T. Calaway and F. E. Hanson, all of Cleveland, Ohio.

Sutton, W. Va.—The Strange Creek Coal & Coke Co., of Braxton County, has been organized with a capital of $200,000. The incorporators are E. S. Areford, F. P. Truesdale, J. C. Hibbs and L. S. Masten, of Uniontown, Penn., and Levi Seigel, of Bittner, Penn.

Winnipeg, Manitoba—The Anglo Alberta Coal Co., Ltd., has been incorporated for the purpose of mining with a capital stock of $800,000. The head office will be in Winnipeg, and the incorporators are E. C. Comblin, R. G. Holmes, N. McKay, S. W. A. Seward and P. Morgan.

INDUSTRIAL NEWS

Pittston, Penn.—The office force of the Lehigh Valley Coal Co. at Upper Pittston, will remove from the present location to more commodious quarters at Wilkes-Barre in the near future.

Huntington, W. Va.—The Elk Horn Fuel Co., which owns a large acreage of coal land in eastern Kentucky, has announced that a 2½ per cent. semiannual dividend has been declared on its preferred capital stock, the same made payable May 1.

Freeburn, Ky.—The Turkey Gap Coal Co. announces that on or about Apr. 20, there will be an increase made in its coal shipments, that on and after that date it expects to ship 80 cars or thereabouts per day. An increase has already been made in the working force of the mine.

Washington, Penn.—By a final decree handed down by the court here Apr. 9, the Pittsburgh Coal Co. loses in its contention that fraud existed in the deed given by the late Francis L. Robin, formerly president of that company, transferring 90 acres of valuable coal land underlying the Washington Fair Grounds at Arden.

Scranton, Penn.—It is reported that it is probable that in a short time there will be a combination of three coal companies of Scranton, the Traders Coal Co., the St. Clair Coal Co., and the Robertson Coal Co. will be combined into one large corporation. It is said that W. H. Taylor, of New York, formerly of Scranton, is the leading spirit in the proposed combination.

Baltimore, Md.—A receiver for the Fairmount & Baltimore Coal & Coke Co. was recently applied for by various stockholders. That the company is insolvent is among the allegations in the bill of complaint. This firm was incorporated in West Virginia and operates a mine at Clarksburg in that state, and had an authorized capital stock of $50,000.

Cleveland, Ohio—A Cleveland vessel owner recently took a contract to transport 200,000 tons of soft coal for delivery at a dock at Superior during the coming summer at 30c. Shippers generally will not be in the market for another few weeks and several vessel owners are in no hurry to charter their boats for coal until they know how much ore they will be able to secure.

Washington, D. C.—Attorney General MacReynolds recently stated that the Government would appeal in the Lackawanna case to the United States Supreme Court. He said it was the first time the commodities clause had come up for judicial decision, and that the Government would, of course, take it to the highest court as the railroad would have done had the decision been the opposite.

Whitesburg, Ky.—It is reported that the recent trouble between the coal operators in eastern Kentucky and southwestern Virginia and the Louisville & Nashville R.R., and other railways entering the territory over unreasonable and discriminatory rates on northbound coal has been settled. This matter of rates has been for some time in the hands of the Interstate Commerce Commission.

Coal Trade Reviews

General Review

Anthracite continues strong and active. Bituminous dull with prevailing circulars under heavy pressure. More than enough coal coming in to supply current requirements. No signs of improvement in the immediate future.

The customary spring activity prevails in the anthracite trade. Mines are working up to the full limit and nearly all the companies report more orders for April delivery than they will be able to fill. The movement has been heavy, and the cool weather has caused an unexpected consumption so that the tonnages carried over in the bins of the consumers will be materially reduced.

Even in the face of what appears to be an indefinite suspension, bituminous quotations are under a severe test because of the effort to force coal on an already over-stocked market. The general contraction in all lines continues, and coal is now shipped only on specific orders, the general market being too uncertain to risk demurrage. Stocks at tidewater are heavy, and, in view of the light demand, conservative observers believe there is sufficient production in the nonunion districts to take care of the consumption and that the situation may continue indefinitely on the present basis. With plenty of coal coming in and large stocks on hand, there certainly is no cause for anxiety, and it will be interesting to see how operators maintain prices during the summer. In fact, buyers do not regard the situation seriously, and there is so little business being negotiated that the market is hardly quotable.

Production in the Pittsburgh district is at less than half capacity, with shipments confined entirely to contracts. Some relief is anticipated when the lake season opens, but at the present time consumers are using up surplus stocks, a great deal of which is on demurrage. It is estimated that it will take about a month to clean up the storage supplies. With practically all the mines in Ohio shut down, the market continues at a complete standstill, and the entire interest of the trade is concentrated upon the proceedings initiated to test the validity of the recent adverse legislation. Steps are also being taken toward holding another conference over the wage scale and, on the whole, the situation in Ohio has taken a decided turn for the better. Quotations at the Hampton Roads piers have been well maintained, in fact, much better than at the distributing centers; dumpings have also been heavy, and indications are that they will continue so through the balance of the month, while there is only a normal accumulation in the railway yards and a fair amount of tonnage due. The rather grave situation in the union fields has not affected the West Virginia trade in the least.

Plenty of coal is still available in the Middle-west, while operations are practically at a complete standstill and the market appears to be getting steadily weaker, with prices showing a tendency toward lower levels. The adverse conditions on prompt business are making it difficult for operators to negotiate on the new contracts as is also the uncertainty in the labor situation.

EASTERN MARKET

BOSTON

Little change in Pocahontas and New River. "Market cargoes" still a danger spot on season prices. About 65@70% of the steam contracts are reported closed. Pennsylvania grades quiet and Georges Creek dull. Anthracite coming forward freely.

Bituminous—The market for Pocahontas and New River shows no appreciable change from a week ago. "Dull" is the word everywhere and no improvement is expected for weeks to come. The base price is being fairly well maintained on spot business f.o.b. Hampton Roads but as much cannot be said for quotations at the distributing points. Cargoes continue to arrive at this end without disposition orders and prices have suffered through the effort to force supplies on a reluctant and already over-stocked trade. This has its serious aspect when considered in connection with contract business on which all the shippers are most anxious to see the regular basis maintained. About 65@70% of all season business on Hampton Roads coals in this section is now understood to have been placed and it would be a great pity if the various agencies should have to make ruinously low prices through foolish moves on the relatively small and scattering tonnage that is yet to be closed.

There are few "bull points" in the situation here. With the large volume of Southern coal available for this territory it is very doubtful if the $2.85 price carries through. There are some who freely predict lower prices in June and July. In some instances the price has been shaded but as a rule the operators themselves are holding the strings and are firm in their purpose not to mine coal at a loss.

The trade in the Pennsylvania coals is also very quiet. An increasing number of the larger all-rail contracts are placed each year in May and June rather than in April, so that with labor conditions more or less upset, in addition to other uncertainties, there is little doing on season orders. At tidewater there is no change. Coal is being sent to the loading piers only on special orders, the general market being too unreliable for shippers to take risks of demurrage or of softening prices.

Anthracite—Receipts continue heavy at all the ports and retail trade is remarkably brisk for the season. The cool weather has kept up with hardly a break, a condition that argues well for the demand in the summer and fall. The amount of hard coal carried over by consumers this year will be the smallest for several years.

Bituminous prices are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.50@2.90	2.92@3.02	
New York*	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.63@3.78
Providence†				3.60@3.78

*F.o.b. †On cars.

NEW YORK

Anthracite mines working full time with more April orders than can be filled. Some uncertainty regarding the retail circular. Bituminous continues heavy and with no indications of any improvement in sight.

Anthracite—While the hard-coal companies are all working up to full capacity there is a tendency to hold off in the local market, dealers hesitating to buy because of the increase in prices and some uncertainty as to what the summer discounts will be. It is understood just now, that in view of the increase of 25c. in the retail circular, the New York dealers probably will not make the customary advance of 10c. per ton on May 1. On the other hand it is stated that the Brooklyn dealers will make this advance as usual, in which event there will be a differential of 10c. per ton between the New York and Brooklyn price on prepared coal when the full winter schedule finally goes into effect.

While mines are all working full time, it is noted that off prices are occasionally obtainable on tonnages of individual coal threatened with demurrage, particularly at the lower ports. The large companies report more orders for April than they will be able to fill, and indications for the next month are generally bright although a little doubtful in tidewater business.

The good grades of pea coal are in fair demand at the upper ports where there is some scarcity due to considerable of this grade being diverted into the line business; shipments to the lower ports are not so available for the rail trade and pea coal is in plentiful supply there. About the same condition prevails on No. 1 buckwheat. The poorer grades of No. 3 buckwheat are exceptionally long, while the off qualities of No. 2 are also heavy, but somewhat stronger than either Nos. 1 or 3.

The New York market is now quotable as follows:

	Upper Ports		Lower Ports	
	Circular	†Individual	Circular	Individual
Broken	$4.60	$4.60	$4.55	$4.55
Egg	4.85	4.85	4.80	4.70@4.80
Stove	4.85	4.85	4.80	4.70@4.80
Chestnut	5.10	5.10	5.05	4.95@5.05
Pea	3.55	3.55	3.50	3.35@3.50
Buckwheat	2.80	2.80@2.90	2.50@2.75	2.35@2.75
Rice	2.30	2.30@2.40	2.00@2.30	1.80@2.25
Barley	1.80	1.80@1.85	1.70	1.40@1.75

Bituminous—Even with a suspension now nominally in effect the general contraction in the soft coal market continues. There is not a ripple of any kind in the trade, buyers refusing absolutely to take the situation seriously. There is a lot of coal coming in from the nonunion fields in West Virginia and stocks at tidewater are generally considered heavy particularly at Port Reading. Whether this was brought down on speculation or as a protection against a possible shortage, it appears doubtful if it will be required.

Even the optimists generally agree that the immediate future of the bituminous trade is shrouded in gloom. With the entire absence of any demand whatever, as a result of the depression in all lines of industrial endeavor, it is felt in all quarters that there is sufficient coal being produced to meet the reduced requirements. Under more normal conditions there would have been some spurt in the coal market by this time, but the situation may continue unchanged indefinitely without more than a slight advance in prices.

Low quotations are occasionally heard on demurrage coal. As a rule, however, there is so little business being negotiated that there is hardly any market at all and we continue nominal quotations on the same basis as for the past several weeks as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

PHILADELPHIA

Anthracite trade still continues satisfactory. Steam sizes likely to improve if bituminous suspension is long continued. Soft coal quiet, with orders down to a minimum, and no indications of any change in the near future.

Anthracite—Work at the mines continues full with the exception of the Easter holidays. This, however, is to be expected at this season of the year, although coming so late, it has thrown the production back just that much. All sizes seem to be in good demand, with the call centered on egg and stove. It is understood that the market has been such that the production of egg is not sufficient to supply the demand, and considerable of this coal is being picked up. Early deliveries of this size, however, are the rule, rather than the exception. The scarcity of stove is making substitutes necessary and egg is invariably the size suggested. The market for chestnut does not appear to improve, the current output is being taken care of, but there is apparently no necessity for calling on reserves. Pea is about the only grade on which concessions are being offered; anywhere from 20 to 35c. from the circular price is being quoted in some cases. Prices at tidewater rule about the same as the week previous, with the possible exception of pea, as follows:

	Circular	Individual
Broken	$4.25	$4.35 @ 4.50
Egg	4.50	4.50
Stove	4.50	4.60
Chestnut	4.75	4.75
Pea	3.25	3.00 @ 3.10

Bituminous—In the face of what looks like an indefinite suspension at the mines, the bituminous trade shows no apparent change. As a matter of fact, conditions are even worse than reported last week. Predictions of the possibility of short supplies, meet with little interest, and there seems to be no difficulty in obtaining plenty of coal at the prevailing prices of the last two months, or even less.

BALTIMORE

Dull and uninteresting conditions mark the bituminous trade. Some uncertainty due to Central Pennsylvania suspension. Slump in slack. Anthracite trade in dull list too.

The bituminous trade is generally dull. Not only is there a decided let up in the call for prompt coal, but a noticeable slowing down in contract inquiries as well. There is little new business developing while it is difficult to keep the old trade up to normal. One element of uncertainty is the suspension in Central Pennsylvania. While this coal as a usual thing only touches the situation here to a limited degree, a suspension will create an increased demand.

A discouraging feature of the situation in West Virginia the past week was the growing weakness in slack. Sales at the mines around 70c. were recorded in some instances. Three-quarter gas, largely by reason of poor prospects in the Lake trade, was not over strong either. Sales were noted around 85 and 90 cents. No change was noted in the price list for Pennsylvania coals. Little, even of poorer grades, was to be had below $1.05 while the best grades still command from $1.30 to $1.40.

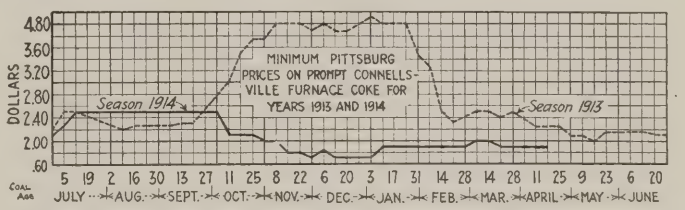
The anthracite trade here continues listless. While there has been talk of adding to the schedule to cover the Pennsylvania mine tax, some dealers have been offering coal about on the same basis as last spring.

CENTRAL STATES

PITTSBURGH, PENN.

Pittsburgh district producing less than 50% of capacity, with many mines entirely idle. Lake shipments promise to be very light up to July 1, with fairly good movement later. Coke market very dull.

Bituminous—Production in the Pittsburgh district is at considerably less than 50% of capacity, and many mines are entirely idle. This, in despite the fact the whole state of Ohio is idle and central Pennsylvania is doing practically nothing, on account of wage disagreements. Present shipments from the Pittsburgh district, limited as they are, are chiefly against contracts and hardly any coal is being bought so that no definite market is developed. It is claimed that occasional sales are made at the regular list, but it would appear that little difficulty would be experienced in securing coal at cut prices, except possibly in the case of slack, which is far from plentiful, by reason of the light production of screened coal. Consumers are using up their stocks as fast as they can, and taking as little as possible from mines. In many instances the coal stocked is subject to demurrage. The early prospects for lake shipments are poor, and the movement up to July 1 is likely to be small, but shippers are expecting that the season as a whole will not show much decrease from 1913. List prices are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district.



Connellsville Coke—The market is quiet and not overly strong, as consumption is tending to decrease rather than increase. No important transactions are reported for the past week. We repeat former quotations: Prompt furnace, $1.90 @2; contract furnace, $2; prompt foundry, $2.40@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending Apr. 4 at 356,320 tons, a decrease of 3698 tons, and shipments at 348,950 tons, an increase of 1460 tons. The production exceeded the shipments by 8830 tons.

BUFFALO

Mining suspension extending fast much to the satisfaction of the operators as there is little market for bituminous coal. Prospect of light production for the rest of this month.

Bituminous—There is no improvement in the demand as the consumer is heavily stocked up and will not be in the market for some time. At present the miners are mostly idle all through the bituminous districts of Pennsylvania and it is believed that no great amount of work will be done before May.

Reports from the Allegheny Valley mines state that the local miners' unions have refused to obey the orders of their officers to continue at work and in some instances have dismissed them and elected new officers, in order to obtain authority for suspending. This is, of course, entirely satisfactory to the operators, who are unable to sell coal at a profit. As it looks now business for some time will be confined to filling the existing contracts. It will require at least a month to use up the surplus already in consumers' hands. The future of the trade is uncertain, the most favorable feature at present being that consumption is once more greater than production.

The nominal market is weak and dull, except that there is some natural demand yet for slack, at prices based on $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, with little doing. Allegheny Valley coal is about 25c. lower, except that the better condition of slack brings it about on a par with Pittsburgh.

Coke—The demand is not improved and so long as iron and steel remains so quiet there is little to be expected of the coke market. Dealers report the price of 72-hr. Connellsville foundry at $4.50, which appears to be a bottom quotation.

Anthracite—The activity in the anthracite market is not great, but there is a good volume moving and shippers find it impossible to get much surplus for water shipment. The cold March and April have cleaned up the stocks in a way that was not anticipated. The opening of the lakes promises to be late so the season will probably be active; the failure of iron ore to move is holding everything else back at present.

A report from the north-shore ports of Lake Ontario is favorable to a good season, as the supply laid down there last year is well exhausted. Coal will be loaded at both Oswego and North Fair Haven for lake shipment this week The bituminous movement from Charlotte continues all winter, but there is no activity at Sodus Point yet.

TORONTO, CAN.

Plentiful supplies and business normal. Active Lake trade in anthracite anticipated.

Trade is normal for the season with abundant supplies on hand. Dealers having anticipated the labor troubles made provisions accordingly, and have stocks on hand sufficient to last for about two months.

As soon as navigation has fairly opened large orders will be placed for anthracite for delivery by water. The usual reductions in price will be made next month, but meantime quotations remain unchanged as follows: Retail anthracite egg, stove and nut, $8.25; pea, $6.75. Bituminous steam, $5.25; screenings, $4.35; domestic lump, $6, cannel, $7.50. Wholesale f.o.b. cars, three-quarter lump, $3.75@3.85; screenings, $2.90@3.

COLUMBUS

Meeting of Ohio operators the feature of the industry during the past week. All Ohio mines are still closed and the trade is at a complete standstill. Prices unchanged.

Ohio operators met in Columbus last week and decided to test the Ohio mine-run law as soon as practicable. Action was also taken looking toward a conference between the operators and miners with a view to receiving the latter's proposition on the renewal of the wage scale. It is felt generally that considerable progress has been made toward solving the snarl in the Ohio coal trade.

The suit to test the constitutionality of the mine-run law will be brought by a Cleveland firm of attorneys in the United States court. It will be in the form of an application for an injunction to restrain the state officials from enforcing the new law after May 15 when it becomes effective on the grounds that the law curtails the freedom of contract which is guaranteed by the constitution of the state of Ohio as well as the United States. It will also be urged that the law illegally confiscates property.

There was a slight difference of opinion between the operators in Eastern Ohio and the Hocking Valley with reference to conferences with the miners. The operators from No. 8 district were loath to treat with the men until after the new law was tested. Producers from other fields believed that they could proceed with their conferences with the miners and if possible get a scale with both the mine-run and the screen basis. A conference of operators and miners is scheduled for some time soon.

The coal trade has been quiet in every respect. As no coal is being produced in this state there is practically no market or supply. Dealers stocks appear to be sufficient for all current needs up to the time of the stocking up period and consequently there is little likelihood of a fuel shortage.

Steam trade is also dull. Practically all steam users have stocked up with a supply to last for 60 to 90 days. Their fuel requirements are not very large because of the dullness which prevails in the manufacturing line. Railroads have taken off many trains and as a result their fuel requirements are decreasing right along.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45 @ 1.35	.....	$1.50 @ 1.40	$1.40 @ 1.35
¾ inch	1.30 @ 1.25	$1.20 @ 1.15	1.35 @ 1.30	1.30 @ 1.25
Nut	1.25 @ 1.20	.....	1.30 @ 1.25	1.25 @ 1.20
Mine-run	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack	0.90 @ 0.85	.....	0.90 @ 0.85	0.80 @ 0.75
Coarse slack	0.80 @ 0.75	1.00 @ 0.95	0.80 @ 0.75	0.70 @ 0.65

CLEVELAND

Spot coal heavy at low prices. Demand for prompt Pocahontas good in the smaller towns, but slow with local dealers. Lake chartering heavy during the week.

Since shipments from the mines have stopped a few grades of coal are beginning to disappear from the spot market although prices are hardly altered. The only advance noted during the week was a slight premium on Pocahontas egg among dealers in the smaller towns about Cleveland. Lump is plentiful.

The retail dealers of Cleveland are accumulating all the hard coal they can. Few yards are in a position to store as much anthracite now as they ought to because they have surplus steam coal in the bins.

During the last week vessel capacity to transport 600,000 tons of bituminous coal from Ohio ports to Superior was chartered at 30c. There are offers of 27½c. for the same service, but those who are making them have not actively sought boats recently. With one or two exceptions the lake coal shippers are not considering chartering for another two weeks or more. The stocks at Duluth-Superior docks were estimated at 2,000,000 tons the first of the month. Docks at the upper lake ports are in about the same shape and will not need coal until well into June or early July.

Navigation opened officially Apr. 15, but owing to the channels at the Straits of Mackinac and Sault Ste. Marie being filled with ice, boats did not leave for upper lake ports. It will be Monday or Tuesday, Apr. 20 or 21, before it will be possible for ships to pass these points.

The local market for slack was a little stronger toward the last of the week and was even more so early this week. Coarse coals are still a drug on the market. There has been some inferior coal, from mines that usually ship other markets, that could not be moved.

Fairmount shippers sold a large amount of slack a month ago at 75c. This has come into the market during the last few weeks and has been sold at a loss of 5 to 10c. The same slack can be bought at 65c., which makes it cost $1.80 here, 5c. over the market. Three-quarter No. 8 is being offered at $1.20 at the mines for shipment and mine-run at $1.10. The freight rate is 90c. Middle district coal for shipment, freight rate 70c., is being offered at $1.30 for three-quarter and $1.20 for mine-run.

Sales agents of Ohio mines are meeting with considerable difficulty closing contracts. The buyers want a definite price which coal operators of Ohio are unable to make. The mining scale and spotting charges are still to be established and will effect the price. The consumers are not willing to buy subject to advances equal to the increased expenses possible through these sources. They point to the settlement of the western Pennsylvania wage question and explain they can buy on a definite price from that field.

The spot prices f.o.b. Cleveland are as follows:

	Pocahontas	No. 8	Middle District	Youghiogheny	Fairmount
Lump	$2.95*				
Lump, 1¼-in.				$2.50*	
Lump, 2½-in.					$1.90@$2.00
Lump, ¾-in.		$1.90	$1.90	2.40*	
Egg	2.95*				
Mine-run	2.60*	1.80	1.80	2.30*	
Nut		1.85		2.20*	
Slack	2.60*	1.75	1.65@ 1.70	1.90	1.75

* Indicates price for shipment.

CINCINNATI

Market weak but steady. Dealers report that most buyers have large tonnages stored. Outcome of West Virginia conference between operators and miners being anxiously awaited.

Uncertainty as to the outcome of the conference of operators and miners in the West Virginia field is occupying the attention of the local trade. Local managers are of the opinion that an amicable arrangement will be arrived at. There is little new in the market in the way of prices and but a fair amount of business is being transacted although dealers confidently look for a sharp demand within the next ten days or two weeks. The quiet attitude is not causing any considerable alarm as this is the season between buying periods. But little new business is being offered, the majority of coal now being moved, representing contract orders. There is some coal on the tracks here awaiting delivery, but much less than two weeks ago.

Dealers in Pocahontas are the only ones that report a good movement and while there is no heavy demand for the same, still the market is steady with prices firm. Pennsylvania mines are operating from three to five days a week and are doing this only to keep their men at work. They state that they have plenty of coal on hand with a rather light demand. New River domestic coal is reported as sold up for the month of April with an active demand for later. Good prices prevail on New River.

DETROIT

Consumers showing some anxiety over the labor situation. Ohio grades slow with West Virginia active. Large tonnages of anthracite moving.

Bituminous—Several large contracts have been closed, three-quarter lump being negotiated at $1.10 per ton, with mine-run at $1, and, occasionally, $1.05. Slack coal is in good demand at 90c. for spot shipments and 85c. on contracts for the new year.

Ohio coals are slow, the trade believing that it is hardly worth while to negotiate for these because of the unsettled conditions there. Pocahontas grades are active and Kentucky coals are arriving in greater abundance than ever before. Manufacturers are beginning to evince some anxiety over the situation and are taking pains to ascertain whether shipments on contracts will be maintained. The outlook is much better on steam coals but is less favorable on the domestic grades, the demand for which is weak.

Anthracite—There is a great deal of activity evident in hard coal, dealers making every effort to get their full quota of all sizes at the minimum April circular. No track coal is to be found, immediate disposition being made upon arrival, some dealers even paying a premium of 10c. per ton in their anxiety to obtain the coal.

Coke—Coke is moderately active, contracts for Connellsville being closed at $3, with Semet Solvay at $3.25 and gas house at $2.90, all f.o.b. ovens.

HAMPTON ROADS

Week's dumpings very good. Large shipments to both West Indian and Italian ports. Prices on all grades firm.

Dumpings over the piers at Hampton Roads for the week have been heavy. The largest cargo went into the U. S. Collier "Orion" this vessel taking 11,329 tons from the piers of the Virginian Ry. in the short space of 7 h. and 55 min. The demand for run-of-mine, both Pocahontas and New River, is still excellent and the indications are that there will be a good movement over tidewater piers all through the month. Although there has been some demand for prepared coal there is practically no call for the high volatile grades.

There has been no change in prices during the week. Export cargoes have gone to Naples, Kingston, Curacao, Leghorn, Canal Zone, Bridgetown, St. Lucia, Port Antonio, Havana and Santiago. The accumulation in the railway yards is about normal with a fair amount of tonnage due.

LOUISVILLE, KY.

Freezing weather has helped the retail market to some extent, but not much business has been handled. A growing scarcity of screenings; prices rising.

Unseasonably cold weather during the past week kept the retailers busy delivering small orders as many domestic consumers found it necessary to have fuel after expectation of any such a need had passed. This naturally did not make up any great total volume of business, and while the operators received a few orders, the market was dull. As yet there is no indication of a stocking movement in any section, despite the rather grave labor situation, and prospects are for a slow domestic market, and a correspondingly tight steam market, for some time to come.

The short production of the prepared grades has at last resulted in a marked scarcity of screenings, and prices have stiffened lately, especially on the Western Kentucky product where curtailed operations have made the shortage quite acute. The railroads are taking practically no mixed coal from this district just now, making pea and slack, hard to get, with nut and slack also scarce, while the market generally is stronger than for some time. Western Kentucky sales at 75c. a ton f.o.b. mines are reported, which is nearly as high as the better Eastern Kentucky grades, although, of course, the lower freight rate cuts a figure in this price. Domestic prices are stationary at the low level which has been maintained for some weeks.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Some orders for domestic lump booked at spring prices but market is very quiet. Steam coal continues dull and furnace and foundry coke show little change. Practically nothing doing in pig iron. Car supply adequate.

Even though all operators have put the spring prices into effect, the retail dealers are holding off buying, believing that the regular schedule will not be adhered to, and that they will be able to buy at a reduced price later. However, it is probable that no reduction in these prices will be made, even with a fair business. Some of the retailers have booked orders for spring and summer shipment, but the tonnage has not been as large as usual during the first two weeks of April. The market on steam coal still continues quiet, but the prices are not being reduced, except in a few rare instances on demurrage coal.

The manufacturers of coke state that there is practically no business to amount to anything either on furnace or foundry coke. Blacksmith coal, however, is in a satisfactory condition. All furnaces report small sales of pig iron, with no immediate relief in sight. The car supply is sufficient to take care of the present business.

INDIANAPOLIS

Mines have been gradually closing since Apr. 1, partly for repairs and partly because of the heavy stocks. Will probably resume sometime this month.

While the miners of the state have been willing to continue at work, pending the fixing of a new wage agreement, the mines have gradually been shutting down since the old contract expired Apr. 1. Most of the large consumers in the state have stocked up heavily with coal and can give no more orders to the mines. As there is also considerable coal in cars at the mines, junction points and terminal yards, this has been available for current trade. Owing to the urgent demands of the public utilities and other large consumers, they have had preference and retail yards have had to wait. As a result some of them have run out of Indiana coal, particularly the domestic grades, the demand for which has kept up on account of touches of freezing weather.

Another reason for closing down of the mines was the necessity for repairs caused after steady operations for two months practically at full capacity, on account of a stretch of several weeks of snow and cold. While the mines are closed, operators are busy renewing contracts. This is progressing satisfactorily and practically on the same basis as last year. A clause in the contracts protects the operators from loss in case of an advance in wages. Prices at the mines have not been materially changed. Retail quotations in this city continue on the basis set Sept. 20 last, although summer prices will soon prevail, after the new wage scale is settled.

CHICAGO

Market dull with many uncertainties. Despite the general curtailment, there has not been sufficient business to absorb the surplus tonnages accumulated in anticipation of the suspension. Dealers' stocks are low, but buying is light even at the April discount.

A great deal of uncertainty has developed in the smokeless market as a result of the tendency on the part of jobbers and agencies to speculate on this grade. That, and almost violent fluctuations in the spot market has made it exceedingly difficult for the companies to prevail upon buyers to sign up contracts. The larger agencies are holding determinedly for $1.25 for mine-run, but there is a great deal of coal available in the market at much less than that figure. Spot prices are generally about $1, and considerable business has been negotiated at 80c. with some down to 75c. These fluctuations are naturally affecting contract negotiations adversely.

There has been little coal come in from the Hocking district that arriving being quickly disposed of. Splint coal is slightly stiffer as the result of restricted shipments, and the same conditions prevail on Eastern Kentucky which is quoted at $1.75. Particular disappointment is felt over the screening situation, a strong market having been anticipated during the spring and summer on this grade. It is rather remarkable, but nevertheless it is a fact that with practically all mines shut down the price tendency still continues downward.

The only department in which any improvement is noticeable is in the byproduct coke, several fairly good contracts having been closed. Gas house coke for prompt shipment is weak; although nominally it sells at $4.25, sales are reported at reductions of 10 and even occasionally 20c. per ton. Furnace and foundry coke are dull.

The Chicago market is now quotable on the following basis:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	$2.07	$2.30@2.40	$2.12	
Steam lump.....	1.97		1.97	
Egg.....		2.30@2.40		$3.65
Mine-run.....	1.87	2.15@2.25	1.87	3.30
Screenings.....	1.67	1.85@1.95	1.62	

Coke—Connellsville and Wise County, $5 and $5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

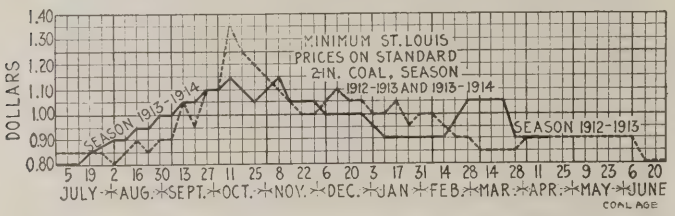
ST. LOUIS

Operations at a complete standstill. Plenty of coal available and prices continue weak. Colder weather stimulates demand.

Trade conditions in and around St. Louis are absolutely at a standstill. Over in the Illinois field a few coöperative mines are working and here and there a railroad mine, and a few commercial mines. These operations are all, as a rule, in the fifth and ninth districts, which shows that the

attitude of the operators in these districts is to cater to the miners instead of holding out with the producers from the other districts. In the Williamson-Franklin field a few mines started up and worked for a day or two, but operations are practically suspended now. There is plenty of coal on track, especially lump and egg, the only scarcity being for the nut and steam sizes.

In spite of the possibility of a prolonged shut down, coal is still being sold below or at the cost of production in all fields. Standard 2-in. lump is offered as low as 85c. and mine-run at 80c. Screenings, however, are selling for as much as mine-run, and will likely be worth as much as lump in the course of a few days. Franklin County coal is down to $1.15, while the average price for Carterville is $1.25. The low Franklin County price is made by a couple of jack-legged operators in that field the regular circular for that grade being from $1.25 to $1.35 from the better operations.



A small tonnage of anthracite has moved into the St. Louis market in the past week, but the smokeless and coke trade are at a standstill. During the past week the weather has been wet and chilly, causing an unusual demand at this season upon the retailers, who have found business good in small lots only. The future as regards local conditions is an uncertainty.

There is no material change from the prices of last week, with the exception of screenings, which in the Standard field are bringing 75 to 85c., and in the Carterville field 90c. to $1, with little offering. There is no washed coal on the market at all.

KANSAS CITY, MO.

Market continues practically unchanged, although showing a slightly improving tendency.

Unseasonable weather has stimulated domestic business to some extent and most of the operators in this field were a trifle more active than they had expected. The outlook is still serious for shaft operators, shovel mining in the Pittsburg field being at its height, with weather conditions favorable for this class of work. The shaft operators, however, are disposing of most of their output without serious difficulty at present, steam demand showing particular strength.

PORTLAND, ORE.

Prices on Utah and Rock Springs coals in wholesale lots reduced. Retail business light now that mild weather has set in.

Local coal dealers received word this week that the price on Utah and Rock Springs coal have been reduced on car-load lots. The reductions are 50c. per ton on Utah lump, bringing the price to $2.25 per ton, and to $1.75 per ton for egg coal. The reduction on the Rock Springs coal is 25c. per ton on lump and 50c. on nut, leaving the price at $2.50 for lump and $2 for nut. While these reductions have not yet affected retail prices, it is supposed that they will mean the announcement of summer prices in the near future. The weather being mild, with summer rapidly approaching, the demand for coal for domestic purposes is light.

FOREIGN MARKETS

GREAT BRITAIN

Apr. 3—The market continues to gain strength, and all classes of coal are well booked for early shipment. Sellers are firm in their ideas of price for forward loading, as it is anticipated that a continuance of the strike in Yorkshire will result in a heavier demand for Welsh Coal. Prices are approximately as follows:

Best Welsh steam	$4.56	Best Monmouthshires	$4.14
Best seconds	4.32	Seconds	4.05
Seconds	4.23	Best Cardiff smalls	2.73
Best dry coals	4.20	Seconds	2.58

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

COKE

Special foundry	$6.36@$6.72
Good foundry	5.52@ 6.00
Furnace	4.92@ 5.28

PRODUCTION AND TRANSPORTATION STATISTICS

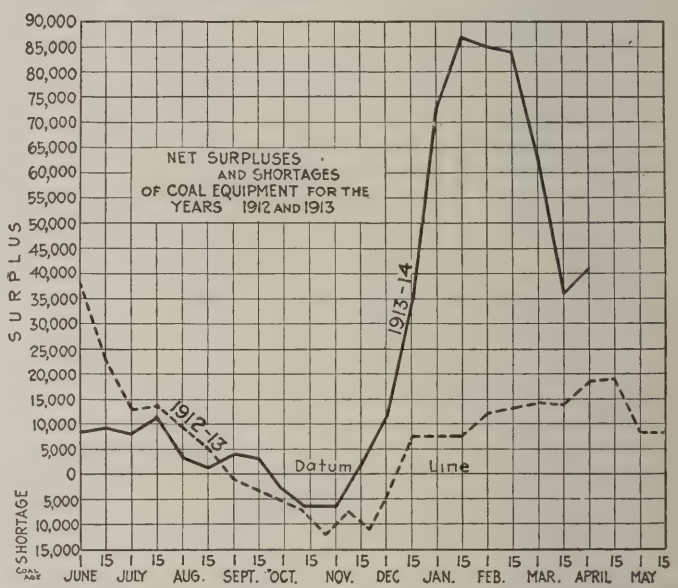
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Apr. 1, as follows:

	Surplus	Shortage	Net*
New England Lines	668	0	**.668**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	3,579	567	**3,012**
Ohio; Indiana; Michigan; Western Pennsylvania	9,803	0	**9,803**
West Virginia, Virginia, North & South Carolina	6,677	0	**6,692**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	6,692	0	**6,692**
Iowa, Illinois, Wis., Minn.; North & South Dakota	4,478	11	**4,467**
Montana, Wyoming, Nebraska	1,524	0	**1,524**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,406	23	**2,283**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	408	14	394
Texas, Louisiana, New Mexico	4,428	0	**4,428**
Oregon, Idaho, California, Arizona	4,428	0	**4,428**
Canadian Lines	392	0	**392**
Total	41,055	615	**40,440**

	Dec. 1	Dec. 15	Jan. 1	Jan. 15	Feb. 1	Feb. 15	Mar. 1	Mar. 15
Surplus	17,621	36,435	72,535	87,149	85,489	84,775	64,822	39,133
Shortage	5,095	2,295	57	789	102	239	1,394	3,282
Net*	**12,526**	**34,140**	**72,478**	**86,360**	**85,387**	**84,536**	**63,428**	**35,851**

***Bold face** type indicates a surplus.



COAL SECURITIES

The following table gives the range of various active coal securities during the week ending Apr. 11.

Stocks	Week's Range High	Week's Range Low	Week's Range Last	Year's Range High	Year's Range Low
American Coal Products	84	84	84	86¼	84
American Coal Products Pref.	104½	104½	104½	106	104
Colorado Fuel & Iron	32½	30	30	34½	28½
Colorado Fuel & Iron Pref.	....	....	155	....	....
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com	49¾	46⅝	49¾	....	....
Island Creek Coal Pref.	86½	85½	86	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	21	20⅞	21	23½	17⅛
Pittsburgh Coal Pref.	92	91	91	93½	86
Pond Creek	18½	17⅜	18¼	....	....
Reading	166¼	164¾	165	172¼	161½
Reading 1st Pref.	88	88	88	89	87½
Reading 2nd Pref.	90	90	90	93	90
Virginia Iron, Coal & Coke	50	50	50	52	40

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	97	98½	98	Mar. '14	91½	99
Colo. F. & I. gen. 6s	104	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	76½	73	78½	Apr. '14	76½	82
Cons. Ind. Coal Me. 1st 5s	..	73	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89½	92	89	Mar. '14	89	89
Gr. Riv. Coal & C. 1st g 6s	91	..	99½	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	98½	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	91	..	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	88⅛	Sale	88	88½	84	88¼
Tenn. Coal gen. 5s	78	80	80¼	Mar. '14	77	82
Birm. Div. 1st consol. 6s	100⅛	..	103	103	97½	103½
Tenn. Div. 1st g 6s	102	102½	102	102	101½	103
Cah. C. M. Co. 1st g 6s	102	103	102	Mar. '14	101	102½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	101¼
Victor Fuel 1st s f 5s	..	75	80	May '13	..	..
Va. I. Coal & Coke 1st g 5s	92⅛	93	93	Apr. '14	92½	95

Index of Coal Literature

We will furnish a copy of any article (if in print) for the price quoted. Where no price is quoted, the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

ACCIDENTS AND THEIR PREVENTION

Monthly Statement of Coal-Mine Fatalities in the United States, December, 1913, with Revised Figures for Preceding Months. Albert H. Fay. Bureau of Mines; 23 pp.

The Prevention of Accidents in Mines. Chas. P. McGregor, Coal & Coke Op., Mar. 12, 1914; 2 pp. 20c.

BLASTING, EXPLOSIVES

Heat Test as Applied to Explosives. (First report of the Departmental Committee.) Iron Coal Tr. Rev., Mar. 30, 1914; 1¼ pp. 40c.

Permissible Explosives Tested Prior to Jan. 1, 1914. Clarence Hall. Bureau of Mines, Tech. Paper 71; 7 pp.

Production of Explosives in the United States During the Calendar Year 1912. Albert H. Fay. Bureau of Mines, Tech. Paper 69; 4 pp.

Self-Testing Electrical Shot-Firer. Coll. Guard., Mar. 13, 1914; ½ p., illus. 40c.

BORING AND TUNNELING

Air-Hammer versus Rotary Drills. Pol Dunaime. Coll. Engr., April, 1914; ⅝ p. 35c.

Air Consumption and Maintenance Cost of Rock Drills. Chas. C. Hansen. Comp. Air Mag., March, 1914; 1¾ pp., illus. 20c.

Hammer vs. Piston Rock Drills. Coll. Engr., April, 1914; 1⅝ pp., illus. 35c.

BRIQUETTES

Commercial Development of the Briquetting Industry. Chas. T. Malcomson. Coal Dealer, April, 1914; 1 p. 20c.

Use of Napthalene in Coal Briquettes. Berg. Grahn. (Translated from Glückauf.) Coll. Engr., April, 1914; ½ p. 35c.

COAL DUST

Moistening Coal Dust. Jas. L. Davidson. Coll. Engr., April, 1914; 2½ pp. 35c.

German Coal-Dust Precautions. Dr. Tornow. Coll. Engr., April, 1914; 10⅓ pp., illus. 35c.

COKE

Analysis of Coke. Coll. Engr., April, 1914; ⅓ p. 35c.

A Large Koppers' Regenerative Coke-Oven Plant in Great Britain. Coal Age, Mar. 28, 1914; 1½ pp., illus. 10c.

The Automatic Control of Byproduct Coke-Oven Plants —IV. (Thermometers and Pyrometers.) A. Thau. Gas Wld., Mar. 7, 1914; 1¼ pp., illus. 40c.

The Manufacture of Byproduct Coke. T. V. Salt. Jour. West. Soc. of Engrs., February, 1914; 30 pp., illus. 60c.

Vertical Retorts and Conveying Machinery at Leicester. Gas Wld., Mar. 28, 1914; 1½ pp., illus. 40c.

COMPRESSED AIR

Moisture in Compressed Air. Frank Richards. Power, Apr. 14, 1914; 2 pp., illus. 15c.

Some Efficient Compressed-Air Plants in Coal Mines. S. W. Symons. Coal Age, Mar. 14, 1914; 3¾ pp., illus. 10c.

The Efficiency of an Air Compressor in Mine Operations. Min. & Eng. Wld., Mar. 14, 1914; 1 p. 20c.

DRAINAGE, PUMPING, ETC.

A Mammoth Mine Pump. (Built for a service of 2500 gal. per minute against a 750-ft. vertical head.) Coal Age, Apr. 4, 1914; 1¼ pp., illus. 10c.

Combined Air-Lift and Pumping System. Lewis Jones. Coal Age, Apr. 4, 1914; 2 pp., illus. 10c.

Electric Pumping at Tilmanstone Colliery. Coal Age, Apr. 4, 1914; 3½ pp., illus. 10c.

Stripping a Mine by Hydraulic Methods. P. J. McAuliffe. Coal Age, Apr. 4, 1914; 1 p., illus. 10c.

Self-Starting Motors for Mine Pumps. W. H. Easton, Coal Age, Apr. 4, 1914; 1 p., illus. 10c.

The Proper Choice and Care of Mine Pumps. C. W. Crawford. Coal Age, Apr. 4, 1914; 1 p. 10c.

The Principle of the Centrifugal Pump. J. D. Cone. Coal Age, Apr. 4, 1914; 2 pp., illus. 10c.

ELECTRICITY

Brush-Shifting Polyphase Motor. Coll. Engr., April, 1914; 1 p., illus. 35c.

Electric Circuit Testing. Sci. & Art of Min., Mar. 28, 1914; 2 pp., illus. (to be continued). 40c.

Electric Switches for Use in Gaseous Mines. H. H. Clark and R. W. Crocker. Bureau of Mines, Bull. 68; 31 pp., illus.

Electrical Equipment for Low-Energy Consumption. (Paper read by J. Glynn Williams before the Assn. of Min. Elec. Engrs.) Iron Coal Tr. Rev., Mar. 6, 1914; ¾ p. 40c.

Fire Protection for Electrical Equipment. Lewis H. Eddy. Eng. & Min. Journ., Mar. 21, 1914; 1 p., illus. 25c.

Mine Substations—II. Motor-Generator Sets vs. Synchronous Converters. Will M. Hoen. Proc. Amer. Inst. Elec. Engrs., April, 1914; 6¼ pp., illus.

Mine Substations—I. Their Construction and Operation. H. Booker. Proc. Amer. Inst. Elec. Engrs., April, 1914; 5½ pp.

Mine Duty Controllers. Harrison P. Reed. Proc. Amer. Inst. Elec. Engrs., April, 1914; 12 pp., illus.

Power Economics for Intermittent Loads. (Paper by E. I. David read before the Rugby Eng. Soc.) Iron Coal Tr. Rev., Mar. 27, 1914; 3¾ pp., illus. 40c.

Selection of Induction Motors. C. A. Tupper. Coll. Engr., April, 1914; 2¾ pp., illus. 35c.

Explosions

The Air Factor in Mine Explosions. John Verner. Coal Age, Apr. 11, 1914; 1¾ pp. 10c.

FUEL TESTING

Helium in Firedamp and and Radio-Activity of Coal. Coll. Guard., Mar. 27, 1914; ⅓ p. 40c.

The Absorption of Gases by Coal. (From Comptes Rendus.) Coll. Guard., Mar. 27, 1914; ⅓ p. 40c.

GENERAL

A Triangulation Survey of the Fairmont Region. A. W. Hesse. Coal Age, Apr. 11, 1914; 3¾ pp., illus. 10c.

The American Coal Industry; Its Risks, Reserves and Trust Relations. A. T. Shurick, Eng. Mag., April, 1914; 3 pp. 35c.

Austro-Hungarian Iron, Steel and Coal Industry in 1913. Iron Coal Tr. Rev., Mar. 13, 1914; ⅓ p. 40c.

Buying Coal on Specification. F. G. Lemke. Power, Apr. 14, 1914; ½ p. 15c.

Burning Pulverized Coal. (Experience of the American Iron & Steel Co. in burning pulverized coal in its metallurgical furnaces.) Iron Tr. Rev., Apr. 9, 1914; ½ p. 25c.

Coal Industry of the British Empire. (From the annual Statistical Abstract for the British Empire issued by the Board of Trade.) Iron Coal Tr. Rev., Mar. 13, 1914; ½ p. 40c.

Dwelling Houses at the L. C. & N. Co.'s New Hauto Plant. (Hollow tile is used in the erection of these houses.) E. L. Kellogg. Coal Age, Mar. 28, 1914; 1¾ pp., illus. 10c.

Coal-Mining Operations in Belgian Collieries. (Translated from Annales d. M. de Belgique.) Coll. Guard., Mar. 13, 1914; 1¼ pp., illus. 40c.

Founding a Building over Coal-Mine Workings. Geo. E. Stevenson. Eng. News, Apr. 9, 1914; 1½ pp., illus. 25c.

Fifteenth Annual Report of the Mining Industry of Idaho for the Year 1913. Robt. N. Bell. 114 pp., illus.

Flooded Coal Mine in Illinois. Frank Rosbottom. Coll. Engr., April, 1914; 1 p. 35c.

Important Details in Construction of Colliery Plants. (Paper by M. L. Hyde read before the Can. Min. Inst., February, 1914.) Coal Age, Mar. 21, 1914; 8 pp., illus. 10c.

Insurance on Mine Property. W. H. Charlton. Coll. Engr., April, 1914; 2 pp. 35c.

Methods of Weighing and Computing Mine Outputs. Neill Hutchings. Coal Age, Apr. 4, 1914; 2 pp. 10c.

Nationalization of Mines and Minerals. (Paper by Prof. Henry Louis read before the Economic Soc., Feb. 25, 1914.) Iron Coal Tr. Rev., Mar. 6, 1914; 2⅓ pp. 40c.

Principles of Efficiency for Mine Management. (Abstract of paper read by G. A. Collins before the Pacific Northwest Soc. of Engrs.) Min. & Eng. Wld., Apr. 4, 1914; 3 pp. 20c.

The Combustion of Coal and Smoke Abatement. (Paper by S. B. Flagg read before the Cleveland Eng. Soc., Mar. 10, 1914.) Coal & Coke Op., Apr. 2, 1914; 3⅓ pp., illus. 20c.

Third Annual Report of the Director of the Bureau of Mines. Joseph A. Holmes, Bureau of Mines, June 30, 1913; 106 pp.

The Advancement in Bituminous Coal Mining. (Address of S. A. Taylor before the Engrs. Soc. of West Penn.) Proc. Engrs. Soc. of West. Penn., January, 1914; 60 pp., illus. 60c.

Uniformity in Inspectors' Reports. Rufus J. Foster. Coll. Engr., April, 1914; 2 pp. 35c.

GEOLOGY

The Ching Hsing Coal Basin. Edward Di Villi. Min. & Sci. Press, Apr. 4, 1914; 1 p., illus. 20c.

The Occurrence of Coal in Squaw Creek Basin, Coos County, Oregon. Ira A. Williams. Min. Resources of Ore., Vol. 1, No. 1; 23 pp., illus.

The Pittsburgh Coal Bed. W. G. Burroughs. Coal Age, Mar. 14, 1914; 2½ pp., illus. 10c.

Conditions Affecting Mining. (Relates to the Bering River and Matanuska coal fields of Alaska; folded and faulted coal beds with irregular cleatage and much water.) W. R. Crane. Coll. Engr., March, 1914; 4¾ pp., illus. 35c.

Coal Fields of Jasper Park, Alberta. Frank E. O'Neal. Coll. Engr., February, 1914; 3⅓ pp., illus. 35c.

Hisylvania Mine 23. (Geology of the Hocking Valley and description of mining methods used in the Sunday Creek, Ohio coal field.) W. G. Burroughs. Coll. Engr., February, 1914; 3½ pp., illus. 35c.

HOISTING AND HAULAGE

Some Advantages of the Electric Hoist over the Steam or Air Hoist. K. A. Pauly. Gen. Elec. Rev., April, 1914; 6 pp., illus. 30c.

The Development of the Electric Mine Locomotive. G. M. Eaton. Proc. Amer. Inst. Elec. Engrs., April, 1914; 22 pp., illus.

The Electrical Driving of Winding Engines and Rolling Mills. (Abstract of a paper read by C. Anthony Ablett before the Can. Soc. of Civil Engrs.) Can. Min. Jour., Apr. 1, 1914; 6½ pp., illus. (To be Continued.) 25c.

LEGAL REFERENCES

An Analysis of the Commerce Law. Sydney A. Hale. Coal Age, Mar. 14, 1914; 3 pp. 10c.

Pertinent Supreme Court Decision, Affecting Mine Cave Problem. (Editorial.) Coal Age, Mar. 14, 1914; ¾ p. 10c.

LIGHTING

Experimental Research Work on Safety Lamps. (Report by Dr. R. V. Wheeler from Part II of Mines and Quarries.) Min. Eng., March, 1914; 2 pp. 40c.

Self-Contained Portable Electric Mine Lamps. H. O. Swoboda. Proc. Amer. Inst. Elec. Engrs., April, 1914; 12½ pp., illus.

Working Engineers' Electric Lamp. Sci. & Art of Min., Mar. 28, 1914; 1 p., illus. 40c.

MINE FIRES

Gob Fire at a West Yorkshire Colliery. (Paper read by H. F. Smithson before the Natl. Assn. of Coll. Mgrs.) Iron Coal Tr. Rev., Mar. 6, 1914; 2 pp. 40c.

Packer No. 5 Mine Fire. Coll. Engr., April, 1914; 1 p., illus. 35c.

MINE GASES, TESTING

The Sampling and Examination of Mine Gases and Natural Gas. Geo. A. Burrell and Frank M. Seibert. Bureau of Mines, Bull. 42, illus.

PREPARATION

A Brick Tipple. W. G. Burroughs. Coll. Engr., April, 1914; 2¼ pp., illus. 35c.

Cleaning Anthracite by the Huff Electrostatic Process. H. P. Withington. Coal Age, Mar. 14, 1914; 2 pp., illus. 10c.

Mixing Plant for Coking Coals. (Translated from Glückauf.) F. Korten. Coll. Guard., Mar. 20, 1914; 1¼ pp., illus. 40c.

The I. & S. C. M. Co.'s Plant at Issaquah, Wash. (Describes an unusually effective installation for handling and treating the low-grade Pacific Coast Fuels.) Coal Age, Apr. 11, 1914; 3 pp., illus. 10c.

RESCUE, SAFETY APPARATUS

Converting the Foreman to the "Safety First" Idea. S. C. Reynolds. Coal Age, Mar. 28, 1914; 1½ pp. 10c.

Methods of Rendering First-Aid. (Discussion of the most effective methods of rendering first aid in the more frequent types of mine accidents.) A. S. Snyder. Coal Age, Mar. 28, 1914; 1¾ pp., illus. 10c.

Some New Types of Rescue Apparatus. (Series of papers read before the Midland Inst. of Min. Civil & Mech. Engrs.) Coll. Guard., Mar. 27, 1914; 1¾ pp., illus. 40c.

SANITATION, DISEASES

Hygenic Aspect of the Coal-Mining Industry. (Second and third lectures by Dr. F. Shufflebotham before the Royal College of Physicians.) Iron Coal Tr. Rev., Mar. 6, 1914; 1 p. 40c.

STORAGE

Storing Coal. Iron Tr. Rev., Apr. 9, 1914; 1 p., illus. 25c.

The Firing of Coal in Storage. J. S. Burrows. Black Diamond, Apr. 11, 1914; 1⅓ pp. 20c.

STEAM AND GAS ENGINES, BOILERS

Burning Low-Grade Anthracite. J. E. Parrish. Coll. Engr., April, 1914; 1⅔ pp., illus. 35c.

Causes and Prevention of Boiler Corrosion. F. H. Davies. Power, Apr. 14, 1914; 1½ pp. 15c.

Power Production at Collieries. Arthur Douglas. Gas Wld., Mar. 7, 1914; 1¼ pp. 40c.

Working Up a Boiler Test. F. R. Low. Power, Mar. 17, 1914; 4½ pp.; 2 tables. 15c.

The Selection of Steam Turbine Condensers. A. R. Smith. Gen. Elec. Rev., April, 1914; 8½ pp., illus. 30c.

The Slack-Coal Problem in Colorado. Carson W. Smith. Coal Age, Mar. 14, 1914; 1 p. 10c.

SIGNALING

A New Visual Signal. (Simple in design and can be readily fitted up by a colliery mechanic.) Iron Coal Tr. Rev., Feb. 27, 1914; ⅔ p., illus. 40c.

The Adnil Mine Shaft Signaling System. Coll. Guard., Mar. 6, 1914; 1⅓ pp., illus. 40c.

TRANSPORTATION

Anthracite Handling at a Modern Dock. Coal Dealer, April, 1914; 2 pp., illus. 20c.

Coal Handling at the Atlantic Coast Piers. Jas. Steelman. Coal Age, Mar. 21, 1914; 4½ pp., illus. 10c.

New Norfolk & Western Coal Pier at Norfolk, Va. (Unusual combination of new and old features in the largest coal-shipping dock on the Atlantic Coast.) Ry. Age. Gaz., Mar. 27, 1914; 3½ pp., illus. 25c.

Trestle Chutes and Improvements at Philadelphia. Black Diamond, Apr. 4, 1914; ¾ p., illus. 20c.

Wire Ropeways for Coal Transport. Coal Age, Apr. 11, 1914; 2 pp., illus. 10c.

TIMBERING, PACKING, ETC.

Method of Lining Shafts with Concrete. Edward Morlae. Min. & Eng. Wld., Apr. 4, 1914; 1 p., illus. 20c.

The Preservation of Pit Props. Coll. Guard., Mar. 20, 1914; ½ p. 40c.

Small Timber-Framing Plant. Frank M. Leland. Coal Age, Apr. 11, 1914; 1¼ pp., illus. 10c.

WORKING OF MINERALS

Advantages of the Modern Steam Shovel in Mining Shallow Seams. Coal Age, Mar. 21, 1914; 1¼ pp., illus. 10c.

Mining in Eastern Kentucky. Wm. Z. Price. Coll. Engr., April, 1914; 2¾ pp., illus. 35c.

The Panel System in Ohio. W. H. Burroughs. Coll. Engr., April, 1914; 2⅓ pp., illus. 25c.

The Disk Coal Cutter. Charles Frobisher. Min. Eng., March and April, 1914; 6 pp., illus. (Continuated from February.) 80c.

Longwall Mining in Kansas. Barry Scobee. Coal Age, Apr. 11, 1914; 1¼ pp., illus. 10c.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 17
Issued Every Saturday
Hill Publishing Company

NEW YORK, APRIL 25, 1914

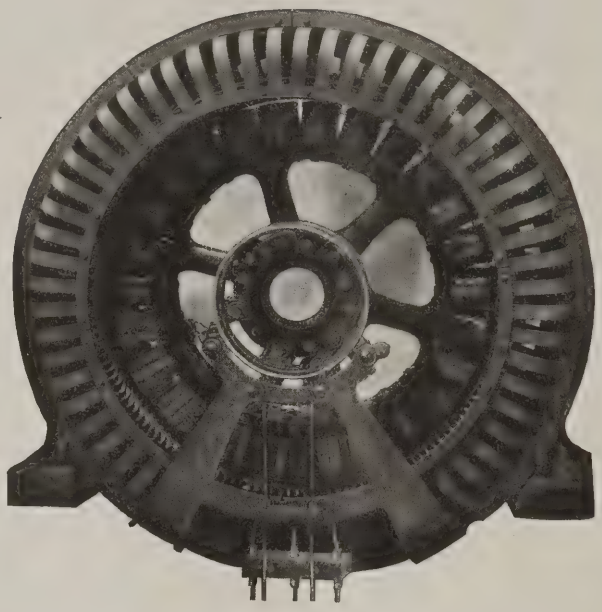
Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Rescue Corps at a British Colliery



The First Trained Rescue Team in Western Canada



This is an end view of a Westinghouse Electric Synchronous Motor. It is interesting to mining men because these motors provide

The Most Satisfactory Drive for Air Compressors

They can be direct-connected to the compressor and hence **cost less to install** than belted drives and require less floor space. Belt maintenance expense and transmission losses are eliminated.

The first cost is about the same as for other types of drive for compressors of 1000 cubic feet per minute capacity. For larger sizes, it is less.

The efficiency is higher than that of any other type of drive and the high power factor at which these motors can be run improves the operating characteristics of the entire circuit.

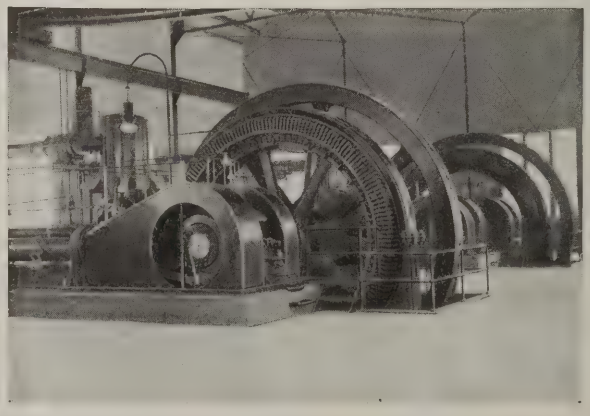
The great reliability of these motors is proved beyond all question by successful installations in all parts of the country.

Send for full description of these motors.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W.Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, O.
Cleveland, O.
Columbus, O.
*Dallas, Tex.
Dayton, O.
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Calif.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
Syracuse, N. Y.
Tacoma, Wash.
Toledo, O.
Washington, D. C.

*W. E. & M. Co. of Texas.



7200 H.P. (total) Westinghouse Motors Driving Air Compressors at Anaconda Copper Mine.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 APRIL 25, 1914 NUMBER 17

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED.

*Illustrated Article

FOREWORD: *Page* 673

Some companies are endeavoring, through welfare work, to establish a business based on friendship. This causes the employee to feel that he is too much the ward of the company. Welfare work to be successful should never savor of charity to the men. Don't do welfare work as the means to an end.

*PROBLEMS ENCOUNTERED IN KENTUCKY COAL MINING: *Pages* 674-676

In the west Kentucky coal field about 66 per cent. of the coal is extracted, and in some places only 44 per cent. The roofs of the beds are weak, but coal is left in mining to protect the miner. As a result of this, and other care, the death rate is less than one fatality for 790,000 tons. Gob fires give much trouble. Newell G. Alford. COAL AGE, Vol. 5.

NEW MINING LAW IN KENTUCKY: *Pages* 676-677

*ANTHRACITE COLLIERY BOILER PLANT: *Pages* 678-682

Many boiler plants throughout the anthracite region of Pennsylvania are anything but economical in their use of fuel. By the use of modern boilers, equipped with proper auxiliaries, the cost of steam may be reduced 60 per cent. J. F. McMahon. COAL AGE, Vol. 5.

AN EXTRAORDINARY EXPERIENCE: *Page* 682

THE KENTUCKY COMPENSATION ACT: *Pages* 683-684

A review of the salient features of the Workmen's Compensation Act recently passed by the Kentucky Legislature, with particular reference to its bearing on the coal operations of the state. COAL AGE, Vol. 5.

*A METHOD OF MEASURING GOAF TEMPERATURES: *Pages* 684-685

A description of the construction and application of a new instrument for measuring goaf temperatures, together with certain tests relating thereto. The device exhibits increased electrical resistance on any rise in temperature. T. F. Winmill. COAL AGE, Vol. 5.

*A SMALL PORTABLE ELECTRIC HOIST: *Page* 685

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 702

COAL AND COKE NEWS: *Pages* 703-706

ACCIDENT FREQUENCY AMONG ENGLISH-SPEAKING MEN AND OTHERS: *Pages* 686-687

Only in West Virginia are statistics on this subject available. The Germans appear to have the highest nonfatal accident rate. It seems established that the Italians and Negroes take less care of themselves than the American whites. Howard I. Smith. COAL AGE, Vol. 5.

*LONGWALL IN SEAMS LIABLE TO SPONTANEOUS COMBUSTION: *Pages* 687-688

Working a seam at South Derbyshire, England, where the coal is liable to spontaneous combustion. Several attempts to prevent the ignition of the coal by excluding the air from the waste proved unsuccessful, until the adoption of the longwall system of mining. J. E. Spicer. COAL AGE, Vol. 5.

*AVAILABILITY OF THE CEMENT GUN FOR MINE WORK: *Pages* 689-692

The cement gun deposits cement mortar by an air blast, mixing the water with the dry ingredients at the delivering nozzle. The material formed is known as gunite and is denser and stronger than ordinary cement mortar or concrete. It is well suited for making buildings fireproof and permanent, and for coating headframes, tipples and mine roadways. COAL AGE, Vol. 5.

THE TRAITOR: *Page* 692

Poem by Berton Braley. COAL AGE, Vol. 5.

*AUTOMATIC SAFETY MINE-CAR CAGERS: *Page* 693

E. G. Banta. COAL AGE, Vol. 5.

WHO'S WHO IN COAL MINING: *Page* 694

Brief sketches of the lives of E. V. d'Invilliers, geologist and mining engineer of Philadelphia, and William Haven, formerly manager of the Inland Fuel Co., Charlton, Iowa.

EDITORIALS: *Pages* 695-696

One Way to Introduce Your Coal—Manyana—The Operators of Central Pennsylvania—One Great Item of Cost in Mining—Rules, General and Special—The 100-Per Cent. Union—The Saloonstead.

DISCUSSION BY READERS: *Pages* 697-699

Starting Longwall in Room-and-Pillar Work. Letters Nos. 1 and 2.

STUDY COURE IN COAL MINING: *Pages* 699-700

INQUIRIES OF GENERAL INTEREST: *Page* 701

Room-and-Pillar System vs. Longwall—*Laying Out Mine-Track Curves.

COAL TRADE REVIEWS: *Pages* 707-715

ADVERTISING INDEX: *Page* 24

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

Advertising Is Not A Tax

The Weekly Ad-Talk Page

Who pays for the advertising—the buyer or the advertiser?

Perhaps many of you have long waited for an answer to this question. Perhaps you have heard it answered before—both ways.

Our answer is that the advertiser pays for the advertising, and it in turn pays both you and the advertiser.

The fact that the advertised article usually costs less, whether in first cost or ultimate cost, than the unadvertised article, proves the truth of the statement that you do not pay any part of the advertising costs of any article you buy.

The big department store which has the most popular corner in your city pays an enormous rent when compared to that which the little fellow pays on the side street—and yet you pay no more for the article you buy in the big store (usually you pay less) than you do for the same thing in the small store, which pays small rent.

Therefore you are not taxed for any part of the difference in rent between that which the big store on the corner pays and that which the little store pays on the side street.

The former can afford to pay big rent because his location, among other things, is the big factor in drawing the trade. His profit may be less on the individual article, but in the aggregate it is more—because he *sells* more.

And so it is in advertising. The concern which advertises is the concern which can *afford* to give you a better article at a better price than can the concern which does not advertise at all.

This point was well illustrated a few months ago when the writer took a chance on some merchandise, at the merchant's advice that the brand he had was "just as good" as what was asked for, and that it was cheaper "because the manufacturer did not advertise, and hence did not have to pay any advertising costs."

Yes, it was cheaper—both in price and quality, but mostly quality; as it did not give 50% of the wear and service of the advertised brand.

You will find the same conditions in the technical field. The concern which advertises its wares week after week must make good *both* in price and in quality, for the reason that he has more investment and more prestige at stake than does the concern which stays in its shell out of sight of the distant buyer.

And because he does advertise, he sells more. His profits in the aggregate are more, and thus he can meet competition without taxing *you* for any part of his advertising costs.

Go to the Selling Section of COAL AGE when *you* want equipment for plants in the coal mining field. You'll find the competition keen, the prices right, and service the best.

COAL AGE

Vol. 5 NEW YORK, APRIL 25, 1914 No. 17

It is a saying of one of the richest men in America, the head of a great industrial corporation, that:

"A Friendship founded on Business is a good deal better than a Business founded on Friendship."

Most concerns have learned the value of service; that is, following up the goods sold to see that the customer is not only satisfied with his purchase, but that whatever is necessary in the way of advice as to the best use and operation of the articles bought, together with all essential repair parts, etc., is constantly and easily obtainable.

That is SERVICE and it makes friends as the result of good business.

A good many coal-mining companies nowadays are making SERVICE an integral part of their operations by doing "Welfare Work" which consists of service to employees through making living conditions in mine camps and towns more desirable by reason of proper housing, sanitation, etc. Also by making life in such camps and towns more like life should be, in the way of providing churches, schools, playgrounds, baseball and tennis grounds, moving-picture halls, etc. In fact to make a mine camp or town as attractive and desirable a place to live as anywhere else.

This welfare work is good. Without doubt it is responsible for improved living conditions in many coal-mining communities. The cost of it is nearly all borne by the companies engaged in the work. Yet, welfare work still has many critics, and, strange to say, most of these are among the very employees for whose benefit such work is being done. What is the basis of this criticism and how can the companies that are honestly trying to improve conditions for their employees and familes, overcome it?

The answer to the first question is that some companies are endeavoring, through welfare work, to establish a business based on friendship, which they hope to secure through this medium. The welfare work they do is played up so strong and is so much advertised, that the employee is led to believe that he is too much the ward of the company, and that after all whatever Charity—as he terms it—the corporation bestows on him in the way of welfare work, it got out of him down in the mine.

Sometimes too this is true as in the case of one model mine camp we recall, where everything on the surface from tenements, church and schoolhouse to steel tipple, was so pretty, that men on going there to seek work turned away, saying "Nothing doing—it's too d—n nice on top." Certainly that sounded like these men had been to places where the inside was neglected for the benefit of the outside.

The answer to the second question is that while criticism of welfare work will possibly never be entirely overcome, because of the instinctive belief the miner has that when you do so much of this kind of thing for him, you are striking at his independence somewhere; it can in large measure be overcome by making the welfare work a company does, as much an integral part of its operations as running pumps and motors. To persist in it through good times and bad, yet never to let it savor of Charity to the men. In other words to conduct the business so that friendship follows.

After all it is simply a matter of following the right principle, for it is next to impossible for men to be proof against good treatment when they are convinced that there is no ulterior motive. But the most lavish welfare work will finally be of no avail if the wages, conditions and treatment of men in and about the mine itself are not equally as good and even better in kind than the welfare work itself. In other words, don't do welfare work as the means to an end. If this principle governs the conduct of it, you may as well not do it.

Problems Encountered in Kentucky Coal Mining

By Newell G. Alford*

SYNOPSIS—In the west Kentucky coal field about 66 per cent. of the coal is extracted and in some places only 44 per cent. The roofs of the beds are weak, but coal is left in mining to protect the miner. As a result of this and other care the death rate is less than one fatality for 790,000 tons. Gob fires give much trouble.

In the latest available reports of the Kentucky mine inspector and the United States Geological Survey's "Production of Coal in 1912," it is estimated that the total coal acreage of the state is approximately 16,670 square miles, of which the western Kentucky coal field embraces 38.3 per cent.; also that Kentucky's coal production in 1912 was 16,491,000 tons, 47.7 per cent. of which was produced in the western field.

This 47.7 per cent., which amounts to slightly less than 8,000,000 tons, was produced by 120 mines, operated by 98 companies. I have made a detailed classification of these 120 mines and their outputs as follows: 21 per cent. produce less than 10,000 tons; 51 per cent. produce less than 60,000 tons; 23 per cent. produce more than 100,000 tons; two companies operating 18 mines, produced 2¾ million tons.

Coal Beds Worked

The workable coal beds in the western Kentucky field, under development, are with but a few exceptions No. 9 and No. 11 as identified by the Kentucky State Geological Survey. Being more consistent in occurrence, No. 9 supplies about three-fourths of the total output of the field. This seam, which is present in eight counties, averages 5 ft. in thickness. While this bed is most generally approached by shafts 300 ft. or less in depth, there are depressions in some vicinities which make entrance possible by slope or drift.

Seam No. 11, which is from 40 to 100 ft. above No. 9, is the next bed of importance in this field. It averages 6 ft. in thickness.

Room-and-Pillar Workings

Without exception, the mines of western Kentucky are developed by the room-and-pillar method, with double or triple entries. The triple-entry system is used only in the larger mines. There the motor parting is made in the central entry; the side entries are used for mule haulage and ventilation, respectively. This not only facilitates ventilation, but permits of the motor parting being placed nearer the working rooms, thus reducing the mule haulage. This efficiency is gained, however, only at the increased cost of driving an extra entry.

Robbing pillars in No. 11 coal is particularly hazardous and impracticable because of the heavy, solid limestone roof. No. 11 coal is friable and crushing results where insufficient pillars have been left. Moreover, the pillars settle under pressure with the consequent heaving of the soft, fireclay bottom.

In some of the mines in this field, old works are used as air courses. Gases generated from gob and shale piles are absorbed and carried along by the air current.

The difficulties arising from this practice indicate that it should be avoided in all cases, for the numerous wooden brattices to be maintained make it impossible to prevent large leakages in the current. In addition to this, the friction resulting from the large rubbing surfaces encountered necessitates an increase in the horsepower of the ventilating equipment.

An instance is referred to, in the territory under discussion, where within the last few years an old mine was abandoned. The intake air was delivered by way of a long, circuitous route through old workings to the working faces. Owing to the long distance which the air had to travel, it finally reached the faces so permeated with impurities that its vitiated condition became one of the causes for the closing of the mine.

Ignition of No. 11 Coal in Old Workings

Seams No. 9 and No. 11 with their accompanying shales and gob roof are highly charged with iron pyrites. The atmospheric oxidation of the iron pyrites in the pillars of old works accounts for the generation of much heat, slow as the process may be.

It is also believed that the energy expended in crushing pillars of insufficient size, by the overlying strata, is transformed into heat which promotes a rise in temperature.

The consequent expanding of the coal produces crevices which in turn augment oxidation. Gradually after smoking awhile the coal breaks into a smoldering fire, the boney roof ignites and falls, and this is followed by the ignition of No. 12 coal, where the intermediate stratum of limestone is absent. This last development occurs where the fire has gained sufficient headway.

The prevention of such fires presents an interesting problem, which is solved by sealing off the works liable to such chemical action; or by increasing the quantity of circulating air.

The pursuance of the first method is a popular one because it not only prevents spontaneous combustion, but avoids the impregnation of the circulating air with the gob or shale gases. Since this method can best be worked out by sealing up an entire block of old workings after their abandonment, it has created a tendency on the part of the largest operator in the field to adopt the panel system in working No. 11 coal. To brattice off the old works largely excludes the oxygen necessary to the oxidation of the iron pyrites.

The second scheme is important because conditions arise where it is impossible to follow the sealing-off method. Here the end is accomplished through reducing the temperature of the air in contact with the pillars, by increasing the quantity in circulation and thus preventing the development of heat.

Coal Dust

In workings where there is a scarcity of mine water, the accumulation of coal dust is, in most cases, given the close attention of the various managements. In keeping

*Assistant engineer, St. Bernard Mining Co., Earlington, Ky.

Abstract of a paper presented at the winter meeting of the Kentucky Mining Institute, Dec. 8, 1913.

with the usual practice, coal dust is cleaned up at intervals and hauled from the mines. Sprinkling is also in prevalent usage in this connection. Humidification of the intake air in the winter months has been universally adopted by the larger operators.

Shooting Off the Solid

Because of the dangers attending the shooting of coal from the solid, Chief Inspector Norwood has repeatedly discouraged this practice. In his report of 1891, he comments in part as follows:

"Shooting off the solid is less common now than a few years ago, when the prevalence of this practice called for a warning from this office. Coal dust is now (speaking of 1891) generally admitted by those who have studied the question, to be almost as dangerous as firedamp. An explosion may occur in any dusty mine and one is to be expected where shooting off the solid is practiced."

When unsupported, the roof of the working places in the No. 9 seam presents a great hazard to the life of the workman. Only by careful inspection and thorough propping, can accidents be avoided. As workings approach crop lines the liability of accident becomes even greater, since the black slate here shows marked tendencies toward disintegration.

In the No. 11 seam, the bone roof, between the coal and the limestone, is even more dangerous than the slate roof of No. 9. After the coal has been shot down, the bone roof will overhang the working places in thicknesses varying from 4 to 30 in. Being exceedingly treacherous, it will work downward from the limestone cover and fall without warning.

One of the large operators has the coal cut by hand in the workings of those entries where the roof is such as to necessitate propping too close for the operation of a coal-cutting machine.



The West Kentucky Coal Field

Thus, almost two decades prior to the scientific investigations and experiments conducted to prove that coal dust was an explosive agent, the chief inspector of Kentucky, together with other advanced thinkers, declared that dangers were attendant upon the presence of coal dust in our mines.

In connection with shooting coal from the solid, it is worthy of note that the machine-mined coal in western Kentucky was 26 per cent. of the field's output in 1895; in 1911 it was 79 per cent., an increase in 16 years of 53 per cent. In Hopkins County, the largest producing county of the state, 2,550,000 tons of coal were mined in 1912, 99 per cent. of which was undercut by machines

Accidental Death Rate Low

It is to the credit of the mine inspectors and mine managers alike, that the last report shows an unprecedented increase in the amount of coal mined per fatal accident. In 1910 there were 159,033 tons of coal won for each life lost. In 1911, the production per fatality was 790,222 tons.

Overlying these coals is from 10 to 15 ft. of light-gray shale, which is in the advanced stages of disintegration. On removing all the coal, the shale will fall to heights of 6 to 8 ft.; 12 to 18 in. of coal is, therefore, left overhead as a roof, of which 60 per cent. is reclaimed in the rooms after they have been exhausted. When the coal is mined to its full thickness the rotten overlying shale requires timber sets, thoroughly and solidly lagged, to hold it. In all entries no attempt is made to reclaim this top coal.

The degree of caution exercised within the mines in this field by superintendents and foremen is reflected in the following accident list:

During the year 1911, in the entire western Kentucky field there were only three fatal accidents from falls of roof, and 19 minor or nonfatal accidents from the same cause.

Coal Recovery 66 Per Cent.

A fair estimate fixes about two-thirds as the net proportion of coal which is won from the mines. Excessive competition in this field leaves so small a differential between

costs of production and sales prices that crop coal, and coal of more expensive excavation must be left untouched and forever lost. Despite decreases in the market price, the consumer becomes more exacting and much coal is wasted at the tipples in cleaning the product to make the grades salable at even a small figure. Good coal clinging to lumps of sulphur is often discarded on the waste piles in quantities which more than justify the lamentations of those who are sincerely interested in the conservation of our coal resources.

Excessive Loss in Cleaning

A large operator in this field discovered that in satisfying the exacting demands of his customers he was throwing away, on his refuse pile at a single mine, coal, which if properly cleaned, would have yielded him in the neighboorhood of $1000 per month. This shows that if there had been some means of preparing this coal for use, provided that the mine was operating on a very narrow margin of profit, the net value would have done much toward helping the balance on the credit side of the ledger.

Another source of waste in this district is the indifference with which some of the operators plan the future development of their property. On good authority, it is claimed that 50 per cent. of the operators have no idea as to the amount of the holdings which they have already exhausted. Coincident with this is the general scarcity of technically trained engineers.

Inadequate pillars also contribute to the general waste. Frequently the smallness of pillars results in a squeeze which necessitates the abandonment of the working places. These rooms must then be recovered by driving "cutoffs," at much additional expense. Much of this coal is ultimately lost.

It is taken for granted by most western Kentucky operators that squeezing goes hand in hand with the mining of coal. It is regarded as a necessary evil, as if it was one of the penalties of mining.

Operators working seams other than Nos. 9 and 11, in several instances, find it wholly impossible to recover more than 44 per cent. of their available coal and are required by their conditions to leave more than half of the coal unmined.

Cost Keeping

Another question needing attention in this field is that of cost keeping. It is perfectly safe to say that 75 per cent. of the operators do not know what it costs them to mine a ton of coal. They get extensions on bills and buy equipments on the instalment plan with interest. This method of doing business does not constitute bad management, but in many cases these items are not charged off in keeping with a careful accounting system. At the end of a given period the operators find their balance on either one side of the ledger or the other, but how it came about there is no telling.

The other 25 per cent. of the managers who keep detailed information on this phase of operation are those that have been producing the larger outputs.

Pond Sites

Most of the coal acreage in the western field lies inland between the Ohio and Green Rivers, and because of the flat surface, trouble is often experienced in locating reservoir sites with sufficient water sheds. In such cases, extended droughts necessitate either long pipe lines or the hauling of water in tank cars.

Competition

The conditions which tend to promote keen competition in this field deserve mention. Involuntary suspensions in other fields have in times past created a demand for western Kentucky coal in the large markets outside of its natural sale zone. Limited capital has drawn the conclusion that the lucrative mining of coal means only the sinking of a shaft or the opening of a drift. The comparative ease with which such openings are made in this field, the cheapness of coal "in place," together with short periods of spasmodic prosperity, have brought into being small operations which cannot be sustained by the normal demands of the present market.

New Mining Law in Kentucky

A bill was recently introduced by Mr. Arnett (Senate Bill No. 321, Feb. 19, 1914), in the Kentucky Assembly, and promptly referred to the Committee on Mines and Mining. The bill is a practical revision of the mining laws of the state. It passed the Assembly, Mar. 15, and became the law of the state by the signature of the governor, Mar. 23.

A Kentucky Department of Mines

Among the important changes in the state mining law, made by this enactment, is the creation of a Department of Mines and the authorization of the title "Chief Inspector of Mines," as applied to the official who shall have full charge of said department. By the law of 1891-93, mine inspection in the state was placed in the hands of the Dean of the School of Mining Engineering, of the State College, at Lexington, who then became the inspector of mines.

The Old Mining Law

By act of the General Assembly, 1906, the governor was authorized and directed to appoint two additional assistant inspectors. Two more assistant inspectors of mines were authorized by the enactment of the General Assembly, 1908. The same act provided a board of examiners for the examination of applicants for certificates of qualification to serve as mine foremen. This board consisted of the chief mine inspector and two of his assistants chosen by himself from his own staff. The same law also authorized the chief mine inspector to order the employment of shotfirers in any dangerous or gaseous mine or mines employing 10 or more persons.

By act of General Assembly, 1910, the certificates of qualification were classified as follows: A first-class certificate authorized its holder to act as mine foreman in any coal mine in the state. A second-class certificate authorized its holder to act as mine foreman in any non-gaseous mine in the state. A third-class certificate authorized its holder to act as mine foreman in any non-gaseous mine employing not more than 25 persons at one time.

Provisions of the New Law

By the new law, Act of 1914, the chief inspector of mines is authorized to divide the state into inspection districts and to assign each assistant inspector to work in his

own district. The law also provides for the making of accurate maps and plans of the workings of each mine, within 60 days after Jan. 1, each year.

Personnel of the Examining Board

An important feature of the new law is the appointment by the governor of one miner who has had five years' practical experience in the mining of coal and is actually employed in mining coal at the present time, and one coal operator or his representative who is actually engaged in the operation of a coal mine in the state at the time, as members of the examining board, thus increasing the board members from three to five. The chief mine inspector is made chairman of the board and two of his assistants are of his own selection. The examining board examines all applicants for the positions of assistant inspector of mines, mine foreman and fireboss.

Another feature of the new law is the provision that no person shall be permitted to serve as mine foreman or fireboss, in any mine employing 15 or more persons at one time, except a person holding a certificate of qualification granted by the examining board, making him eligible for such position. The new law defines terms and specifies the duties of mine superintendent, mine foreman and fireboss, and contains a number of other provisions relating to ventilation, drainage, safety lamps, the firing of shots, electrical installations, first-aid supplies and the storage of oil and explosives. Many other points of importance are also included in the new law, which marks a commendable advance in the efforts to conserve our coal beds, increase efficiency and promote safety in mining.

First Aid and Accident Prevention

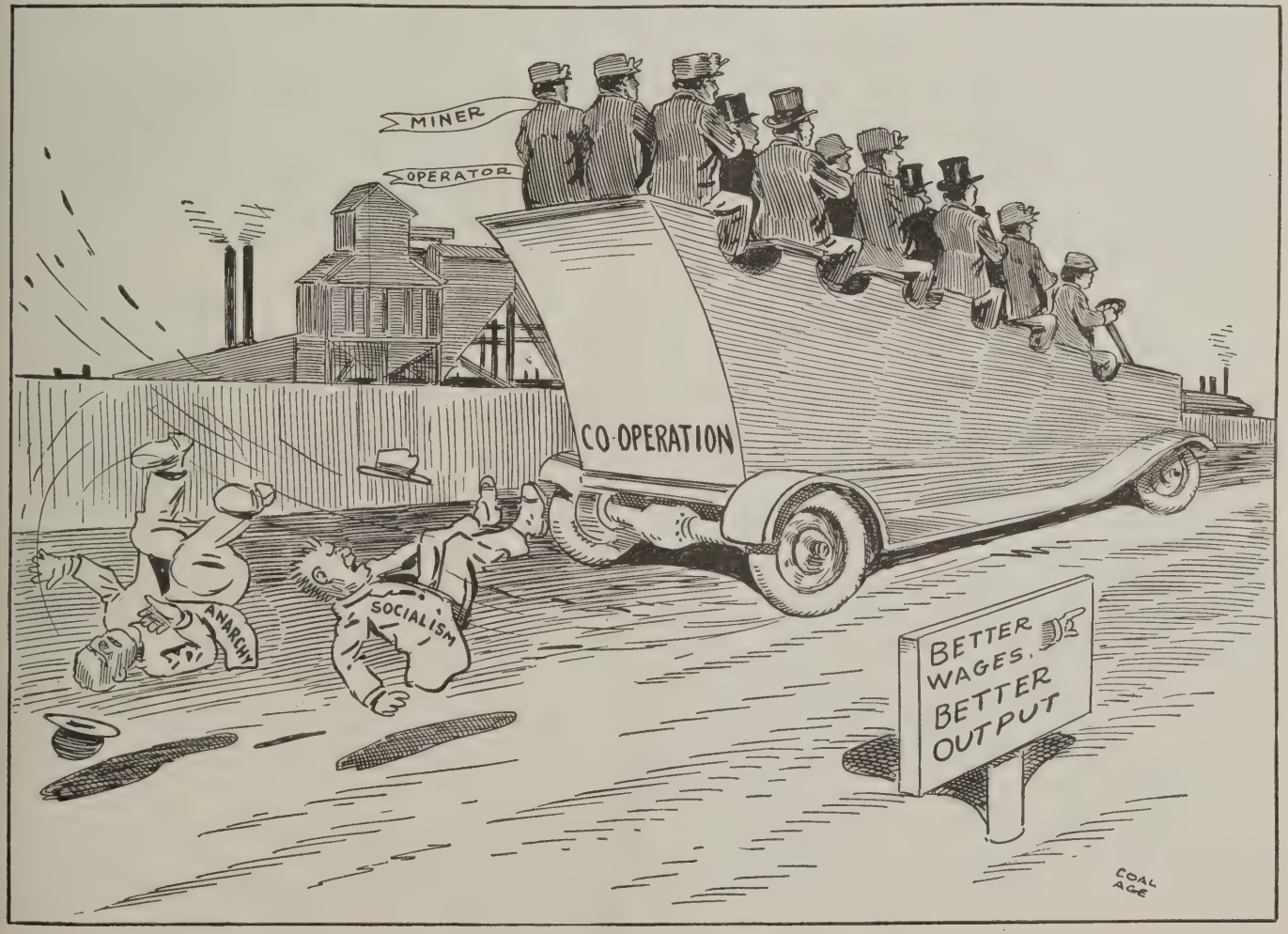
By A. S. Snyder*

Instruction to first-aid men should not be restricted to the rendering of first aid for injuries. Prevention of accidents is just as important a study as is how to take care of an injured man.

Those who have received instructions in first aid are usually more alive than others to the dangers surrounding mine work and more careful to avoid them. This care should be impressed on them in their training and they should be urged to report all dangerous conditions which may come under their notice to the foreman or his aides unless they can themselves remove the danger.

The saving of life is the most important of all conservation, for without human life of what use is the conservation of any natural resource—minerals, forests or what not? The prevention of accidents is profitable to everyone—to the employee, the employer, the community and above all, to those who are dependent on the wages of the employee.

*Instructor, first-aid and mine-rescue work, Berwind-White Coal Mining Co., Windber, Penn.



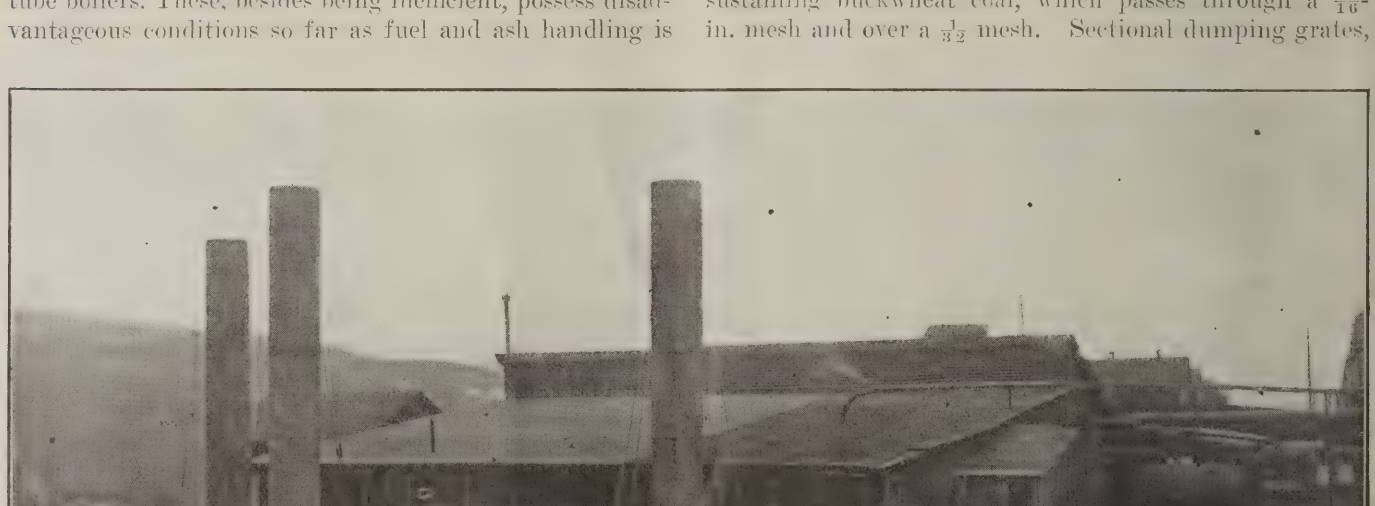
Let's All Get into the Band Wagon

Anthracite Colliery Boiler Plants

By J. F. McMahon*

SYNOPSIS—Many boiler plants throughout the anthracite region of Pennsylvania are anything but economical in their use of fuel. By the use of modern boilers equipped with proper auxiliaries the cost of steam may be reduced 60 per cent.

It is an admitted fact that anthracite-colliery boiler installations seldom attain the standard of efficiency secured by public-service companies. The reason frequently ascribed for this state of affairs is that in many instances the colliery management has been incumbered with an adverse inheritance, consisting of either cylindrical, tubular, locomotive or some ancient type of water-tube boilers. These, besides being inefficient, possess disadvantageous conditions so far as fuel and ash handling is concerned, with the result that men and mules have become a constant charge in their operation. Furthermore, as the fuel consumed is ordinarily Buckwheat Nos. 2 and 3 with a more or less generous mixture of Buckwheat No. 1 in extreme conditions, it is impossible to realize even approximately the heat content of the coal.



General View of an Ancient Anthracite Boiler Plant. Many Such Plants Are Still Operated

In many instances, however, such extravagant conditions and practices as exist in power plants throughout the anthracite region show either a lack of forethought or positive negligence upon the part of both engineering department and management, and unless the assured life of the colliery is extremely short, a change of equipment (upon which benefits might be realized at once) should be undoubtedly made. While cases may exist where good engineering economics would dictate that the equipment should remain in a *status quo* without remodeling or improvement, these are isolated and the general statement holds true that in most instances anthracite boiler plants might economically be made efficient and acceptable to the best present-day engineering practice.

*Wilkes-Barre, Penn.

Steam Equipment Should Be Centralized

In order to accomplish the maximum efficiency in power-plant design and operation, the entire steam-generating equipment should so far as possible be centralized in one general unit with the distribution lines radiating to the various steam consumers. Provided these lines are properly covered this arrangement is vastly superior in economy to several isolated plants.

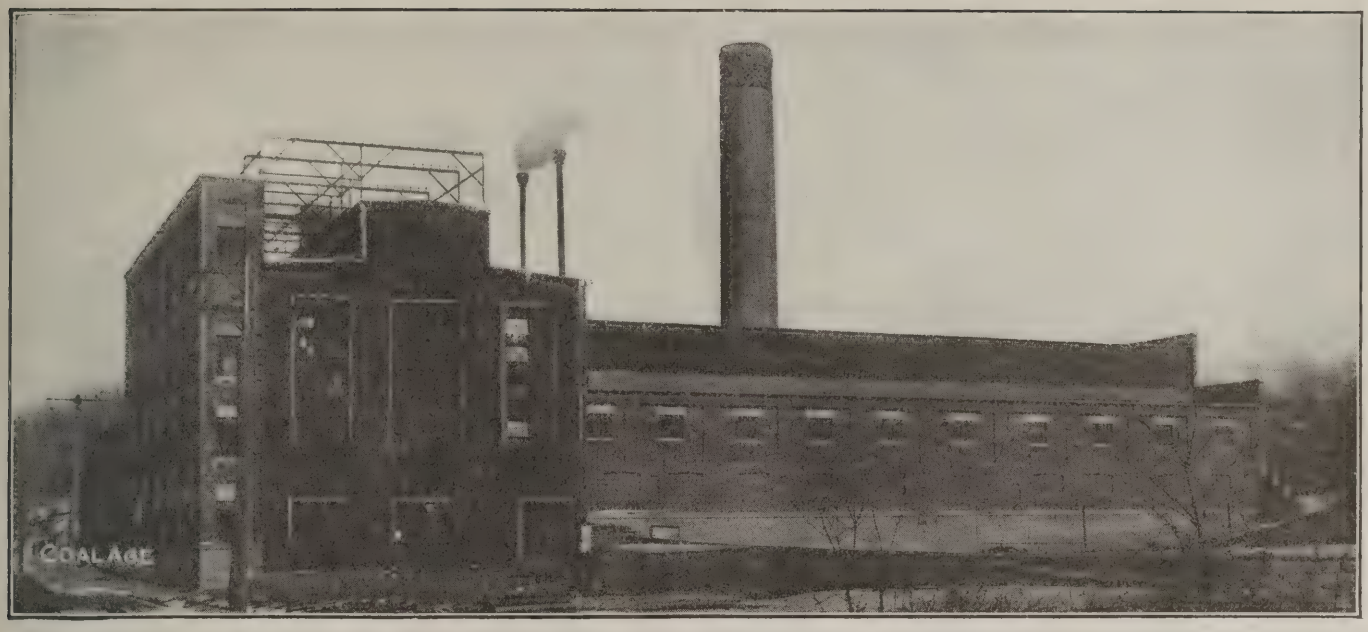
The boilers employed should be of the latest water-tube type, having a ratio of heating surface to grate area of about 25 to 1, and never exceeding 30 to 1.

The air space of the grate should be from 8 to 15 per cent. of the grate area with the openings suitable for sustaining buckwheat coal, which passes through a $\frac{3}{16}$-in. mesh and over a $\frac{1}{32}$ mesh. Sectional dumping grates, stationary grates having a discharging section or a discharge outlet in the deadplate should be employed. Regardless of whether the plant is erected new or remodeled every facility should be employed for discharging the refuse material quickly and with the least labor.

Ash disposal may be accomplished in a variety of ways. The ashes may be conveyed with water by gravity to a common point and there transferred to cars. The ash pits may discharge direct to tunnel cars, which may be disposed of in some suitable manner, or the refuse material may be disposed of by means of an overhead or aërial ash-handling equipment.

The fuel may be brought from the breakers by a conveyor line to a general overhead coal bunker or it may be brought to the boiler house in railway cars, being dumped through a tunnel or trough to a table or bench, so placed as to be most convenient to the firemen, thus eliminating unnecessary manual labor and tending toward a clean boiler room.

A firebrick arch, a Dutch oven, or an adequate distance between the lower row of boiler tubes and the grate line should be provided as these are important factors exerting a definite influence where high rates of combus-

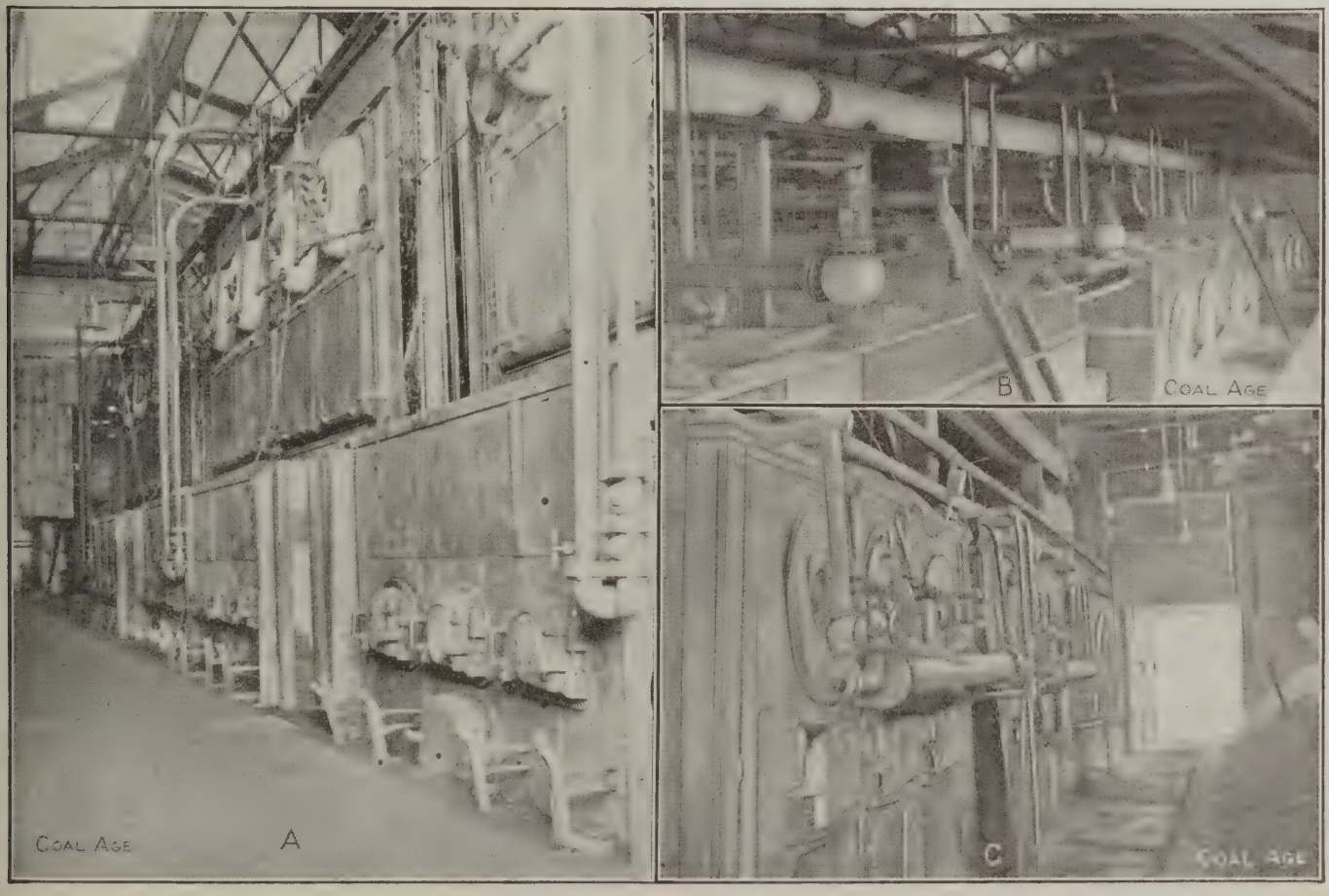


General View of a Modern Anthracite Power Plant

tion are to be attained. The boiler should be so baffled that the gases may impinge upon practically the entire heating surface, yet still give sufficient stack temperature to maintain the draft. The stack dampers should be so controlled as to maintain as high a gas velocity as is consistent with the production of a minimum negative pressure in the firebox.

Some Attainable Results

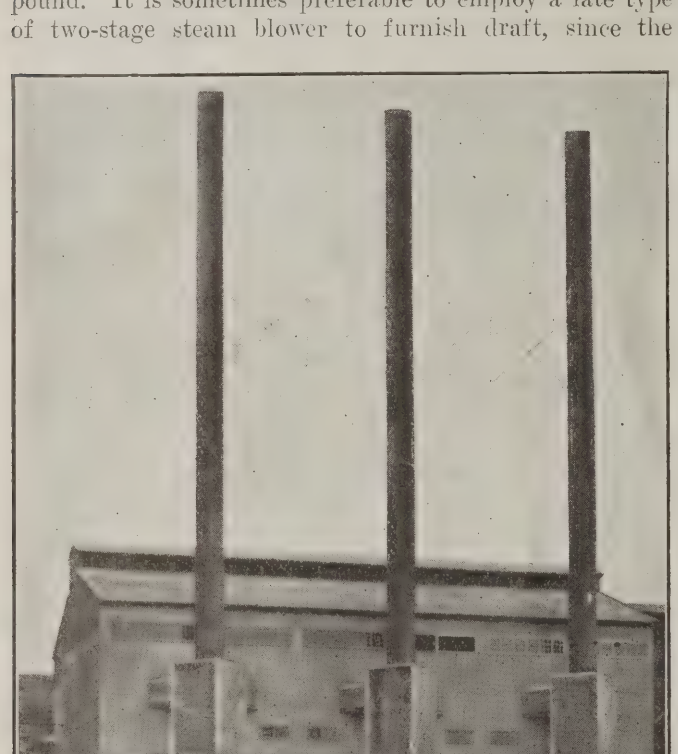
With proper construction the temperature of the furnace should reach 2500 deg. F., and the products of combustion should leave the third pass and enter the breaching at a temperature not exceeding 550 deg. F. If these conditions exist, the boiler has done its full duty in heat absorption.



A. A Neat Modern Firing Alley. B. Piping above Boilers Shown in A. C. Firing Alley in Usual Type of Boiler Plant

In order to secure a proper gas velocity, it is imperative to have a suitable diameter and height of stack to give sufficient draft to overcome the resistance of the boiler when passing the maximum amount of the products of combustion and maintain a slight negative pressure in the firebox. Since forced draft is employed, the ashpit pressure is, of course, positive, and varies anywhere from one to three inches of water, depending on the thickness of the fire and the resistance of the grates.

The coal used will probably contain between 18 and 30 per cent. of ash; while the heat content in the combustible will range between 10,000 and 12,000 B.t.u. per pound. It is sometimes preferable to employ a late type of two-stage steam blower to furnish draft, since the



A Modern Reinforced-Concrete Boiler Plant

moisture of the steam passing up through the grates will prevent clinkering. This service represents about 4 per cent. of the evaporation of the boiler. Where sufficient exhaust steam is available and can be injected directly under the grate, an air blast is without question preferable, as this seldom requires over 2 per cent. of the evaporation.

But with all of their refinements, such boilers as have been described above, are not in themselves sufficient to give best results. It is first of all essential that boilers should be properly housed in a building giving abundant light and provided with ventilators for the escape of foul air and gas. The latter should be so arranged that in cold weather the boilers are so protected from drafts that there is no danger of the fittings freezing. Doors and windows should also be so arranged as to prevent currents of air sweeping from one end of the boiler room to the other and endangering the health of the attendants. A good boiler room is comfortable in the severest weather, the temperatures never falling below 60 deg. F.

Justifiable Auxiliaries

With such boilers and plants we are justified in installing such auxiliaries as soot blowers for the boiler tubes; regulating-valve control for the boiler feed water; draft-gage control for the stack and firebox, which indicates the air pressure and the condition of the fire, and whether the boiler is operating under or over its rating; steam-recording gages, which show the amount of steam produced; a temperature-recording gage in connection with the feed-water heater; and a gage showing the total amount of water used by the plant. Where much blowing off of boilers is required, a V-type recording gage is necessary.

With a coal-consumption recording device installed in the funnel leading to the receiving table of each boiler, a positive check is at hand on the firemen, and each man may be thus required to perform his true share of the work. The quantity of coal supplied to and consumed in the firebox must be uniform throughout, and the firemen, after being instructed by a qualified expert, may be placed in charge of the water tender, whose duty is to see that they do their *pro rata* work while he controls the feed water.

With this arrangement and organization any request for a greater quantity of steam or any complaint of whatever kind or source upon the boiler house should be taken up direct with the water tender, without interference of any kind or in any manner with the individual firemen.

It should be unnecessary, except as a passing remark, to state that all steam, exhaust and feed-water pipes, as well as exposed headers, should be properly insulated.

Besides providing connecting pipes suitably proportioned for the amount of steam carried, the safeguarding of workmen in and about the boilers, has become voluntary on the part of all coal companies. Such precautionary apparatus covering all suggested dangers is a necessary part of any new installation.

Non-return valves on the boiler nozzles with gate valves in the pipes connecting them to the main header, automatic closing valves on the water columns, safety fire doors, extra valves on the boiler blowoff, guards over dangerous moving parts of auxiliary machines and illuminated danger signs to be employed when repair work becomes necesary, have all become a part of modern equipment. Furthermore, for night operation abundant lighting should be furnished for reading gages, and for necessary movement about the building.

Sanitary wash rooms, drinking fountains and restful seats provided with backs may also well be provided. These latter may appear as an unimportant luxurious comfort, but observation of their effect by comparative timing in the cleaning of fires shows a saving due to their use of from 33 per cent. to 50 per cent.

A Permanent Log Should Be Kept

The employment of recording and measuring instruments is valueless unless the charts secured are properly worked up and placed in a log or static form, so that the superintendent or engineer in charge of the equipment may readily observe whenever there is a failure to maintain the standard established in any department. While this data is primarily valuable to those in direct responsibility for economic operation, it is of natural interest to those who actually handle the fuel and water. It is well,

therefore, to tabulate in simple form the weekly log, made up of the names of the firemen on the various shifts, together with that of the foreman and the actual quantity and size of fuel used, the steam generated or boiler horsepower developed, also the weather conditions and whether the figures were secured on an idle or working day.

After a standard for boiler efficiency has been established if the firemen develop skillfulness in exceeding this basis of work an approved sliding-scale bonus will automatically establish the best and most skillful men and make employment in the boiler house a competitive and desirable occupation. Such an arrangement should not conflict with the standard wage paid for general service in or about the colliery. Such standard wage, however, would become the minimum compensation and the basis upon which the bonus scale should be established.

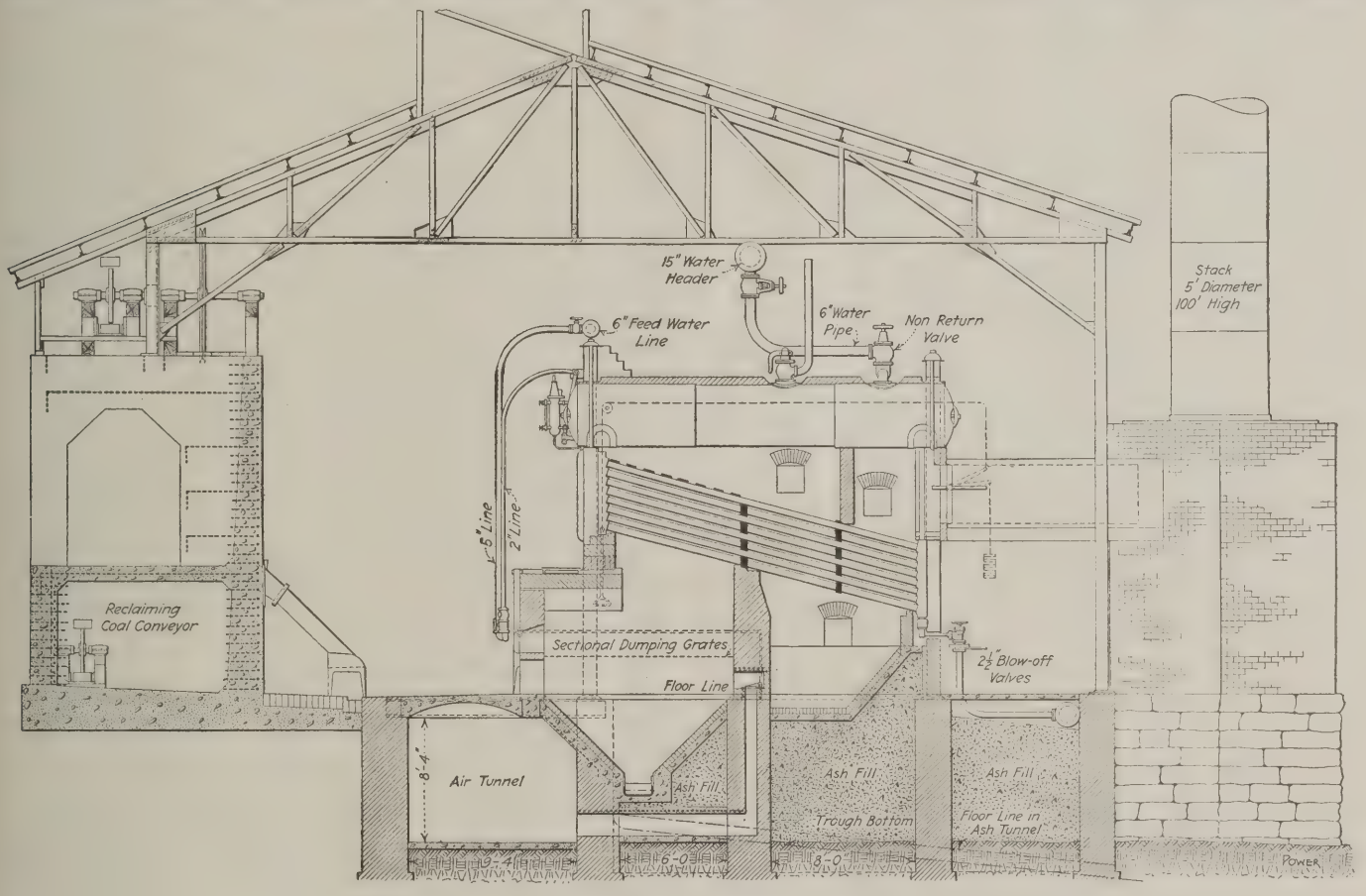
Such improvements as have been above described would render it possible to operate a boiler continuously at 150 per cent. of its normal rating, while under emergency it might be crowded to 200 per cent. of its rated capacity. The number of boilers necessary for any installation will, therefore, be reduced to a minimum.

A still further refinement in steam consumption is that of superheating the steam to approximately 100 deg., delivering it at that temperature to the various steam users. Such a superheat has no particular bad effect upon the working parts of the various machines and effects a decided saving in the actual amount of steam consumed.

Advantageous though it may be to compound the cylinders of pumps, compressors, and the like, substitute Corliss or four-valve gear for the ordinary D-slide valve on simple engines and operate a plant condensing, as well as cover the steam lines leading to the various machines, the boiler house is in reality the first place wherein to inaugurate improvements, as there the fixed charges and the wastes are constant and consequently heavy.

Costs and Returns of Remodeling

The question to be solved, therefore, resolves itself into two parts, What will the necessary equipment cost, and what will be the saving? A new plant complete with a steel-frame building with reinforced-concrete or brick sides, fireproof roof, boilers, stacks, ash pits, forced draft, blowers, ash-conveyor lines and hoppers, steam headers, feed-water lines, steam soot blowers, concrete coal bunker, coal conveyors, turbine centrifugal or compound boiler-feed pump, feed-water heaters, recording instruments, gages, a complete equipment including every expense except the value of the land occupied by the plant and the tracks approaching it, will cost about $28 per boiler-horsepower.



Cross-Section through a Modern Boiler Plant

The type of boiler-feed pump to be used is worthy of careful consideration, as this is an important part of the steam-generating unit. A compound steam or a turbine-driven centrifugal pump of the number of stages most suitable for the steam pressure carried, is the most efficient.

Another important consideration is the location of the feed-water heater. This may be in the boiler plant or at some point in close proximity thereto, where the greatest number of exhaust-steam feeders is available. In the latter case the small feed-water line from the heater and pump to the boilers is much less expensive than a large exhaust line with its high insulation cost. This, however, is a consideration which may be readily determined in the layout of a plant.

With efficient and uptodate equipment, a boiler-horsepower-hour may be developed on about 4.36 lb. of dry coal, 8 lb. of water being evaporated per pound of coal from and at 212 deg. F. Assuming a value for the fuel of 50c. per ton, this corresponds to a coal cost of $1.09 for 1000 hp.-hr.; while the other expenses of the plant may be calculated as follows:

	Per 1000 Boiler Hp.-Hr.
Fireman, @ $6.18 per 24-hr. day	$0.29
Water tender, @ $6.24 per 24-hr. day	0.03
Ash removal, @ $1.51 per 9-hr. day	0.02
Maintenance of plant	0.008
Fire insurance, eliminated. Building fireproof.	
Safety boiler insurance	0.013
Total operating and maintenance cost	$1.451

With the old type of equipment, 7½ lb. of dry coal are necessary to develop 1 hp.-hr. Taking this coal as being worth 80c. per ton, this is equivalent to $3 per 1000 hp.-hr., while the other expenses as before are:

	Per 1000 Boiler Hp.-Hr.
Fireman, @ $6.18 per 24-hr. day	$0.60
Water tender, @ $6.24 per 24-hr. day	0.06
Ash handling, labor, @ $5.46 per 24-hr. day	0.10
Maintenance of plant	0.007
Fire insurance of plant	0.003
Safety boiler insurance	0.015
Total operating and maintenance cost	$3.785

As may be seen from the above, the saving which may be effected by the installation of modern apparatus is equivalent to $2.33 per thousand horsepower-hours, or 62 per cent. of the original cost for power. This may be properly credited against the amortization of the new equipment, and forms a basis upon which the advisability of remodeling a boiler plant may be readily determined.

It is further suggested that all of this class of work should be contracted for through competitive bids. This is because a mining organization should rightfully concentrate its efforts on the economic production and preparation of coal, and do as little work outside of this department as is consistent with reason.

An Extraordinary Experience

The following is an account of an experience that I recently had with gas, at a new opening along the Montour R.R., Washington County, Penn. Some who read this will undoubtedly recommend me for membership in the "Ananias Club"; but, nevertheless, the facts stated are absolutely true.

A few days ago, a fall occurred in one of two entries that were being driven for ventilating purposes. Three or four cars of roof slate and coal fell suddenly, near the face of one of these entries. A short time before, the roof was apparently sound. As the cavity filled with gas, I had a canvas brattice run from the last breakthrough to the fall, and the face was practically clear before the last nail was driven. A current of about 6000 cu.ft. per min. was passing the place.

A little later, not being able to detect gas with the safety lamp, I raised an open light into the cavity above the fall to inspect the condition of the hanging rock. About 6 in. from the top of the cavity, the light was suddenly drawn upward and the lamp extinguished. Wondering at this, I relit the lamp and tried again, raising it more slowly. At about the same distance from the top, as before, I noticed a blue flame appear around and above the flame of the lamp. Holding the lamp still in this position, I observed as pretty a cap as was ever formed in a safety lamp. This cap was from 4 to 4½ in. in length, about 1 in. in diameter at the base and tapered to a point. After observing the cap for about 30 sec., I slowly raised the lamp higher and the flame was extinguished. Continuing the experiment, I repeatedly got a cap on the open flame, which was extinguished on raising the lamp higher, as before.

On one occasion, the cap was detached from the lamp and drawn up against the roof where it revolved like a top, moving around a space from 5 to 10 ft. in diameter. This continued for about ½ min., when suddenly a burst of flame rolled up to the face, down both ribs and back both sides of the canvas. This left the impression that there was gas below and all around. The flame was not a compact body, but descended from the roof in folds or waves, making an interesting sight.

Two days later, I repeated the experiment, and obtained the same results as before, in the presence of the superintendent and two firebosses, who exclaimed, "Pretty!" "Beautiful!" During the last four days, I have repeated the experiment several times with the same results. In making these tests, immediately after the gas would burn itself out bursting into a flame as described, I would raise an open light and get a cap 1 ft. from the top, but the flame would be extinguished on raising the lamp higher. In some of these attempts, it would be difficult to light the gas, except where it issued from the fissures of the slate; but, after repeating the experiment two or more times, the gas ignited more readily.

I should state that the top of this cavity is about 3½ ft. above the "lip" or drawslate. The slate fell to a white "bastard" slate, having a smooth surface. The gas is given off quite freely through a fissure in the slate 9 in. in length and some fissures on the sides; but the pressure is not sufficient for the gas to be heard as it escapes from the strata. The color of the burning gas is a dark red or purple.

I have tried to describe the observed phenomena as nearly correctly as possible, relating the incidents as they have occurred with little variation during the last four days. I will not attempt to offer any opinion myself, but would be glad to have the readers of COAL AGE suggest a possible cause for the strange behavior of the gas. After an experience of six years as fireboss, assistant mine foreman and mine foreman, in mines of three different counties in the Pittsburgh district, all of which generated more or less gas, this is the most extraordinary occurrence I have witnessed.

I may add that, to test the gas further, I cut off the air from the place and allowed over a foot of gas to collect, when it acted the same as ordinary explosive gas. When doing this, however, I used only a safety lamp.

JOHN LAWLOR, JR.,
Mine Foreman.

Lawrence, Penn.

[The above narration must be taken for what it is worth. Allowing its credibility, it portrays an almost inconceivable exhibition of reckless daring on the part of those who observed the alleged experiments. While we would not question the veracity of our correspondent, we are compelled to suggest that the repetition of such experiments is to court danger and possible death, not only for one's self, but for all in the mine at that time. We hope to hear further comments from readers.—EDITOR.]

The Kentucky Compensation Act

SYNOPSIS—A review of the salient features of the Workmen's Compensation Act, recently passed by the Kentucky Legislature, with particular reference to its bearing on the coal operations of the state.

The recent passage by the Kentucky legislature of the Workmen's Compensation Act will affect scores of large and small coal operations in both the eastern and western sections of Kentucky. The passage of this act is due largely to the strong coalition formed in support of it by the coal miners and coal operators of the state.

Originally, there were four bills on this subject before the legislature, COAL AGE, Vol. 5, p. 362. The similarity between these several bills, however, led, eventually, to the substitution of the original labor bill (the Meyers-Knight bill), and it was this which became a law.

Supporting the bill, as finally adopted, were such organizations as the Kentucky Mine Owners' Association, the Southern Appalachian Coal Operators' Association, and the Western Kentucky Coal Operators' Association. The Kentucky Mine Owners' Association was most active in its efforts to secure compensation legislation, and during the entire session, maintained headquarters at Frankfort, the capital, where President Hywell Davies and Secretary W. H. Cunningham were in active charge.

The principal features of the compensation act are: State insurance, with options to permit the employer to carry his own insurance, or to secure liability insurance; administration by a board composed of existing state officials, with the minimum of expense; penalty by additional premiums where willful injury is inflicted, or is received, where the employer is violating the law; semiannual readjustment of rates, based on experience of the preceding six months.

The Workmen's Compensation Board

The attorney-general, the commissioner of insurance and the commissioner of agriculture, labor and statistics of the state are to constitute the Workmen's Compensation Board under this act, which will take effect Jan. 1, 1915. Each is to receive in this capacity a salary of $75 per month payable out of the compensation funds.

The board is given all necessary authority to administer the act, such as that to make investigations, swear and examine witnesses, punish for contempt (through the courts), and so forth. It is authorized to collect from employers detailed information regarding their business, insofar as it is pertinent for the purposes of the act, but it is provided that this information shall be regarded as confidential, and that any person connected with the board divulging any such information, except in authorized statistical form, shall be fined not less than $100 nor more than $500.

All employers of six or more persons, in any of the 22 classes created by the act, as these may be rearranged or modified by the board, and all who may, with their employees, voluntarily make application for that purpose, are made subject to the provisions of the act. And "coal mines, including their tipples, power, light, heating and ventilating plants, tramways, private tracks and sidings, and accessory and auxiliary plants, working in or with byproducts," comprise the first class.

Rates for the purpose of accumulating a compensation fund, not exceeding a maximum charge of $1.25 on each one hundred dollars of the gross annual payroll of each employer, are to be fixed by the board, subject to the semiannual readjustment referred to; and in order to enable the board to proceed to fix its rates, as provided by the act, they are required to furnish all information desired, under penalty of a fine of $500, to be collected by civil action. Premiums are payable monthly, but those for the first three months are to be paid on or before Jan. 1, 1915, in order to give a substantial fund to start with.

The usual provision, that the continuance in the employment shall be conclusively presumed, as against any employee, to constitute a contract with the employer to accept the compensation provided by this act, in case of injury, and to waive all right of action for such injury, where the employer has given notice of his intention to accept the provisions of the act, is included; but, it is also provided that where an employee elects, and so informs his employer, not to accept the provisions of the act as to compensation, the common-law defenses of contributory negligence, assumption of risk, and the act of a fellow-servant are to be available against him, with such others as may exist.

On the other hand, it is provided that where an employer elects not to accept the provisions of the act with reference to compensations, he shall be deprived of the common-law defenses. He is also specially penalized in cases where injuries are due to his willful act, to the failure to perform a statutory, or other nondelegable duty, or where a minor employee, illegally employed, is injured. In certain of these cases a right of election is given to the employee between his right of action and the compensation provided by the act.

Injuries received by employees while intoxicated, or by their deliberate, self-inflicted act, or by willful misconduct, are barred.

Compensation Obtainable

The act provides for a maximum compensation of $3750 in case of death or permanent disability, and of one-half of the weekly wages, with a maximum of $12 a week, for injury resulting in temporary total disability. For temporary disability the compensation is one-half of the loss of income caused by the disability, with a maximum of $12 a week. The minimum weekly indemnity is $5, except where the weekly wage is less than that sum, when the compensation equals the wage.

Hospital and medical attendance, to the extent of $100, are to be paid out of the fund, and funeral expenses up to $75, in addition to other compensation; and in case of death, where there are no dependents, these items are all the payments to be made out of the compensation fund. Dependents are defined as the wife, living with the deceased at the time of his death, and children under the age of sixteen, living with the parent. In other cases the board decides the matter as a question of fact, with the limitations that no person shall be considered a dependent except husband or wife, brother or sister, ancestor or lineal descendant.

Upon satisfactory proof of solvency and ability to pay

the compensation provided by the act, any employer may administer the compensation himself; and he may, in such case, carry liability insurance, "provided the amounts to be paid are not less than that provided in this act"—a proviso which would seem to be of but little benefit to the liability-insurance companies, in view of the fact that the usual policy limits their liability in any one accident to $10,000, and that their rates, for coal mines, at least, are much above the maximum rate provided for in the act.

All employers subject to the act must notify the board on or before Nov. 1, 1914, of their election not to accept the provisions of the act.

There are appropriate provisions covering adjustment of controversies, appeals, employers in interstate business, and so forth, but those outlined above are the salient features of the act. The coal interests of the state, operators and miners alike, are willing, as far as is now apparent, to accept it and act under it, leaving such defects as may appear to be remedied by future legislation.

A Method of Measuring Goaf Temperatures*

By T. F. Winmill

SYNOPSIS—A description of the construction and application of a new instrument for measuring goaf temperatures, together with certain tests relating thereto. The device exhibits increased electrical resistance on any rise in temperature.

It is important to know, in connection with the question of gob fires in mines, what is the normal goaf temperature. If the goaf be absolutely air-tight, its temperature should ultimately become that of the undisturbed strata surrounding it. A small air-leak will, however, cause oxidation of the coal left in the goaf and a corresponding rise in temperature.

An apparatus has been devised which will allow of a continuous measurement of the goaf temperature in any place, without the necessity for boreholes. As is well known, the electrical resistance of a metal varies considerably with the temperature, and this property is made use of in constructing resistance thermometers. These instruments are very commonly used for accurate temperature measurements, and a simple modification suitable for use in mines is herewith described.

Description of the Apparatus

A strip of sheet-mica 1 cm. broad and about 1 mm. thick is bound with two copper collars, made from strips of copper-foil. Both ends of a coil of nickel wire, ⅛ mm. in diameter, are soldered to the copper collars. For convenience in standardizing and subsequent use, the coil is made of such length as will give a resistance of 25 ohms at 0 deg. C. Two copper leads of No. 14 gage cotton-insulated wire are then soldered, one to each copper collar, in the position shown. The coil is now wrapped in very thin asbestos paper in order to insulate it, and slipped into a copper tube, the ends of which are then sealed with any of the usual silicate cements. Long leads must then be fixed to the projecting copper wires at *a* and *b* so that the coil may be well buried in the goaf. These wires are made most conveniently of three No. 22 gage copper twisted together and well insulated. Two leads are fastened to one of the coil-terminals and one lead to the other.

In measuring the resistance from the end of the leads *B* and *C*, the resistance of the coil plus the resistance of the leads is obtained; but in measuring the resistance between *A* and *B*, the resistance of the leads only is arrived at. Since all the leads are exactly similar, the difference between these two measurements gives the resistance of the coil independently of that of the leads. By this means leads any length desired may be employed. Certainly leads a mile long would offer no difficulties to accurate measurement of the resistance of the coil.

How the Apparatus Is Used

The apparatus is used as follows: The copper tube is placed in a strong iron tube of about the same length, and then put in the desired position in the open goaf. As the face advances and the goaf closes, the leads are carried forward along the floor, being covered with about 6 in. of sand, so as to prevent them from being cut as the weight comes on. The coil is then permanently in position and by measuring the resistance at any time the goaf temperature at that point is obtained. Under most favorable conditions the measurements are correct to about $\frac{1}{10}$ deg. F., more generally the accuracy is about ½ deg. F.



Instrument for the Measuring of Goaf Temperatures

The temperature-coefficient of the nickel wire described has been determined from measurements at 0 deg., 25 deg., 60.30 deg., 80.48 deg., 100 deg., 132 deg. and 184 deg. C., and from these results the following relation is deduced:

$$R = A + BT + CT^2$$

Where R = the resistance of the coil in ohms; A, B and C are constants, and T = the temperature of the coil in degrees Centigrade.

For a coil resistance of 25 ohms at 0 deg. C.,

$$A = 25$$
$$B = 1.128 \times 10^{-1} \text{ and}$$
$$C = 1.746 \times 10^{-4}$$

For a coil of resistance A at 0 deg. C., the above constants must be multiplied by $A/25$.

Results of Tests

The apparatus was tested at a rib-side which was being left to divide off a district and the results of the tests are given in the appended table. The coil is now buried at a point about 50 yd. from the edge of the goaf.

*From a paper presented at the 24th annual meeting of the Institution of Mining Engineers, Sept. 24, 1913.

RESULTS OF TESTS WITH THE APPARATUS

Date	Measured Resistance in Ohms Coil and Leads	Leads	Coil	Temperature, in Degrees Fahrenheit
Nov. 29, 1912	27.93	0.61	27.32	68
Dec. 13, 1912	27.91	0.61	27.30	67.8
Jan. 2, 1913	28.84	0.61	28.23	81.15
Jan. 3, 1913	30.41	2.21	28.28	*82.2
Jan. 10, 1913	30.21	2.10	28.11	80
Jan. 17, 1913	30.10	2.09	28.01	79
Jan. 31, 1913	29.91	2.10	27.81	76
Feb. 11, 1913	30.07	2.10	27.97	78
Feb. 17, 1913	30.60	2.12	28.48	85
Feb. 24, 1913	28.85	0.45	28.40	†84
Mar. 7, 1913	28.86	0.45	28.41	84
April 7, 1913	30.64	2.23	28.41	*84

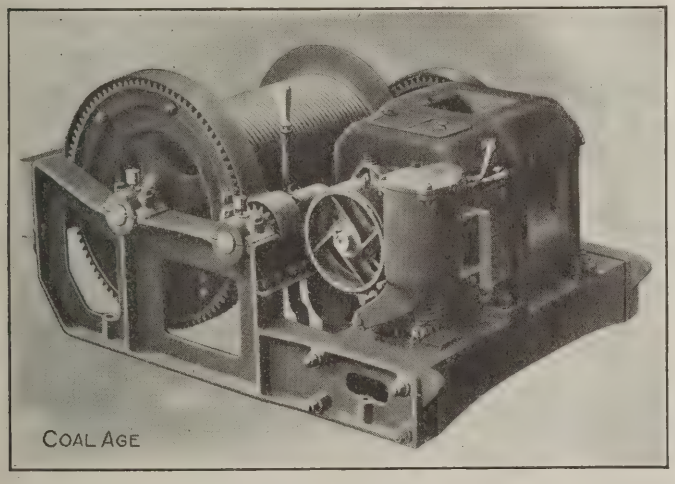
* Leads lengthened. † Leads cut by a car.

The low initial temperatures are due to the fact that the rib-side on being left had been well stowed with wet sand. After this sand had dried, the temperature rose to that of the strata, showing that the stowing has been tight and that no air is leaking in.

A Small Portable Electric Hoist

With the increased use of electricity around mining plants, the operators will welcome the appearance of a small portable electric hoist as shown herewith. This particular machine was designed essentially as a drag for spotting railroad cars on adverse grades, but the possibilities of such a portable and flexible apparatus around a mine are too numerous to mention.

The frame consists of heavy cast-steel sides securely connected by cast- and structural-steel cross pieces, forming a rigid unit. The frame bottom is made flush for skidding and provided with bosses for holding down bolts. Lugs are also provided for attachment to hauling links for moving the machine to different locations.



THE SHAW PORTABLE ELECTRIC DRAG

The winding drum is of cast iron, machined with grooves to keep the hauling cable in place. The cable is of special plow-steel rope, ¾ in. in diameter, 10 wires to the strand, six strands and a hemp core.

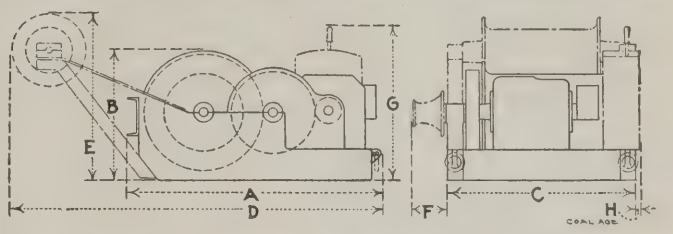
STANDARD RATINGS AND DIMENSIONS OF ELECTRIC HOISTS

Size	Rope Pull, in Lb.	Rope Speed Ft. P. M.	Dimensions A	B	C	D	E	F	G	H
5	2300	60	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	3 Ft. 5 In.	
8	2700	85	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	3 Ft. 5 In.	
12	3200	110	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	3 Ft. 5 In.	5 In.
18	4000	130	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	4 Ft. 7 In.	8 In.
25	5000	150	5 Ft. 5 In.	2 Ft. 10 In.	4 Ft. 2 In.	7 Ft. 10 In.	3 Ft. 6 In.	10 In.	4 Ft. 7 In.	11 In.

All shafts are carried in capped bearings with bronze bushings. The gears are of steel with cut teeth. All gears are guarded. The drum pinion is free on the shaft and a jaw clutch is provided thereon for coupling same to shaft. The drum is, therefore, free to rotate when necessary to unwind the rope by pulling on it. The clutch may be left in engagement and motor controlled at proper speed to unwind rope as the end is carried away.

The motor is rated on a basis of 40° C. temperature rise after 30-min. run with full load. It is designed exclusively for crane and hoist service.

The machine is regularly built as shown in full lines on diagram, or with either one or both auxiliaries, as shown in broken lines, i.e., guide drum or niggerhead. The accompanying table is for drags of standard specification, but machine can be altered to meet special requirements.



SKETCH SHOWING PRINCIPAL DIMENSIONS

The apparatus is designed so that it can be used as a portable electric winch, or as a stationary electric hoist. For the latter class of service the hoist would be arranged for dynamic lowering and the controller can be located independently of the hoist proper which often works out as a substantial advantage.

These machines are built by the Shaw Electric Crane Co., of Muskegon, Mich., and sold by Manning, Maxwell & Moore, Inc., New York City.

Recent Legal Decisions

Proving Unlawful Sale of Underweight of Coal—In a prosecution against a retail coal dealer on a charge of willfully selling coal at an underweight, the state was entitled to prove underweights in other sales made by him for the purpose of negativing a claim of mistake in the particular instance. (New Jersey Supreme Court, State vs. Mor, 89 Atlantic Reporter 755.)

Amount Recoverable for Injury to Miner—Where a coal miner established a right to recover against the company which employed him, on account of injury sustained by him in being overcome by black damp, a verdict for $300 in his favor was not excessive, though it appeared that he was not so seriously injured as to require medical attention. (Kentucky Court of Appeals, Mt. Morgan Coal Co. vs. Shumate, 163 Southwestern Reporter 1099.)

Danger Not Assumed by Miner—A coal miner does not assume the risk of being injured on account of noncompliance on the part of his employer with a statute requiring a certain space to be provided in entries sufficient to permit drivers of cars to keep clear of the same. (Pennsylvania Supreme Court, Smith vs. Stoner, 89 Atlantic Reporter 795.)

Extent of Mine Foreman's Control—Under the Pennsylvania Mine Foreman Law, a mine operator is not liable for injury to a person while in the mine to seek employment, even though such injury be due to negligence of a miner in failing to give warning of the approach of a car; this is a matter within the control of the mine foreman employed under the law. (New York Supreme Court, Appellate Division; Bigus vs. Lehigh & Wilkes-Barre Coal Co., 146 New York Supplement 107.)

Accident Frequency among English-Speaking Men and Others

By Howard I. Smith*

SYNOPSIS—Only in West Virginia are statistics on this subject available. The Germans appear to have the highest nonfatal-accident rate and greatest proportion of accidents from falls of coal, drawslate and roof and to rank second in general fatal accident frequency. But the number of Germans employed makes the value of the result uncertain. It seems established that the Italians and negroes take less care of themselves than the American whites. While the English-speaking foreigners are too few to furnish reliable evidence, the statistics do not give them a leading place as careful miners.

The frequency of accidents among those foreigners who come from other countries than those where English and German are spoken has been repeatedly discussed, but most of the men who expressed themselves have given merely personal observations and beliefs. These, while interesting, are not convincing and facts are needed.

Statistics on this question are sadly lacking because only one state, West Virginia, has gathered sufficient figures to permit the conclusions to be drawn. A few states do clasify the fatalities by nationalities, but fail to give the number of men employed from any given nation. However, on account of the compensation acts which are being considered and other important questions, the statistics bearing on this subject, no doubt, may, in the future, be more fully compiled and become available for use in attempting to improve the accident rates.

In Ohio and Pennsylvania, the number of men killed of the various nationalities have been tabulated, but not the numbers employed so we cannot draw sufficient evidence from which to establish just what nationalities are the most unfortunate.

As many of the foreign miners get their first experience in mining in this country, the following table drawn from the Chief Mine Inspector's Report of West Virginia for 1911, is of great interest:

TABLE I. LENGTH OF EXPERIENCE OF PERSONS KILLED AND INJURED AT THE WEST VIRGINIA MINES 1901 TO 1911, INCLUSIVE

	Per Cent.
Under 3 months	10.71
Over 3 months including 6 months	5.62
Over 6 months including one year	13.44
Total including one year	29.77
Over 1 year including 5 years	38.17
Over 5 years including 10 years	17.94
Over 10 years	14.12
Total	100.00
Number of men reported from which these deductions are made	6638

From the published report unfortunately there is no way of determining what proportions given in the above table of those killed in the several groups are foreigners or do not speak English. This table, if it represents the average conditions in the various coal fields, indicates that when the men first entered the mines they were ignorant of danger for the first period of three months, then they became very cautious during the second three-months period, at the end of which time they again become indifferent to dangers and accidents followed. The continued decrease in the number of accidents after the first five years is probably due to the smaller number of men employed having the stated length of experience.

The following tables, Nos. 2 and 3, taken from the mine-inspectors' reports of Ohio and Pennsylvania, show only the relative number of men of different nationalities killed in and about the mines, and so we are prevented from drawing conclusions from them. These tables are, however, interesting.

TABLE 2.—TOTAL FATAL ACCIDENTS IN AND ABOUT THE MINES OF OHIO ARRANGED ACCORDING TO NATIONALITY ABSTRACTED FROM THE ANNUAL REPORT OF THE INSPECTOR OF MINES—1911

	No.	Per Cent. of Total		No.	Per Cent. of Total
American	49	45.0	Hungarian	5	4.6
Polish	15	13.7	Austrian	4	3.7
Slavish	12	11.0	Greek	3	2.7
Italian	8	7.3	Other nationalities	13	12.0
Total				109	100.0

Thus 49 Americans were killed and 60 foreigners and the death rate of Americans was 45 per cent. of the total whereas the rate of foreigners was 55 per cent.

TABLE 3. PERCENTAGE OF MEN, BY NATIONALITIES, KILLED IN AND ABOUT THE MINES OF PENNSYLVANIA FROM 1899 TO 1911, INCLUSIVE

	Per Cent.		Per Cent.
Americans	18.42	Germans	3.32
Slavonians	18.29	English	3.31
Italians	13.32	Irish	1.70
Polish	11.60	Magyar	1.55
Hungarians	9.75	Scotch	1.54
Austrians	7.59	Lithuanian	1.47
Russians	3.45	Other nationalities	4.69
Total			100.00

From page LXXXVI, Report of the Department of Mines of Pennsylvania, Bituminous—1911.

We are fortunate in finding in the mine-inspector's report of West Virginia, not only the number of fatal accidents of the different nationalities, but we have the number of men employed in and about the mines for each nationality for the years 1907 to 1911, inclusive, and from this we can figure the death by accident rate for each. These are shown in Fig. 1 and are based on a total of 317,661 man-years and 1997 deaths.

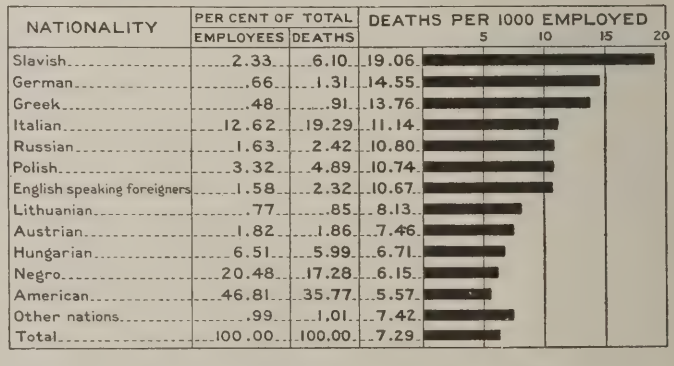


FIG. 1. FATAL ACCIDENTS IN AND ABOUT MINES IN WEST VIRGINIA, 1907-1911

In the above, the nationalities of 14.27 per cent. of the employees were unknown and those of 0.60 per cent. of the men killed were also unknown. The tables were computed by discarding the unknown in each case and figuring the death rate on the number of each reported, which

*Mining engineer, Bureau of Mines, Pittsburgh, Penn. An answer to a query in the question box of the Coal Mining Institute of America read Dec. 5 at the Pittsburgh meeting.

is higher than it should be, but the proportions will, no doubt, remain the same.

The table of nonfatal accidents is shown in Fig. 2, which is based on 317,661 man-years and 4083 nonfatal accidents. The nationalities of 14.23 per cent. of the total number of men employed were unknown and those of 0.36 per cent. of the nationalities of those sustaining accidents were also unknown. As in the previous table, the accident rate shown will be higher than it should be, but the proportions will, no doubt, follow the same order, as if they were correct.

Fig. 3 represents the death rate of the men employed

NATIONALITY	PER CENT OF TOTAL		ACCIDENTS PER 1000 EMPLOYED (5 10 15 20 25 30)
	EMPLOYEES	NON-FATAL ACCIDENTS	
German	.66	1.16	26.30
Slavish	2.33	3.89	24.88
Russian	1.63	2.36	21.60
English speaking foreigners	1.58	2.12	19.94
Polish	3.32	4.21	18.94
Lithuanian	.77	.91	17.70
Italian	12.62	14.88	17.57
Negro	20.48	19.63	14.29
Hungarian	6.51	5.91	13.54
American	46.81	41.31	13.16
Austrian	1.82	1.58	12.90
Greek	.48	.39	12.23
Other nations	.99	1.65	24.84
Total	100.00	100.00	14.91

FIG. 2. NONFATAL ACCIDENTS IN AND ABOUT MINES OF WEST VIRGINIA, 1907-1911

in the mines who were killed by falls of coal, slate or roof, and is based on 256,058 men employed for one year and 836 deaths; the nationalities of 14.91 per cent. of the employees were unknown and those of 0.48 per cent. of the dead were also not known.

These three tables clearly indicate which nationalities in West Virginia should most need education in safety methods, but it would not be safe to assume that the same ratios of accidents to nationalities will be found in other states.

Why the death rate is higher among men of one nationality than among those of another is hard to explain. We may suppose that it is because some men are more ignorant of danger, some more awkward and clumsy, some have more of a dare-devil spirit causing them to court danger. Others, perhaps, have a pride in looking out for themselves and their fellow countrymen. Possibly men of some nationalities are naturally less methodical or careful than others, or perhaps their training at home or in school may be more deficient.

NATIONALITY	PER CENT OF TOTAL		DEATHS PER 1000 EMPLOYED (1 2 3 4 5 6 7 8 9)
	EMPLOYED IN MINES	DEATHS FROM FALLS OF COAL SLATE AND ROOF	
German	.76	1.68	8.47
Greek	.43	.84	7.52
Slavish	2.78	4.21	5.78
Polish	3.91	5.77	5.63
English speaking foreigners	1.83	2.52	5.27
Austrian	2.05	2.76	5.15
Italian	12.31	15.26	4.74
Hungarian	7.47	9.13	4.67
Russian	1.94	2.16	4.27
Negro	18.71	18.75	3.83
American	45.79	34.76	2.90
Lithuanian	.93	.48	1.97
Other nations	1.09	1.68	5.92
Total	100.00	100.00	3.82

FIG. 3. FATAL ACCIDENTS FROM FALLS OF COAL, DRAW SLATE AND ROOF IN MINES OF WEST VIRGINIA, 1907-11

In the summary report of the Immigration Commission, we find that for 88,368 employees in the mines of the eastern and central coal fields, of whom detailed information was received, 61.91 per cent. were of foreign birth and 9.5 per cent. were of native birth but with a foreign father. Only 20.7 per cent. of the foreign-born employed had had any experience in bituminous-coal mining before coming to this country. Should we deduct from this per cent. the men from Great Britain, I believe this percentage would be lowered considerably.

Longwall in Seams Liable to Spontaneous Combustion

BY J. E. SPICER*

SYNOPSIS—Working a seam at South Derbyshire, England, where the coal is liable to spontaneous combustion. Several attempts to prevent the ignition of the coal by excluding the air from the waste proved unsuccessful, until the adoption of the longwall system of mining. Seam generates gas. Description of the method employed.

The longwall workings in the main coal seam of South Derbyshire, England, are an interesting example of the application of this method to the working of coal liable to spontaneous combustion. This seam was formerly worked by the common system of longwall advancing, the roads being maintained by well built packwalls. Much trouble was experienced by the heating of the gob, which resulted in frequent fires difficult to isolate. Attempts were made to overcome this difficulty by building continuous walls of clay, which were locally known as "wax walls." These efforts, however, were only partially successful in excluding the air from the waste and preventing spontaneous ignition from taking place. The inflammable nature of this coal together with the gas generated rendered the mine subject to frequent gob fires.

The room-and-pillar system was also tried, in the working of this seam, the pillars being removed by "lifts" or "skips," in the usual manner. Several serious fires occurred, in the use of this method and, as a result, strong stoppings of brick or concrete had to be built and a portion of the mine indefinitely abandoned. The method of longwall retreating that I am about to describe proved the most successful process that has been thus far adopted, in the working of this seam. It is the method by which the seam is worked today.

*Cumberland, B. C., Canada.

The accompanying illustration (Fig. 1) shows a vertical section of the main coal seam to which I have referred. The workable portion of this seam is included between the fireclay and shale that forms the floor and the "batt" underlying what is called the "over coal." These several strata are shown in the section. The over coal, which is 5 ft. in thickness, is of inferior quality and is generally left in to form the roof in the first working. Sometimes, however, the lower coal is only taken out to the "tops," which forms a good roof and saves the handling of the "batt" just above it. The "best hards" being of splendid quality is loaded separately. The fireclay, forming the floor of the seam, is also worked, to some extent, and is used for brick-making, this industry being carried on largely in the district.

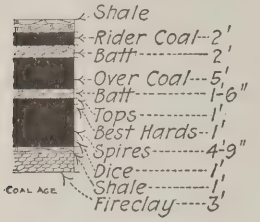


FIG. 1. VERTICAL SECTION OF COAL SEAM

While the coal itself remains fairly regular, over a large area, maintaining its average thickness and quality, the other strata vary considerably. For example, the batt underlying the over coal varies from 6 in. to 4 ft. in thickness. This feature practically decides the question of whether or not the "tops" should be taken down in the first working.

The general plan adopted in the working of the main coal seam is illustrated in Fig. 2. Parallel headings are first driven in the coal, from 9 to 12 ft. in width, and from 90 to 120 ft. apart. These headings, which serve as haulage roads, are connected by crosscuts of the same width. The crosscuts, which are driven for ventilation, should be as few in number as possible. On the plat they are shown 50 yd. apart. Owing to the thickness of the intervening pillars, the driving of the crosscuts is expensive; and, furthermore, when retreating, they are apt to cause heavy caves or roof falls.

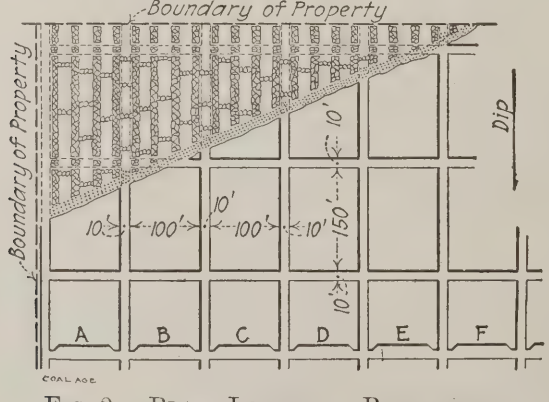


FIG. 2. PLAN, LONGWALL RETREATING

The headings are driven right to the boundary line or the extent of the property, before the longwall face is commenced. As a precaution against spontaneous combustion in the waste, all the slack and small coal are loaded out of the mine. This greatly reduces the chances of mine fires occurring in the waste.

The seam gives off a quantity of marsh gas (CH_4); but, for the most part, the gas drains from the pillars, during the first working. Drill holes are put up in the roof, at intervals, to allow the gas to drain from the overlying strata. It is necessary, in order to prevent the accumulation of gas in any portion of the mine, to maintain a strong ventilating current, which is made to sweep the working faces, the circulation being assisted by secondary fans where that is necessary. The strong air current is all the more important, because of the presence of gas and the possibility of fire starting in the waste, which presents a serious and dangerous condition.

As shown in Fig. 2, as the headings reach the boundary line, in continuous succession, the longwall face is extended. It is important to keep this longwall face in a straight line running at an angle with the heading, in order to reduce to a minimum the possibility of a cave cutting off a considerable length of the working face at one time. This would be very apt to occur, if the face were made to run square across the pillars.

During the work of retreating, as the coal is extracted, packwalls are built 9 ft. wide, with 18-ft. wastes between them, except at the headings where the waste space is narrowed to a width of 12 ft. The packs are built of coal taken from the interior portion of the seam, the interstices being well filled with sand or flue dust, which would tend to extinguish any fire that might occur in the mass. This system is continued as long as the roof holds good; but if a cave should occur in the waste, the place is built off by a packwall 6 ft. wide, which is made as tight as possible to exclude the air.

The timbering consists mainly of posts set in rows 5 ft. 6 in. apart, the posts in each row being spaced the same distance, center to center. Two rows of posts are set in each crosscut, and three rows at the longwall face, the third row at the rear being drawn and set forward as the face advances. These are not shown in the figure. The headings require to be well timbered, since they are weakened by long standing. As shown in Fig. 2, the headings are driven to the rise. As shown also in Fig. 2, at *A, B, C,* etc., the plan was adopted, at one time, of widening the crosscuts, a short distance from the heading. The crosscuts were widened to 15 or 20 ft., but the plan proved to be bad policy, as it was more expensive and caused heavy caves when reached by the retreating longwall face. These caves cut into the longwall face so badly that the plan had to be abandoned.

Coming Mine-Safety Field Meets

The United States Bureau of Mines is being continuously called upon to lend its coöperation in various field meets and contests in first-aid and mine-rescue work. The following field meets and contests have been called to the attention of the bureau within the last few days:

April 25: Ironwood, Mich. Gogebic Range Mining Association. O. E. Olsons, Sec.-Treas., Ironwood, Mich.

May 2: Harrisburg, Ill. Saline County Mine Safety Association. Oscar Cartlidge, Springfield, Ill. Chairman, Program Committee.

May 9: Lexington, Ky. Kentucky Mining Institute and Kentucky Mine Operators' Association. C. J. Norwood, Program Committee, Chairman.

May 13-15: Bluefield, W. Va. West Virginia Medical Association and Pocahontas Coal Operators' Association. Mr. Tierney, of the Powhattan Coal & Coke Co., and Mine Foreman Henson, of the United States Bureau of Mines, are planning such a meet in correspondence with Dr. A. P. Butt, of Davis, W. Va. Details not definitely settled.

May 18: Fort Smith, Ark. W. D. Ryan and J. J. Rutledge, of the Bureau of Mines, are arranging this meet.

May 21: McAlester, Okla. W. D. Ryan and J. J. Rutledge, of the Bureau of Mines, are arranging and will probably attend.

May 25: Pittsburg, Kan.

May 28: Moberly, Mo.

June 1: Des Moines, Iowa. (This date and place in Iowa may be changed later.)

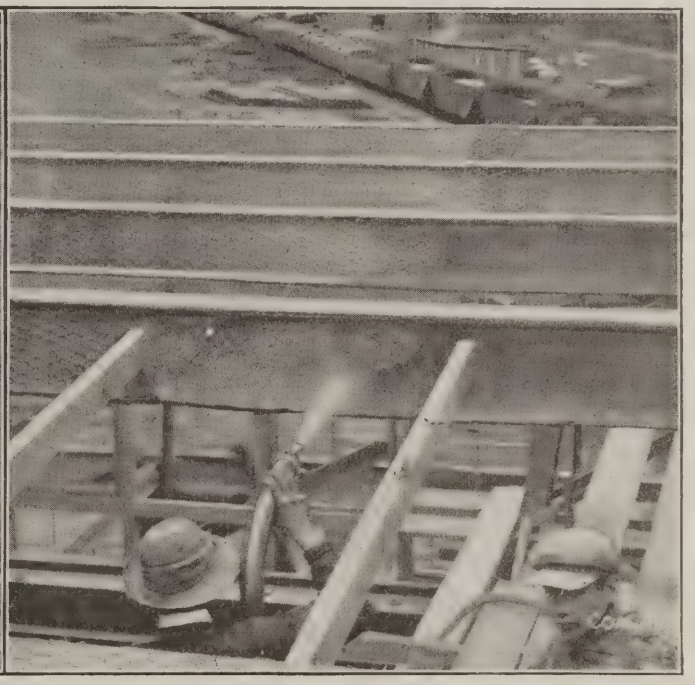
Availability of the Cement Gun for Mine Work

SYNOPSIS—The cement gun deposits cement mortar by an air blast mixing the water with the dry ingredients at the delivering nozzle. The material formed is known as gunite and is denser and stronger than ordinary cement mortar or concrete. It is well suited for making buildings fireproof and permanent, and for coating headframes, tipples and mine roadways. It could also be used with advantage for stoppings and overcasts.

The cement gun has been described before in these columns† but its availability for the specific uses of the mine owner were not indicated. It is probable that it would make slow headway in underground mining work regardless of its intrinsic value for such purposes were it not for the fact that it is a most desirable piece of equipment for outside mine uses. Once purchased by mining companies for surface work, it is likely to be rapidly introduced below ground for compressed air is frequently available and the height of a low machine 4 ft. 8 in., and its width 3 ft. 1 in. make it readily suitable to movement from place to place. When this machine, weighing only 1500 lb., is tilted, its height is the same as that of the wheels, namely 36 in. Consequently it can be taken almost anywhere.



Cement Gun Being Used to Coat Interior of Building



Gunite Being Deposited on Steel Work. Note Reinforcement

Manner of Operation

The cement gun practically consists of a cylinder for storing dry cement mortar, a feeder for delivering measured quantities to an opening which quantities are driven by air pressure through a hose line till they reach a nozzle where they are hydrated by a water hose just before they emerge into the air.

The storage chamber must necessarily consist of two parts marked *A* and *B*, the latter being kept constantly at a pressure of 45 lb. Before *A* is loaded, the air in it is allowed to escape. The small cone is lowered by lifting the handle and the dry mix falls into the cylinder *A*. The cone is then lifted and air under pressure is admitted. The inverted cone *C* becomes tightly seated and as the pressures in *A* and *B* become equal the inverted cone *D* can be lowered permitting the charge to fall into cylinder *B*. On raising the cone *D* by the handle, a cycle of operations is completed and the upper cylinder is ready for depleting of air and recharging with a new batch of mix. In this way continuity of operation is insured with only one machine feeding the nozzle, the work not being stopped during the charging of the hopper.

How the Charge Is Hydrated

The feeder *K* is kept revolving through a spur- and bevel-gear train by the air motor *E* on the rear of the truck. It delivers intermittently yet with frequency at *R*, through the valve *H*, a measured amount of dry mortar from the storage chamber *B*. This is discharged under pressure by the air and passes through hose of pure soft rubber covered with heavy canvas. This is of any necessary length, and may be 300 or even more feet long.

On reaching the nozzle to which water is admitted from the pipe *P* by the valve *V*, the mix is thrown into the air in a concentrated stream at a speed of 110 ft. per second. The material is now hydrated for the first time. There is, therefore, absolutely no set in the mortar when it reaches the place of deposit.

There can be no question as to the amount of water to use. It must be sufficient to cause the mortar to adhere without running. If enough water is not added the

†May 11, 1912. Vol. 1, p. 1011.

gunite will not stay in place and the dust formed will inconvenience the nozzleman so that he will be sure to increase the supply. If too much water is used, it is expelled automatically by the force of the impact. The air also which might be expected to render gunite a scoria-like mass of cement bubbles, creates a material more dense than the best mortar owing apparently to the violence with which the mix is projected against the face to be coated.

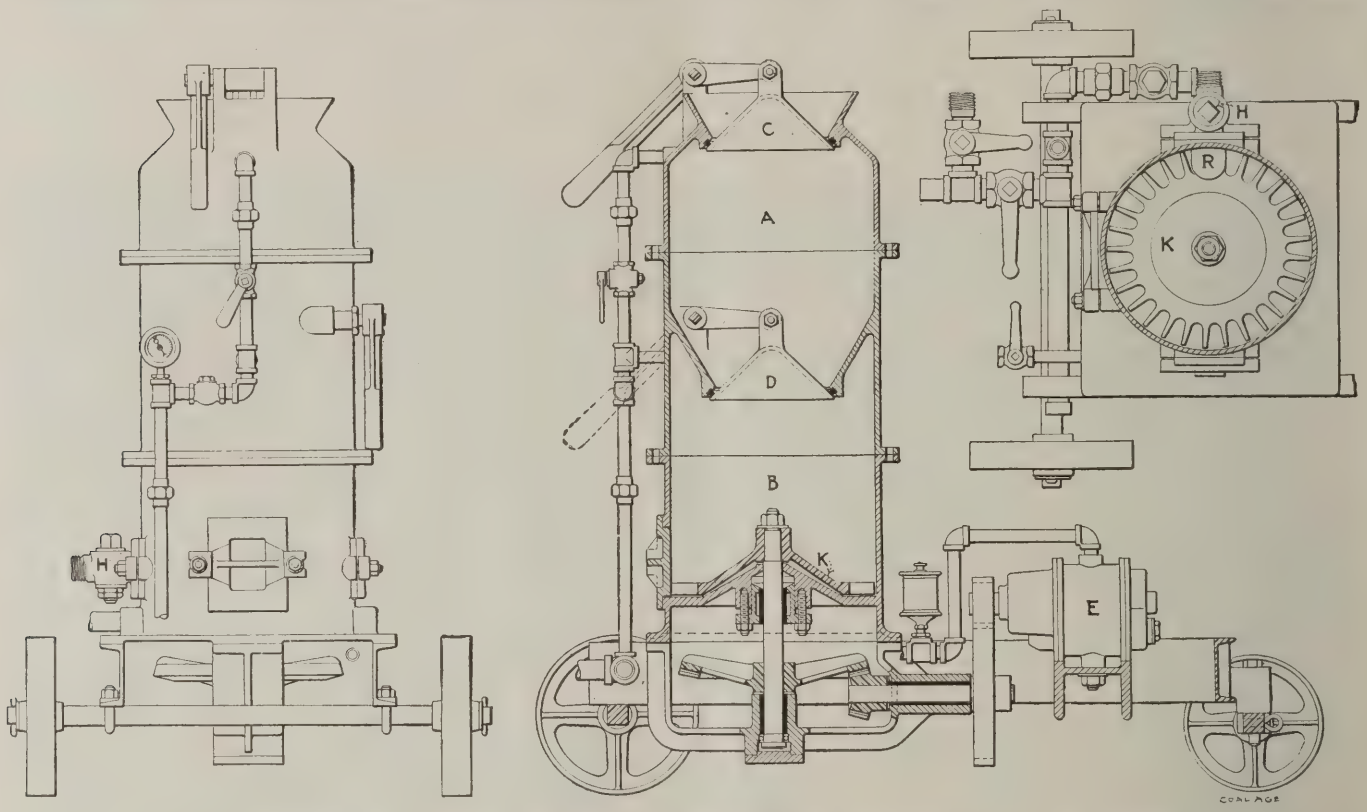
Surface Coat of Pure Cement

When the mixture is first thrown against a surface, the sand fails to stay in place. Only pure cement will stick until the body is coated with that material. But the rebound of sand immediately ceases and the mortar begins to adhere as a whole, building grain upon grain. In this way there is no contact between the sand and the material coated. Every grain of sand is attached by a coating of cement to the reinforcement or backing.

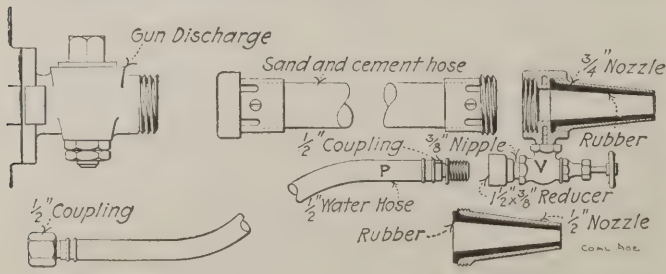
Engineers who have been specifying that such a coating of pure cement be placed on all surfaces, before making an addition to work after a delay in building up a concrete structure, will appreciate the value of this automatic selective action of the cement gun and will realize why gunite holds with a grip of iron so strong that it is being projected on the surface of piles in harbor work before they are driven. After the gunite has been hardened, they will then bear driving by a 3000-lb. hammer to a 20-ton bearing.

Precautions against Wear of Hose

The hose, couplings and nozzle of the cement gun must be suitable or the wear will be rapid. The couplings fit on the outside of the hose so that there is a continuous lining of rubber. The nozzle also is lined with the same substance, to defend it against abrasion. This is necessary because there is a certain diameter of nozzle suited to a definite diameter of hose and if much wear took place the loss of air would be considerable. The nozzle is made with an annular ring at its larger end. The water is admitted to this ring, and is permitted to enter the outflowing stream of mortar by perforations in its periphery. Straight steel pipe may be used to transport the mix but on curved sections, rubber-lined hose is essential because a curved-steel pipe will wear out in a few hours' time. The rubber lining of the nozzle will last from one to three weeks. The material hose is from 1 to 1½ in. inside diameter and the hose delivering water to the nozzle is ½ in.



Elevations of Original Model of Cement Gun, Mounted on Four Wheels



Details of Material and Water Hose

The cement gun does not use much air. All that is needed is about 150 cu.ft. of free air per minute compressed to 45 lb. pressure, which is sufficient for the working of a gun at a capacity of 1½ cu.yd. of dry mortar per hour. A larger volume of air at a higher pressure will speed the machine up to 3 cu.yd. per hour.

Gunite Is a Superior Grade of Cement Mortar

As stated, gunite is superior to cement mortar as prepared by ordinary methods for there is no incipient set before placing; its adhesion is superior and its density a maximum. The report of Westinghouse, Church and Kerr shows that gunwork excelled handwork from 20 to 260 per cent. in tensile strength, 20 to 720 per cent. in

compressive tests, 43 to 1900 per cent. in surface impermeability, 40 to 430 per cent. in resistance to water absorption, 33 to 92 per cent. in the volume of voids, 27 per cent. in adhesion and 12 per cent. in weight.

Hence, the only question as to whether to use gunite is not one of quality but as to the amount needed to justify the employment of a machine, for the price of application is lower than with handwork, and the coating being stronger need not be so thick.

Suitable for Refacing Mine Buildings

Gunite can be used for a great many purposes among others for coating frame houses. This makes them warmer, drier, stiffer, more fireproof and more permanent. The illustration shows the little town of Elba, N. Y. In 8 days, 15 houses were covered with a 1¼-in. covering of cement mortar. The actual time occupied was only 60 hr. 40 min.

Better results could have been obtained had the coating been only ¾ in. thick instead of 1¼ in. However, ⅞-in. furring had been supplied instead of ¼ in. and the thickness could not be kept down to the preferred figure. Small-mesh expanded-metal lath was used as reinforcement.

To perform this work the following labor was used: 1 gunman at $2.50, 1 nozzleman at $2.50, 1 foreman at $3.50, 3 laborers at $2, 1 engineer at $2.60, 2 plasterers at $5.50, the latter being union men. The total payroll per day was $28.10. In all, 1402 sq.yd. exclusive of openings, were covered at a labor cost of 14.2c. per sq.yd., using 434 bags of cement and 44 cu.yd. of sand. This figure, we are assured, is somewhat high for cement-gun work, the labor costs ranging from 8c. to 16c. per sq.yd., according to circumstances.



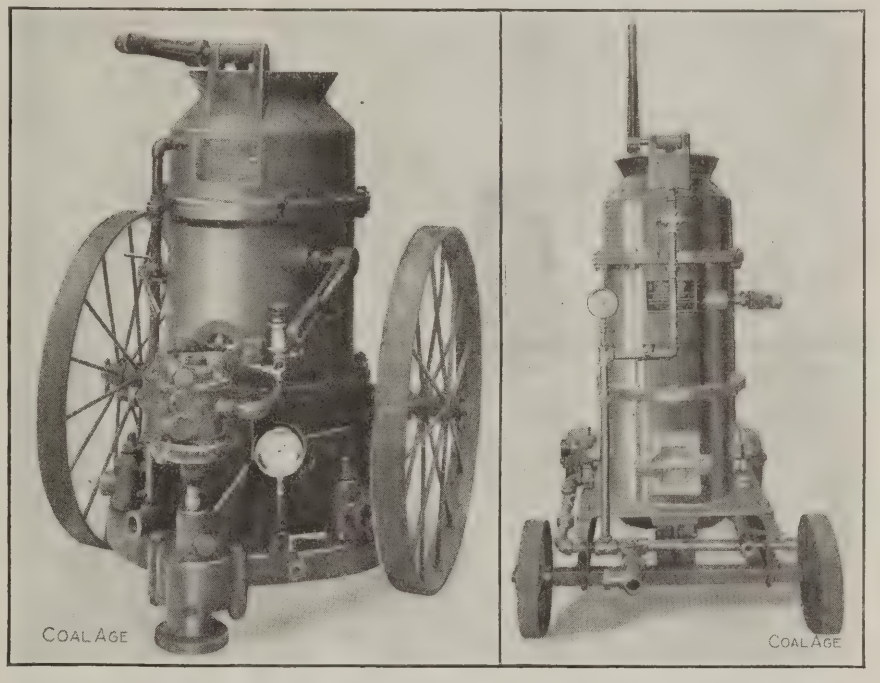


A Gunited Village at Elba, N. Y.

This method of coating houses inside and out is well suited for use in the building and repairing of mine villages. It can be used for power houses, office buildings and barns. If a fine finish is not needed, the employment of plasterers is unnecessary and except where an even coat is desired, there is no need for a skilful operator. The quality of the gunite is the same when made by a novice or a competent man.

Gunite May Be Used to Coat Steelwork

It is a desirable coating for steel tipples, headframes and bins. Being so impervious it protects the steel most effectively. Ordinary concrete of as lean a mixture as 1 to 9, can be filled in the heart of the box columns. The exterior of these can be encircled with reinforcement and coated with gunite. If desirable, however, this reinforcement can be used only on the top and bottom flange and the gunite be used to coat the flanges and web as shown in *C* in the illustration on the succeeding page.



The More Recent Type of Machine Suited for Mine Work

The Original Type on Four-Wheel Truck

Gunite can also be used for tanks and reservoirs and for such purposes its imperviousness is strongly in its favor. The Twin Peak Reservoir at San Francisco is used partly for water storage and partly for an auditorium. When first built, it leaked at the divisional wall, but it was coated with a coat of gunite ¼ to ½ in. thick and now is water-tight, yet the head of water on the base of the wall is 27 ft. The cement gun would serve for coating boiler settings, making them impervious to the air. The coat might crack from the heat after a while but such destruction is to be expected of all such coatings and can be repaired.

Use Underground

Gunite can be used for fireproofing, drifts, mine roadways and stables. Where it is desirable to place a dividing wall between compartments in a shaft, the use of the gun is to be preferred, especially as the delivery of the material is conveniently effected through the medium of a hose.

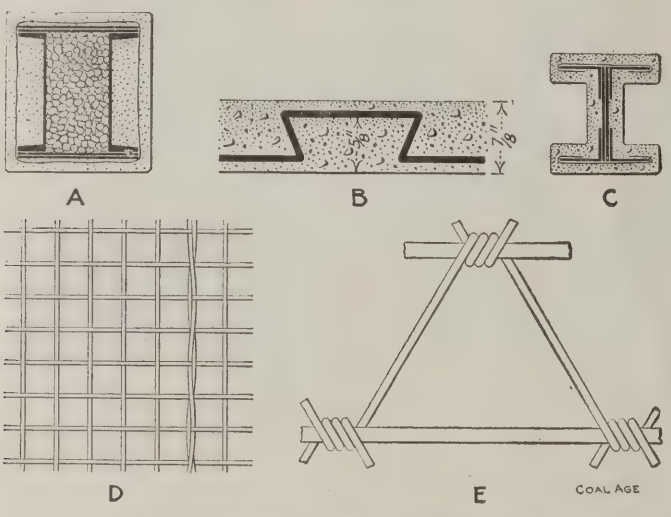
It seems remarkable at first how largely gunite is used in connection with something so temporary as timber. Yet when we remember that it is cheaper than cement plastering, the reason is evident. Where it is desirable to secure a life for timber sets inferior perhaps to iron,

but greater than that of ordinary timber, the roof, ribs, sides and timbers could be coated by the cement gun, wire reinforcement being placed around the timbers and the posts being supported on a concrete footing. All this could be arranged without removing the timbers and so bringing down perhaps much of the roof.

When the roof tends to fall from oxidation or moisture, the cement will give it a permanent coat which will resist further weathering. It will not, of course, serve where the pressure is severe and the coal ribs are insufficiently strong.

Brattices and Stoppings

Gunite could well be used for stoppings and overcasts. For the purpose ferro-inclave reinforcing would be most desirable as it is not a mesh but a thin plate. Consequently, the gunite forms without difficulty on its face and back. The brattice could be made about 7/8 in. thick.



Reinforcement for Gunite Work

A, box column filled with 1:9 concrete wound with reinforcement and coated with gunite; B, ferro-inclave coated with gunite, suitable for new brattices; C, an I-beam with flanges covered with reinforcing and entire surface covered with gunite; D, Clinton electric welded wire; E, triangle mesh American Steel & Wire Co.

When wood brattices have to be replaced throughout the mine, thin cleats could be nailed on their faces and on these spread and nailed some form of reinforcement such as Clinton electric welded wire, 4x4x12x12 in., or the 7 or 7a triangle mesh of the American Steel and Wire Co., or larger expanded metal lath of some sort. When strength is not so necessary, poultry wire will serve instead of the more expensive reinforcing. Where brattices are to be built in front of old wood stoppings, the cement gun can then be used on one side only and the coating will cover the wire complete. It would be easy to make this cement work fit tightly to roof and floor whereas it is hard to connect poured-concrete work to the roof.

The mix is usually one part portland cement to three parts of coarse sharp sand passing through a 1/4-in. screen. Other compositions may be used, however, and hydrated lime, suitable coloring material or any other ingredients may be added such as are used with ordinary cement mortar without injury.

The preceding table gives data on which the performance of the cement gun may be estimated.

The Cement Gun is made by the Cement Gun Co., Inc., of 30 Church St., N. Y.

TABLE OF AIR REQUIREMENTS, CAPACITIES AND RESULTS OF THE CEMENT GUN

Duty per day 3/4 in. coat, sq.yd.	245	254	305	407	762
Duty per hr. 3/4 in. coat, sq.yd.	30.9	31.7	38	57	95
Duty per day 1 1/4 in. coat, sq.yd.	147	152	182	243	456
Duty per hr. 1 1/4 in. coat, sq.yd.	18.5	19.0	22.8	30.4	57
Number of nozzles used	One	One	One	One	Two
Diameter of nozzle, in.	1/2	3/4	3/4	3/4	3/4
Average air pressure at gun, lb. per sq.in.	30 to 35	38 to 40	40 to 45	50	30 to 40
Interior diameter, material hose, in.	1	1	1	1 1/4	1 1/4
Free air supplied compressor, cu.ft. per min.	110	135	150	175	210*
Rated delivery passed through gun, cu.ft. per hr.	25	35	40	50	85
Actual delivery	20	25	30	40	75

Note:—Results obtainable with the cement gun are affected by elevation above sea level, moisture and temperature of the air, quality of sand and its contained moisture, mechanical efficiency of compressor and the length of the transmission hose. The figures in this chart are based on an 8-hr. day, a 1 to 3 mixture of cement with sand and 100 ft. as average length of material hose.

* Air used for material hose only. Feed wheel driven separately by electricity.

The Traitor

By Berton Braley

Written expressly for Coal Age

He was a walking delegate,
A canny labor leader,
Exceeding clever in debate,
A smooth and ready pleader;
The miners thought him keen and wise,
To place and power they thrust him,
He was a hero in their eyes,
They thought that they could trust him.

But he was full of guile and craft,
A wiz at dealing double,
He held the owners up for graft,
He made the miners trouble,
The tricks he worked, the lies he spun
Would fill a lengthy docket,
For he looked out for Number One,
And blithely crammed his pocket.

He was a traitor to his cause,
Betraying friend and neighbor,
And breaking faith and breaking laws,
All in the name of Labor,
HE didn't care if famine came
And want and woe were showing,
For men were counters in his game
To keep his bankroll growing.

Yet when this foxy boy was caught
With all the graft he'd looted,
The workers cried, " 'Tis as we thought
Our leader's persecuted!"
And 'spite of proof and evidence
Of all his sales and barter,
And in the face of common sense
They made him out a martyr!

Rights under Illinois Mine Safety Law—The fact that the examiner of an Illinois mine had not marked a clod in a roof warranted a miner working under it in assuming that the examiner deemed the place safe, and the miner was not guilty of contributory negligence in remaining at work there. The coal company cannot escape liability for injury resulting from fall of the clod, because general instructions had been given employees in clearing out the mine to make all places safe. This precaution did not obviate the necessity for having the mine inspected and dangerous places marked, as required by the Illinois statutes. (Illinois Supreme Court, Piazzi vs. Kerens-Donnewald Coal Co., 104 N.E. Reporter 200.)

Automatic Safety Mine-Car Cagers

By E. G. Banta*

"There is a path which no fowl knoweth and which the vulture's eye hath not seen; the lion's whelps have not trodden it nor the fierce lion passed by it."

So wrote the inspired writer as recorded in a portion of Job; 28. Today the underground channels so vividly pictured in the chapter, as partly quoted above, honeycomb the earth in various localities for many miles and in the central bituminous district alone many thousands of men are employed in producing coal.

As in every other industry, machinery is being used more and more either to largely increase the working power of man or to safeguard him against the many accidents peculiarly incident to the production of fuel.

Many of these accidents occur in the handling of the cars at the shaft bottom and upon the tipples and inclines of the modern mine where whole trips frequently get beyond control of the workmen, expert though they are, and either pile up in the sump or run wild over the edge of the tipple, falling to the ground below.

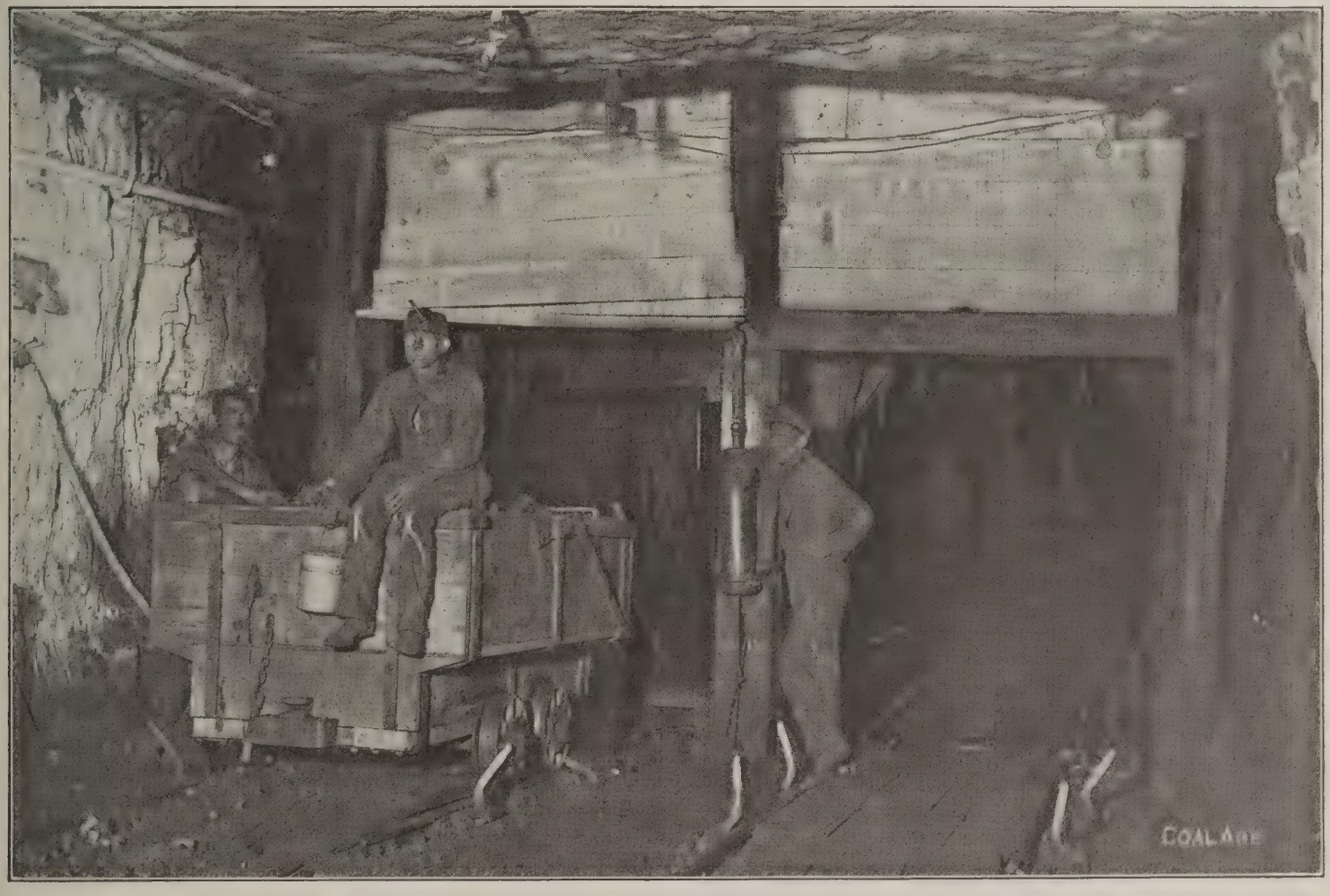
In hoisting, coal is shaken from the car and falling down the shaft breaks hands, wrists, arms and heads of the men engaged in placing cars upon the cage.

The human body has its limitations and increased tonnage means not only additional labor for the men already employed, but an actual increase in their number. If all men so engaged were skilled and could be depended upon to always be at their places in the mine, accidents would be reduced materially but the human element is uncertain and unreliable.

One man takes sick and a green hand is substituted with resulting delays, accidents and wrecks. Another becomes careless, with similar results.

Quick, accurate caging, coupled with speed in hoisting assists materially in increasing the output of any mine and is necessary to the constant employment of those who operate the coal cutters and load the cars.

The accompanying illustration shows the shaft bottom at one of the mines of the Superior Coal Co., at Gillespie, Ill., equipped with an automatic safety mine-car cager, manufactured and marketed by the Mining Safety Device Co., of Bowerston, Ohio.



An Automatic Cager in the Mine of the Superior Coal Co., at Gillespie, Ill.

This cager is a single but effective automatic device, which installed at a shaft bottom does the work of the usual cagers, by taking the cars from the trips, one at a time, and placing them on the cage, accurately, safely and speedily. At the Nokomis (Ill.) mine of the Peabody Coal Co., these machines are feeding two cars, side by side, to the same cage.

In connection with these automatic cagers the same company is marketing a combination of automatic stops and angles which lock the car in position for hoisting.

These equipments are now to be found in mines in both the anthracite and bituminous districts of Pennsylvania, in West Virginia, Ohio, Indiana, Illinois, Iowa, Colorado, Alabama, Kentucky and Canada. It is claimed that their use is resulting in an actual saving in the handling of the cars of from ½c. to 1c. per ton.

412 Fairbanks Bldg., Springfield, Ohio.

Who's Who in Coal Mining

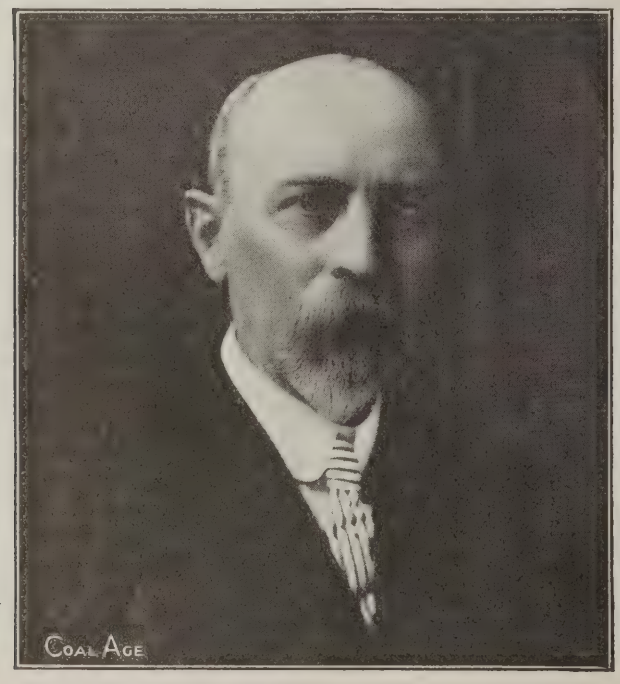
Edward V. d'Invilliers

Edward V. d'Invilliers is one of the foremost mining engineers and geologists in the United States. He was born in Germantown, Penn., Aug. 2, 1857. After attending a military school, Mr. d'Invilliers entered the University of Pennsylvania, from which institution he graduated with the degree "Bachelor of Science," in 1878. In 1913 his *alma mater* honored him with the degree "Doctor of Science."

Since becoming actively engaged in engineering and geological work, Edward d'Invilliers has made reports for some of the largest mining interests in America. His geological investigations of coal and ore measures in various states are particularly notable. He is at present a member of the Pennsylvania Topographic and Geologic Commission, and has contributed largely to the work published by that body. Some of Mr. d'Invilliers' contributions have appeared in the transactions of the A. I. M. E., the Geological Society of America and the Engineers' Club of Philadelphia. One of his most extended examinations covered the Pittsburgh coal region. Another important investigation, conducted by Mr. d'Invilliers, dealt with the iron ores and limestones of the Cumberland Valley.

He is a member of the Mining and Metallurgical Society of America, A. I. M. E., the Geological Society of America, the American Philosophical Society and the Franklin Institute.

Mr. d'Invilliers continues in the practice of mining engineering and geology, having his office at 518 Walnut St., Philadelphia, Penn.



EDWARD V. D'INVILLIERS

William Haven

William Haven is one of the leading coal operators in Iowa. He was born at Portsmouth, N. H., Nov. 11, 1845, and graduated from Norwich University, in Vermont, with the degree "Bachelor of Science" in 1863.

In 1869 Mr. Haven went west to Illinois and had charge of the construction of a section of railroad for the C., B. & Q. R.R. His connection with the coal industry of Iowa commenced in 1870, when he was placed in charge of three mines of the Union Coal & Mining Co. as assistant superintendent.

A few years later he organized the Whitebreast Coal & Mining Co. and was elected president of this corporation. On account of the good marketing facilities and excellent quality of the product, this company, for several years, was the largest shipper of coal in Iowa.

In 1882 Mr. Haven sold his interest in that company, at the same time agreeing not to engage in the coal business in that district for ten years. It was not until 1897 that he again entered the coal business, organizing what is known as the Inland Coal Co. This concern soon developed much territory in the Lucas County field, of Iowa, and placed the coal business of that section on a more substantial basis than ever before. Although the Inland Coal Co.'s mines were recently sold to other interests, Mr. Haven will be remembered as the pioneer operator of that particular field.

He is still a member of the Iowa Coal Operators' Association and deputy governor of the Iowa Society of Colonial Wars.



WILLIAM HAVEN

Editorials

One Way to Introduce Your Coal

"And there is no new thing under the sun." Possibly not, but here is an interesting variation.

A coal-mining company in Alabama has purchased a large quantity of coal scuttles and on each of these buckets they have had printed in artistic lettering, the name of their coal and a statement that it contains little ash. These buckets are now being sent out gratis to the various retail coal dealers who handle this particular coal exclusively, with the request that the buckets be filled with coal and distributed free to the households that are in the habit of buying their coal in small quantities from retail coal yards. The entire expense of filling the buckets with coal is borne by the wholesaler.

Brands of tobacco, baking powder, tooth paste and soda crackers have all been introduced in this manner; why not coal?

Manyana

The state of Pennsylvania is said to be still in existence and it is credibly reported that in 1912 it put some coal on the market, at least E. W. Parker so states, and he ought to know. But so far we have no state report of production and now we learn the bindery of C. E. Aughinbaugh, where the state publishes its belated reports, is burned down.

A part of the issue of Smull's legislative handbook for last year is destroyed and it is proposed that efforts be concentrated on the issue of 1914, which should have been published early in the year. We think this ill-advised and suggest that work be commenced on the entire bulletin issue of 1916, so that there may be no failure when that year arrives. Our attitude on the momentous issue is one of "watchful waiting."

The Operators of Central Pennsylvania

It is pleasing to note that the operators of central Pennsylvania have showed a disposition to meet their men and discuss the wage scale at the earliest possible moment. We confess we did not like to see a body of mine owners laying off their men because these men, not even suggesting a strike, *asked* for something which would involve the former in expense.

We are not accustomed to discharge, or even to suspend for ten days or two weeks that foolish employee who thinks he is entitled to a "raise." We usually discuss the question with him, and if we think he is not entitled to his demand, we are firm. He is no criminal that we should make him suffer and his family in the old-fashioned pre-Mosaic manner.

We are glad to acknowledge that there was no pressure of one operator on another to make him perpetrate so signal an injustice. Those who could not see clearly the falsity and the humor of the situation did not press their construction of what was appropriate on others.

On going to press, we understand that the men and operators are to meet at Clearfield, Penn., about Apr. 23 and it is sincerely to be hoped that their session will soon result in industrial peace. The demands of the men are reasonable and in accord with the present trend which would replace manual labor by mechanical, or at least animal power, but the miners cannot expect that this change will be made at the expense of operators, having to meet such competition as exists in Pennsylvania.

The list of bankrupted companies is too long and would be longer if a little such pressure were brought to hasten insolvency. If pushing cars is such an affliction, as indeed we agree it is, let the miners accept a reduction per ton mined in return for its abolishment and load a few more cars per year to recoup themselves.

District concessions are inconceivable where competition is so fierce. Inequalities usually exist only because such differences in scale are essential to the life of the industry in the region receiving them. There are, of course, large exceptions, and where such exist, the profits made in that section flood it with operators and raise by lowered price and increased royalties, barriers to wage adjustment which soon become insuperable.

One Great Item of Cost in Mining

Few people realize the heavy expense incurred by the hard-coal companies in their efforts to keep the anthracite mines dry. The latest estimate of the Pennsylvania Department of Mines places the total capacity of the pumps below ground in the anthracite field at more than 3400 tons a minute. This means that they are capable of pumping nearly 1,800,000,000 tons of water per annum.

At the present time these pumps are actually handling approximately 951,000,000 tons of water each year. Thus thirteen tons of water are lifted for every ton of coal mined. Such a quantity of water would fill a canal 10 ft. deep, 100 ft. wide and 4600 miles long.

At some collieries water is hoisted as well as pumped to the surface. In a shaft at Hazelton, a 2000-gal. tank (7.4 tons) is hoisted 95 times an hour. In the Pottsville region tanks holding 3000 gal. (11 tons) are in use. In the northern anthracite field, near Scranton, there is one mine where twin tanks are used, and 5100 gal. of water are hoisted each minute. In addition to the twin tanks at this mine, there is a 1000-hp. pump continually at work. This pump raises a column of water 16 in. in diameter 460 ft. in one minute. A modern pumping plant today costs from $25,000 to $30,000. Such an installation will discharge to the surface about 7000 gal. per minute.

The D., L. & W. collieries pump from 7,000,000 to 13,000,000 gal. per day, and at some of the operations of

the Susquehanna company, 9.3 tons of water are hoisted for every ton of coal. The Pennsylvania Coal Co. raises 7 tons of water for each ton of coal, the Delaware & Hudson Co., 14.3 tons, the Lehigh Valley Coal Co., 15 tons, and the Philadelphia & Reading Coal & Iron Co., 12 tons.

Facts of this nature furnish food for thought on the part of the public who complain about the high cost of their domestic fuel. The price of coal on board of cars at the mines today is very low when we consider the hazards of mining and the difficulties of production. One thing is certain, the mining companies themselves are not making an excessive profit from their operations. If the railroads and the retailers are securing more than is their due, the public should endeavor to adjust matters, commencing at the proper end. If an evil exists in the coal business, the blame should lie on the party at fault.

Rules, General and Special

Of all harmless phylacteries none are better opiates to conscience than the rules, general and special in many languages when we nail up on our tipples as men used to bind the Torah on their temples.

No one reads them and like the "speeches" of our statesmen, they are taken as read. We cannot blame any one, for these mandates are assuredly the driest of reading and men who rarely read or who read only with difficulty, will not spend the time to look them over.

But these rules should surely be read most carefully and we believe that the best way to contrive that this may be done, is by having them typewritten, one by one, month by month, and posted as bulletins. By using a different color of paper, interest would never fail. The little screed might be taken for a notice of a dance, a prize fight, a union meeting or a church gathering. Most probably everyone who could, would read it especially if it were written in every lanugage which the typewriter can print with a little help. We except, of course, from such a list of tongues, Greek, Chinese and Japanese.

No one can accept a hundred instructions at one time. They are best brought to the attention of the workmen one by one, and though to comply with the law, the rules still continue to be posted, there is no reason why they should not be publicly displayed in the manner suggested. In doing this, of course, the leading mandates can be quoted first.

A few of the "Don'ts" from the Bureau of Mines' Bulletins and from technical journals are suitable for publication in this manner. It would be well to quote the authority by which they are indorsed. We all are more mindful of the advice of strangers and of the regulations of governmental authority than we are of the rules of those whose follies and foibles we know too well. After all the objection of those who oppose safety regulations is often not so much to too much safety, but to too much Smith. They dislike advice and orders less than they do the adviser and disciplinarian.

The 100-Per Cent. Union

There seems a strong objection on the part of some coal operators to a 100-per cent. union in which they imagine all their miners are banded together against them. They rate abstention from union counsels as a sure proof of the friendliness of their men and look upon activity as a sure sign of discontent.

With this view of conditions, we would most strongly dissent. We can understand the man who would prefer to employ only nonunion men, but we cannot comprehend the attitude of the operator who, in recognizing a union, desires to have to deal solely with those to whom his wishes are anathema.

Better by far for him that the union draw into the fold, all those reasonable souls who believe that the domination of capital is an easy yoke, compared to the burdens which would be imposed on the world if the negligent, inefficient, discontented and visionary occupied all the high places. Far better is it that he should meet in debate, the average, composite intelligence of his men, rather than merely those who believe that the world is all wrong and that he is a chief among wrong doers.

It is the best wish for him that the union shall be representative of his men in the mass as the political ballot records or should record the composite judgment of all shades of opinion. In fact, he needs that the ferment of irresponsibility be toned down with those elements of society which perhaps lean in the direction of inertia.

When we hear men boast that the union contains but half the men, we are disposed to presage trouble for such operators rather than peace, for it is likely that at least half of these union men are factious by temperament and regard the union, not as a place of defence, but as a sally port of defiance. On the other hand in a union 100 per cent. strong, probably at least 75 per cent. of the men are approachable by justice and reason, and desire agreement rather than invite dissent.

We are not advocates of the closed shop because in our opinion, such a condition violates the rights of individuals to combine or refrain from combining at their pleasure. Nevertheless, granted that the men desire to amalgamate as a unit to make a collective bargain, we see in that unity, a guarantee of the operator that he will have to deal, not with an unreasonable body, but with a safe and sane aggregate of reflecting men.

The Saloonstead

Last week under the title "Conservation," we called attention to one of the unfortunate results of the present Western land laws. We wish today to direct the thoughts of our readers to another.

We think that much good would accrue if the United States government would in the sale of its public lands reserve the right to restrict and control the selling of liquor thereon. There is at least one coal company in the West which would make a nice revenue by the renting of its lands to saloon keepers and which doubtless could even erect such places as boarding houses and so profit even more directly from the profit of liquor selling.

It refrains from so doing and it is probable that thereby it would do much to make model towns if Uncle Sam did not himself make a profit which the coal company has spurned. For near the towns are tracts which may be and are bought by individuals as coal land.

The price is held too high at present to make the land attractive as a mining proposition, but it is admirable ground for the raising of saloons, pig's ears and questionable dance halls where fan-tan flourishes and the orientals aid the progress of degeneracy.

Discussion By Readers

Starting Longwall in Room-and-Pillar Work

Letter No. 1—Having noted the request for a general discussion of the question of opening a longwall face in a room-and-pillar mine, COAL AGE, Apr. 4, p. 587, and having had considerable experience in this kind of work, I offer the following:

In the mine to which I will refer, the coal was from 3 to 4 ft. thick and overlaid with a soft slate that ranged from 1 to 3 ft. in thickness. This was again overlaid with a harder slate that made a good roof. The mine had been opened on the room-and-pillar system, and 12 rooms had been turned off one heading and driven about 30 ft. when it was found necessary to abandon them, owing to the expense of maintaining a slate crew, which together with the extra cost for yardage and timbering, made it impossible to continue the work further on this plan.

The manager, knowing that I had formerly had experience in longwall work, asked me if I would undertake to open this section on that plan. I agreed to try, and first cut the 12 rooms into each other, at the face, and built up solid packwalls of slate and dirt, just back from the face. In places it was necessary to build chocks of timber filled with slate. By laying a good road in every fourth room, I was able to open out and work a longwall face from 200 to 250 ft. in length. I used good straight props and good cap pieces over each timber. Where the bottom was soft, I dug through the fireclay and set the post on a hard rock bottom.

The plan worked fine. Using a short-wall, Jeffrey machine, it was possible to make one cut the entire length of the face, to a depth of 6 ft. The result was a larger percentage of lump coal was obtained and the output greatly increased. For a 3-ft. seam, cut 6 ft. deep, counting a cubic yard of coal to the ton, the coal mined would average 2 tons for every yard of face cut. The loaders would move the slate while the motor was pulling the trip to the bottom and returning with another trip of empties.

In this system, practically no coal was lost, the entire seam being taken out clean. In some cases, it is possible to carry two or more independent longwall faces; one, say 50 ft. ahead of the other. In many cases, the only practicable scheme to adopt, to work the coal at a profit is to change from the room-and-pillar system to a longwall face such as I have described.

A. T. WADE.

Red Ash, Va.

Letter No. 2—Constant reader, COAL AGE, Apr. 4, p. 587, asks: "Can a common packwall system of longwall mining, with two or three sets of posts at the face, be made to successfully replace the room-and-pillar system, in a mine that has advanced about two miles." In reply to this question, I say yes, having made such a change myself in the following manner:

In Fig. 1 the full lines show the general plan of a mine working on the room-and-pillar system, while the dotted portion shows the extension of the workings on a longwall basis or system of working. The full lines show the extent of the room-and-pillar workings at the time when it was decided to make the change and put the mine on longwall work. At that time, the room-and-pillar workings consisted of one pair of main or face entries, to the right and left of which are shown the last two pairs of cross-headings, on which rooms are still working, as shown in the plan.

Having decided to change this plan of working for a longwall system, the first step to be taken is to stop the face entries, as well as all the cross-entries. Four men must be put to work at once to open what will be called the 19th level, right," which is to be driven to the right, at the head of the face entries, as shown on the plan. This roadway or level is to be driven 12 ft. wide, with a 12-ft. pack on each side, leaving a 5-ft. space between these packs and each coal face, or rib, making the entire width of the opening 46 ft. At the same time, four men are likewise started to open what will be known as the "19th level, left," in the same manner as just described. Both of these levels must be double shifted, in order to supply a sufficient number of working places for the men who are still driving rooms in the room-and-pillar workings. As places are ready for them in the longwall work, they are transferred from the room-and-pillar workings, to the former.

In the longwall work, "gates" or roads are maintained parallel to the face headings in the room-and-pillar work.

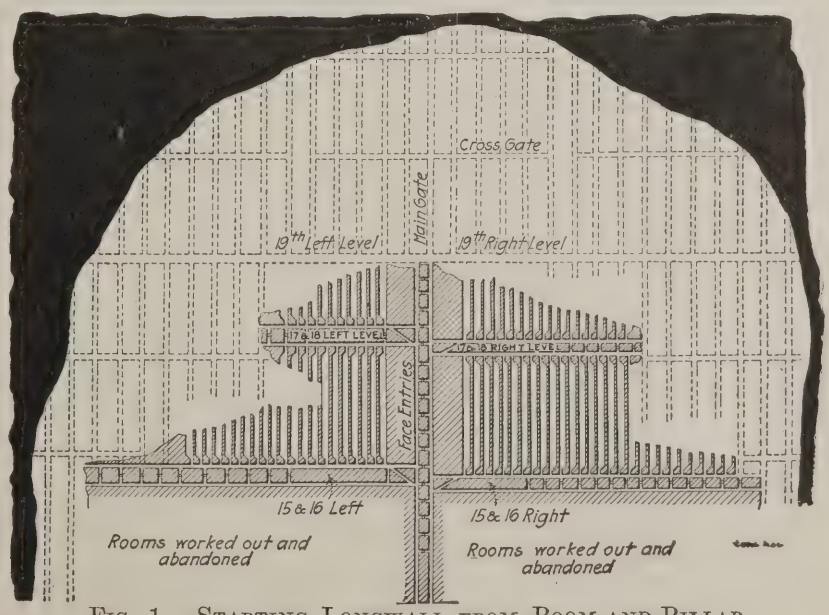


FIG. 1. STARTING LONGWALL FROM ROOM-AND-PILLAR WORKINGS

These gates should be 100 ft. apart if conditions will permit. At times, it may be found necessary to reduce this distance between gates; but it should be remembered that this will increase the expense of "ripping" and packing. The gate which is the extension of the main haulage road of the room-and-pillar workings, as well as the gates dividing the several panels, are "main gates." Each main gate takes the coal from five intervening gates on each side. This plan avoids the necessity of maintaining roads in each gate, after it is cut off by a cross-gate. The cross-gates are driven to the right and left of the main gates, at distances apart varying from 300 to 400 ft.

To provide for the proper movement of cars, it is necessary to put in a "parting" or side track on each main gate just off the level or cross-gate. As each cross-gate is finished, this siding is moved forward to the next cross-gate. The gates opened to the right of 19 right and the left of 19 left work the coal back to the room-and-pillar workings. Ordinarily, four men work in each gate, making 44 men to each main gate.

In Fig. 2, I have shown the proper method of arranging the packwalls and timbering the longwall face. The superintendent of every longwall mine should determine the proper distance apart for setting posts at the face.

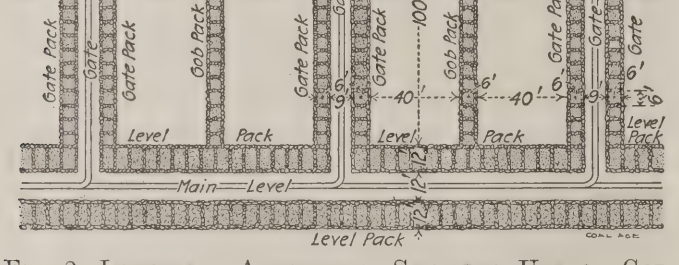


Fig. 2. Longwall Advancing, Showing Use of Gob and Roadside Packs

This is necessary because conditions differ in every mine, in this respect. On no account must posts be left in the gob or at gatesides, because they have a tendency to throw the weight on the coal face, which will frequently cause heavy roof falls that will obstruct the ventilation and cause unnecessary expense for removal.

Before finally deciding to change room-and-pillar workings, in a mine, for the longwall system, a competent longwall man should visit the mine, to study the roof conditions and give his opinion and advice. In the particular seam to which Constant Reader refers, there are 9 in. of soft slate underlying the coal and a 9-in. stratum of coal beneath that, underlaid again with soft fireclay that has a tendency to heave. This floor should be left severely alone, because if bottom is lifted, endless trouble will result from the heaving of the floor, causing extra expense to keep the roads open.

The advantages to be derived from working coal by the longwall system where it can be employed are as follows: 1. Practically 100 per cent. of the coal is extracted, which is from 10 to 15 per cent. more than in the room-and-pillar system. 2. The coal works more readily, which should reduce the price of mining, and the coal is less broken. 3. The workings are more easily ventilated, reducing the cost for bratticing and giving better air to the working face. 4. The distance of hauling the coal is generally reduced, for the same output per day, and there are fewer roads to keep open. 5. More men can be employed and a larger output obtained for the same area of mining than in the room-and-pillar system. 6. The "weighting" of the roof reduces the labor of mining the coal when proper advantage is taken of this factor in longwall working. 7. The expense and danger of blasting are practically eliminated.

It is important in longwall work that the "ripping" should be kept well up to the face, in each gate. Also, the packwalls should be solid and well built. Loosely built packs are crowded out into the roads when the weight comes on them.

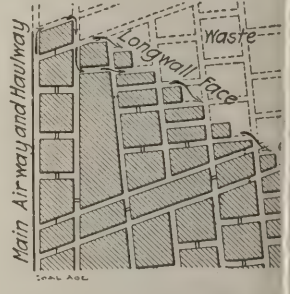
Harry Marson.

Piney Fork, Ohio.

Letter No. 3—I was much interested in the inquiry of Consant Reader, Coal Age, Apr. 4, p. 587, in reference to starting a longwall face, from room-and-pillar workings. I have had 16 years' experience in longwall work, in England. In my opinion, a seam of coal from 4 to 4½ ft. in thickness, with a hard top, is favorable to longwall work. This system has numerous advantages, which may be stated as follows:

The longwall system of mining permits a larger percentage of extraction of coal than can be obtained in the room-and-pillar system. The ventilating current is made to sweep the working face; and, since the waste portions of the mine are closed tight, there is very little opportunity for the accumulation of gas in abandoned places. Less timber is required, and there is practically no expense for yardage.

The most successful plan of longwall work that I have ever witnessed was where the working face presented a broken line. This was accomplished by allowing one place to lead another by about 30 ft., as illustrated in the accompanying figure, showing a small portion of the workings. This plan had the effect of allowing each place to bear its own weight, with the result that it is almost impossible for a sudden weight to be thrown on the face that often results in a heavy cave. In general, the roadside packs should be from 9 to 12 ft. wide. As the work advances, cross-roads are started off the main road so as to cut off the gob roads leading to the face. The purpose of this is to cut down the long haul and reduce the number of roads to be kept up. The same rails can be used over and over again. All abandoned gob roads should be fenced off when the track and timbers are drawn.



Showing Broken Line of Longwall Face

In order to obtain the necessary headroom on the roads, the roof should be brushed instead of lifting bottom, particularly if the bottom is soft. The material taken from the roof over the roadways is then used for building packs at the side of the road. No timber should be left standing in the gob, as it will prevent an even subsidence of the roof on the packwalls and will often cause a sudden weight to be thrown on the face. With

suitable care, roof caves will seldom occur where the working face is advanced uniformly. In longwall work it is important to employ men who understand the system and know how to set the props and draw the back timber as the face advances.

In regard to changing the system of mining from room-and-pillar work to longwall, it is important to prepare for the first weighting of the roof. Cribs must be built every 4 to 6 yd. apart. The gob roads can be laid out from 60 to 70 ft. apart, on each side of the main road, which should be 12 ft. wide; and good solid road-packs should be built on each side of the track. Before making the change from room-and-pillar work to longwall, it is important to lay out a good plan and determine the position of the main haulage road, cross-roads and packwalls. As previously stated, unless substantial cribs and packs are built in a careful manner, the first weighting of the roof will destroy the face. When this is once controlled, the rest is easy. The main intake current is carried up the main road to the face by erecting curtains at the mouth of each cross-road. At the face the current is split, the air passing to each side and returning along the face and the gob roads to the upcast.

JACOB RILEY,
Section Boss.

Universal, Ind.

The United Mine Workers and the National Guards

I was pleased to note the brief editorial, COAL AGE, Mar. 28, p. 531, commenting on the attitude assumed by the United Mine Workers of America in their convention held at Peoria, Feb. 27, at which time the convention went on record as being opposed to the National Guards as maintained in the various states.

The action of the convention, in this respect, is greatly to be deplored. Their contention that the guards are always on the side of capital and never on the side of labor is more of a reflection on themselves as representatives of a great class of workers than on the National Guards. It is the duty of the National Guards, when called upon to act in cases of labor disputes, to protect life and property that are menaced by the attitude of many of the strikers. In the performance of their duty, they frequently come into violent contact with those acting in opposition to law and order.

I do not wish to go on record as being opposed to unionism. On the contrary, I am a firm believer in the spirit of unionism—the spirit that prompts men to band together for mutual benefit and protection. But, when a union adopts a reactionary policy, in opposition to law

(*Concluded on next page*)

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Summation of Potentials—When an air-current passes in succession through two or more airways of different section, the total unit pressure (lb. per sq.ft.) due to the circulation is equal to the sum of the unit pressures of the several sections. The arrangement, in this case, may be described as "tandem."

Likewise, in a tandem circulation, the total power on the air (ft.-lb. per min.) producing the circulation is equal to the sum of the powers absorbed in the several sections through which the current passes.

Indicating the potentials of the respective sections of the air course in a tandem circulation by X_1, X_2, X_3, etc.; and the corresponding unit pressures and powers on the air by p_1, p_2, p_3, etc.; and u_1, u_2, u_3, etc., respectively, remembering that the square of the pressure potential is equal to the cube of the power potential, as expressed by the formula

$$X^2_p = X^3_u$$

we can write the following:

For tandem circulations, calling the general mine pressure p_0 and the total power on the air u_0,

Mine pressure, $$p_0 = Q^2 \left(\frac{1}{X^2_{p1}} + \frac{1}{X^2_{p2}} + etc.\right)$$

or $$p_0 = Q^2 \left(\frac{1}{X^3_{u1}} + \frac{1}{X^3_{u2}} + etc.\right)$$

These formulas may be written more simply by indicating the summation of the potential factors by the character Σ; thus,

Mine pressure, $$p_0 = Q^2 \Sigma \left(\frac{1}{X^2_p}\right)$$

or $$p_0 = Q^2 \Sigma \left(\frac{1}{X^3_u}\right)$$

In like manner, the total power on the air or power producing tandem circulation in a mine is expressed by the formula,

Power on the air, $$u_0 = Q^3 \left(\frac{1}{X^3_{u1}} + \frac{1}{X^3_{u2}} + etc.\right)$$

or $$u_0 = Q^3 \left(\frac{1}{X^2_{p1}} + \frac{1}{X^2_{p2}} + etc.\right)$$

These formulas may be expressed by indicating the summation of the potential factors, as before; thus,

Power on the air $$u_0 = Q^3 \Sigma \left(\frac{1}{X^3_u}\right)$$

or $$u_0 = Q^3 \Sigma \left(\frac{1}{X^2_p}\right)$$

If desired, the part potential value can be used by omitting k when finding its value, and writing the k outside the parenthesis; but the relative potential obtained by canceling common factors cannot be used here. The relative potential, so much used in the calculation of the splitting of air currents, can only be employed when the potential appears as a ratio.

The Coal Age Pocket Book

Example—A shaft mine has been opened on the triple-entry system. The downcast and upcast shafts are each 600 ft. deep and 8x20 ft. in section. The main headings have been driven a distance of 2000 ft. from the shaft bottom. The center one of these headings is the intake and is 7x14 ft. in section, while the two side headings are the return airways for the respective sides of the mine and are each 6x12 ft. in section. On each side of the main headings cross-headings, 6x10 ft. in section, have been driven 500 ft.

If the intake air divides at the face of the main heading and equal currents ventilate the two sides of the mine, what power on the air will be required to circulate a total of 60,000 cu.ft. per min. in this mine, and what water gage will be produced in the fan drift?

Solution—The first step is to calculate the potential values of the two shafts, main intake, two cross-headings and two return airways, as follows, remembering that these being equal splits, it is only necessary to double the potentials of the cross-headings and return airways by taking twice the sectional area:

Shafts,	8 × 20 ft., 600 ft.;	a = 160 sq.ft.;	s =	67,200 sq.ft.
Main intake,	7 × 14 ft., 2000 ft.;	a = 98 sq.ft.;	s =	84,000 sq.ft.
Two cross-headings,	6 × 10 ft., 500 ft.;	$2a$ = 120 sq.ft.;	s =	32,000 sq.ft.
Two return airways,	6 × 12 ft., 2000 ft.;	$2a$ = 144 sq.ft.;	s =	144,000 sq.ft.

The part potential values are then as follows ,omitting k:

Shafts, $$\frac{1}{X^3_u} = \frac{s}{a^3} = \frac{67{,}200}{160^3} = 0.0164$$

Main intake, $$\frac{1}{X^3_u} = \frac{s}{a^3} = \frac{84{,}000}{98^3} = 0.0892$$

Two cross-headings, $$\frac{1}{X^3_u} = \frac{s}{(2a)^3} = \frac{32{,}000}{120^3} = 0.0185$$

Two return airways, $$\frac{1}{X^3_u} = \frac{s}{(2a)^3} = \frac{144{,}000}{144^3} = 0.0482$$

Sum of potential values, $\Sigma \left(\frac{1}{X^3_u}\right)$ 0.1723

The horsepower on the air in the fan drift, in this case, is found by substituting this general potential value, in the formula for finding the power in a tandem circulation; thus,

$$H = \frac{kQ^3}{33{,}000} \Sigma \left(\frac{1}{X^3_u}\right) = \frac{0.00000002 \times 60{,}000^3 \times 0.1723}{33{,}000} = 22.55\ hp.$$

The water gage, in the fan drift, due to this circulation, can be calculated in like manner, independently, from the same general potential value, by substituting the same in the formula for finding the unit pressure and water gage in a tandem circulation; thus,

$$w.g. = \frac{kQ^2}{5.2} \Sigma \left(\frac{1}{X^3_u}\right) = \frac{0.00000002 \times 60{,}000^2 \times 0.1723}{5.2} = 2.38+\ in.$$

The same result is obtained when the water gage is calculated from the power and the quantity of air in circulation.

and order, or any body of men permit themselves to be controlled by unscrupulous leaders, I am opposed to such leadership as dangerous.

It is folly to say that the *union* is always right, or to claim that *coal operators* are always right. I am opposed to the practice of operators bringing strike breakers to a field of contention, except when every honorable effort has been made and failed to induce the men to return to work. The importation of such workers, however, furnishes no excuse for the wanton destruction of property or the taking of lives that often results on such occasions. When the miner's sense of what is just and fair will not restrain him from lawless acts, he must be prevented by other means, and the National Guards is the institution created for that purpose.

It is generally the case that the governor is censured more frequently and more severely for not calling out the guards than for using this means of maintaining or restoring order. In my opinion, the only valid reason for discarding the services of the National Guards will be because they are no longer required. We may hope for the day to come when this will be true; but, for the present, we must recognize the fact that the National Guards is an indispensable factor of state government.

GEO. N. LANTZ.

New Straitsville, Ohio.

Removing Bark from Mine Timbers

The correspondent who suggested, some time ago, that bark should be left on mine timber is, I believe, in error. The bark certainly aids in the propagation of organisms that weaken the timber. Innumerable tests have demonstrated the truth of this fact.

In one instance, two pieces of fir were kept five months, one with the bark on and the other with the bark off. The compression tests, later, showed the former piece to have a breaking strain of 3,570 lb. per sq.in., the latter 3,385 lb.; for pine, the tests showed 2,716 lb. with bark on and 2,958 lb. with bark off; for oak, 2,133 lb. and 2,958 lb., respectively.

MINING ENGINEER.

Pittsburgh, Penn.

Correction

In the Study Course in Coal Mining, Apr. 11, p. 623, an error occurred in the calculation of the relative split potentials, for finding the natural division of the air current. As this error affected the remainder of the solution, we reprint those two pages corrected, below. The natural division of air given, p. 659, should also be corrected to correspond.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

The use of the "relative potential" value, in all calculations to determine the natural division of air between two or more airways, is one of the most important considerations in the saving of time and labor and avoiding unnecessary multiplicity of figures, which increases the opportunities for error and yields less accurate results. An example or two will serve to make this fact plain.

EXAMPLES IN NATURAL DIVISION

Example—An air current of 100,000 cu.ft. per min. is divided at the foot of the downcast shaft, between the following four air courses or splits, thereby providing two separate ventilation districts on each side of the shaft:

Split A,	8 × 12 ft., 6000 ft. long
Split B,	6 × 20 ft., 12,000 ft. long
Split C,	6 × 12 ft., 8000 ft. long
Split D,	4 × 6 ft., 1000 ft. long

All the splits are open to the free passage of the air, no regulators being used. (a) Find the natural division of the main air current or the quantity of air passing in each split. (b) What is the pressure due to this circulation? (c) What is the horsepower on the air?

Solution—(a) The first step is to calculate the relative pressure potential for each of the four air splits. The area, perimeter and length of each airway are as follows:

Split A,	$a = 96$ *sq.ft.*;	$o = 40$ *ft.*;	$l = 6{,}000$
Split B,	$a = 120$ *sq.ft.*;	$o = 52$ *ft.*;	$l = 12{,}000$
Split C,	$a = 72$ *sq.ft.*;	$o = 36$ *ft.*;	$l = 8{,}000$
Split D,	$a = 24$ *sq.ft.*;	$o = 20$ *ft.*;	$l = 1{,}000$

Instead of using these full values as when finding the true potential value of an airway, the lowest relative values for the areas, perimeters and lengths are used. These relative values are obtained by canceling the common factors in the areas, perimeters and lengths, separately, which gives

Split A,	$a = 4$;	$o = 10$;	$l = 6$
Split B,	$a = 5$;	$o = 13$;	$l = 12$
Split C,	$a = 3$;	$o = 9$;	$l = 8$
Split D,	$a = 1$;	$o = 5$,	$l = 1$

The relative split potentials are then found as follows:

Split A, $4\sqrt{\frac{4}{6 \times 10}} = 4\sqrt{\frac{1}{15}} = 4\sqrt{0.06666} = 1.033$

Split B, $5\sqrt{\frac{5}{12 \times 13}} = 5\sqrt{\frac{5}{156}} = 5\sqrt{0.03205} = 0.895$

Split C, $3\sqrt{\frac{3}{8 \times 9}} = 3\sqrt{\frac{1}{24}} = 3\sqrt{0.04166} = 0.612$

Split D, $1\sqrt{\frac{1}{1 \times 5}} = \sqrt{\frac{1}{5}} = \sqrt{0.2} = 0.447$

Sum of relative potentials..... 2.987

The Coal Age Pocket Book

Since the quantity of air passing in each split, in natural division is proportional to the corresponding potential, the quantity ratio is equal to the potential ratio, which is true also for the sum of the quantities and the sum of the potentials. Thus, the ratio of the quantity (q) passing in any split, to the total quantity (Q) in circulation, is equal to the ratio of the corresponding split pressure potential (X_p), to the sum of all the split potentials (ΣX_p).

$$\frac{q}{Q} = \frac{X_p}{\Sigma X_p}; \text{ which gives } q = \frac{X_p}{\Sigma X_p} Q$$

Therefore, substituting the relative potential values just found in this formula gives the following:

Split A, $q_a = \frac{1.033}{2.987} \times 100{,}000 = 34{,}570$ *cu.ft. per min.*

Split B, $q_b = \frac{0.895}{2.987} \times 100{,}000 = 29{,}960$ *cu.ft. per min.*

Split C, $q_c = \frac{0.612}{2.987} \times 100{,}000 = 20{,}500$ *cu.ft. per min.*

Split D, $q_d = \frac{0.447}{2.987} \times 100{,}000 = 14{,}970$ *cu.ft. per min.*

Total quantity..... 100,000 *cu.ft. per min.*

(b) Since the pressure is the same for all the splits, it can be calculated from any one of the given splits, by substituting the values for that split in the formula

$$p = \frac{k\,l\,o\,q^2}{a^3}$$

Thus, taking split A,

$$p = \frac{0.00000002 \times 6000 \times 40 \times 34{,}570^2}{96 \times 96 \times 96} = 6.48 \text{ lb. per sq.ft.}$$

(c) The horsepower on the air in the main entry, or the horsepower producing this circulation is, then,

$$H = \frac{Q\,p}{33{,}000} = \frac{100{,}000 \times 6.48}{33{,}000} = 19.6 \text{ hp.}$$

General Mine Potential—The potential value for the combined splits can be calculated from the total quantity of air in circulation and the resulting pressure, using the formula

$$X^3_u = \frac{Q^2}{p}; \text{ or } X_u = \sqrt[3]{\frac{Q^2}{p}}$$

Example—What is the general power potential for all the splits combined, in the example given above, where 100,000 cu.ft. of air was circulated under a pressure of 6.48 lb. per sq.ft.?

Solution—The general power potential for these combined splits is

Mine power potential, $X_u = \sqrt[3]{\frac{Q^2}{p}} = \sqrt[3]{\frac{100{,}000^2}{6.48}} = 1155$

Inquiries of General Interest

Room-and-Pillar System vs. Longwall

How does the room-and-pillar system differ from the longwall method of mining coal, in usage, cost and the methods employed for the extraction of the coal?

R. E. Wooden.

Cambridge, Mass.

In reply to this question, we would refer correspondent to the interesting discussion started in Coal Age, Jan. 10, p. 99. Much valuable information is contained in the letters, pp. 339, 419 and 458, following. The comparative advantages of these two methods of mining coal are enumerated in the letters discussing the question of starting longwall in room-and-pillar work, in this issue, pp. 697-9.

The longwall method of mining is used in preference to the room-and-pillar system, in the working of thin seams of coal, especially under excessive roof pressure, or where the complete extraction of the coal is important.

The cost of mining coal by the longwall method is generally less than that in the room-and-pillar system, owing to the more complete extraction of the coal, which is less broken and a less percentage of which is lost as fine coal and slack, in mining; less timber is used, the distance of haul is less and fewer roads are to be maintained; little or no powder is used for blasting the coal; the ventilation is better and more easily accomplished; a larger daily output is obtained for the same number of working places and men employed; there is less expense for handling waste, which in the longwall method is used for building packwalls, but in the room-and-pillar system must generally be taken out of the mine; there is less interruption of work and fewer accidents due to roof falls; mine fires are less frequent; and, finally, there is less damage to surface property, resulting from the extraction of the coal.

In the longwall method of mining, the coal is undermined by handpick or machine; and, by a careful and judicious system of timbering, the roof pressure is so controlled that it is utilized to break down the coal shortly after the sprags are drawn. In this method, little or no powder is used to break the coal. In the room-and-pillar system, the coal is undermined and sometimes side cut or sheared and then blasted down by drilling a hole in the coal face and firing a charge of powder sufficient to break the coal. In some cases, the coal after being undercut is wedged down by means of iron wedges driven close to the roof above the coal.

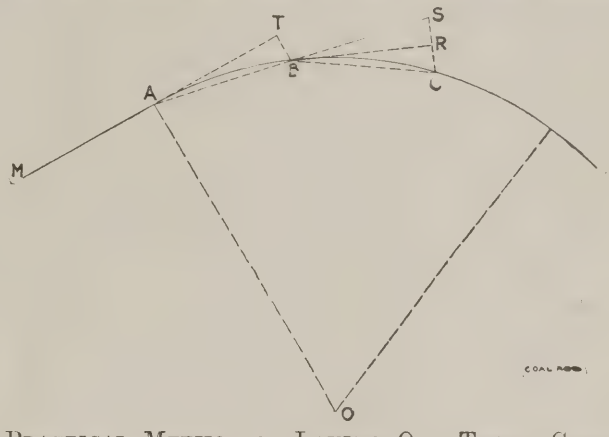
Laying Out Mine-Track Curves

Kindly ask, through Coal Age, or give me some information in regard to mine-track curves. In our mines we lay out all curves on a 63-ft. radius. The engineers give the point of curve, and the mine foreman measures 6 ft. ahead and offsets 7 in., in laying out the curve. Can you give me the formula for finding the chord and offset, in curves of different radius?

Adigo.

Burdine, Ky.

Referring to the accompanying figure, a common method of laying out track curves in a mine, starting



A Practical Method of Laying Out Track Curves in Mines

from the point of curve A on the straight track MA, is to extend the tangent MA to a point T, making AT any convenient or desired length, depending on the sharpness of the curve. In the case mentioned by correspondent, the chords AB and BC are each 6 ft. in length, and BS is equal to BC. The offset TB is called a "tangent deflection;" while SC is a "chord deflection." By the principles of geometry, the chord deflection SC is twice the tangent deflection TB; and a line drawn from B to R, the middle point of SC, is tangent to the curve at B.

The following formulas are used to calculate the chord deflection SC or the tangent deflection TB:

$$TB = \frac{c^2}{2\,r} = \frac{6^2}{2 \times 63} \times 12 = say\ 3\tfrac{1}{2}\ in.$$

$$SC = \frac{c^2}{r} = \frac{6^2}{63} \times 12 = say\ 7\ in.$$

In practice, it is convenient to use a short stick cut to the length of the chord deflection SC, and attached to two wires BS and BC, each the length of the given chord. By this means, the curve is quickly laid out, from point to point. The ends of the two wires BS and BC are attached to a small ring at B, through which a surveyor's stick pin can be passed.

To lay out a curve with this device, the stick pin is passed through the ring and first stuck firmly in the ground at the point of curve A. The center of the stick R when the wires are drawn taut is then lined in with the tangent MAT, and the end of the stick (C) then marks the first point B in the curve. The pin is now moved to B and the operation repeated, except that, now, the end of the stick (S) is made to line with the chord AB, when the other end C will mark the second point in the curve.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—(a) Define the different electrical units and say to what they refer. (b) An electrical machine works at 150 volts and 25 amp.; what is the horsepower of the machine?

Ans.—(a) The four simple electrical units are the following:

1. The *ampere,* which measures the volume, commonly termed the strength of the current.

2. The *volt,* which measures the pressure or intensity of the current. In speaking of electricity, the voltage of a current is commonly referred to as the electromotive force.

3. The *ohm* or unit of resistance, which serves to measure the amount of resistance offered by a conductor to the flow of the electric current.

4. The *watt* or unit of power, which serves to measure the power of the electric current. One horsepower is equivalent to 746 watts.

(*b*) The horsepower in this case is

$$H = \frac{150 \times 25}{746} = 5+ hp.$$

Ques.—Where and when would you enter and make out your daily report, after completing the examination of the mine, in the bituminous region of Pennsylvania?

Ans.—The Bituminous Mine Law of Pennsylvania (Art. 5, Sec. 2) requires that a suitable record book shall be kept at the mine office on the surface; and that the fireboss, immediately after completing the examination of the mine, or any portion thereof, shall enter in said book, with ink, a record of such examination and sign the same. This record must show the time taken in making the examination and also clearly state the nature and location of any danger discovered in any room, entry or other place, in the mine.

The same section of the law provides, also, that such a record book may be kept at a station located in the intake entry of the mine; but, in this case, the fireboss is required to sign also the report entered in the record book in the mine office on the surface.

Art. 8, Sec. 3, of the same law requires a like daily record to be made in a similar book kept at the mine office, by the person whose duty it is to examine the ropes, links and chains in the hoisting shaft at least once in 24 hours.

Ques.—If, in the examination of a mine, the air current was found charged with gas to the explosive limit when the air was not completely saturated, what would be the explosive condition of the same air current after complete saturation had taken place?

Ans.—The effect of an increase in the degree of humidity of the mine air on its explosive condition is somewhat questionable. While it cannot be denied that, in the event of ignition taking place, the evaporation of a larger amount of water, per unit of volume of gas-charged air, will result in the absorption of a corresponding amount of heat and will, to that extent, modify the violence of the explosion by decreasing the temperature developed in the ignition, this effect is generally conceded to be practically inappreciable. The chief point in question, however, is whether the saturated condition of the air would have any practical effect to raise or lower the point of ignition of the explosive mixture.

The purpose of saturating the intake current of a mine, which is generally conceded to be good practice, is *not* to decrease the explosibility of the air; but to carry the moisture thus absorbed by the air current into the mine, and thereby prevent the absorption of moisture from the mine workings by a dry air current. In answer to the question asked, we think it may be safely stated that the increase of saturation in the mine air will not appreciably affect its explosive condition.

Ques.—A tract of coal land contains 1500 acres; the coal lies 500 ft. below the surface; the seam is 4 ft. thick and underlaid with 3 ft. of fireclay, beneath which is 4 ft. of sandstone. Above the coal is 5 ft. of slate and the measures overlying the slate are sandstone and shale. The coal is known to give off gas. How would you proceed to open and develop this property, to produce 1200 tons of coal per day of 8 hours?

Ans.—To provide for a daily output of 1200 tons of coal, it is necessary to estimate on, say 400 miners, 200 loaders, 15 drivers and the same number of mules, 25 bosses, daymen and boys, making a total of, say 640 men underground. The mine being gaseous, provision must be made for not less than 200 cu.ft. per man, and from 500 to 600 cu.ft. per min. per mule. The total volume of air required to fulfill these requirements should not be less than, say 150,000 cu.ft. per min.

A three-compartment shaft should be sunk to the coal, providing two hoistways, say not less than 6x9 ft. in the clear, each, and one manway of the same dimensions making the size of the shaft, say 9x20 ft. in the clear. This hoisting shaft should be made the downcast for the mine. The mine should be opened, preferably, on the four-entry system, providing two intake haulage roads, one for empties running into the mine and the other for coal coming out, and flanked by two return airways, one for each side of the mine. This main-entry system should be driven on both sides of the shaft, thereby providing four separate sections of the mine, each having a separate ventilating current and each producing on an average 300 tons of coal per day. The main-haulage roads should be driven 6x10 ft. in section, while the return airways may be driven 5x12, or, preferably, 5x14 ft. in section, to avoid the handling of an unnecessary amount of slate taken from the roof. The bottom should not be disturbed.

If conditions will permit, better results will be obtained by working this seam longwall. If surface conditions are favorable, the shaft should be located centrally in the property, so as to reach as large an area of coal as practicable. Conditions, however, must determine both the number and location of shafts required.

Coal and Coke News

Washington D. C.

It has been understood that the investigations of the Interstate Commerce Commission into the doings of the anthracite coal roads would be resumed on Apr. 22 and that at that time the roads would be allowed to continue their presentation of the case to its completion, setting forth all of their rates and practices.

The inquiry as now planned is to be the most extensive the commission has ever undertaken. The immediate defendants number nine: Reading, Jersey Central, Lehigh Valley, Delaware & Hudson, Lackawanna, Erie, with the New York, Susquehanna & Western, and Pennsylvania with the Northern Central. As a matter of fact, all roads east of the Mississippi are named as nominal defendants to the investigation, although the case naturally centers around those above named.

The investigation was started by the commission of its own volition, and most elaborate statistics have been asked of the nine defendant roads.

There have been several cases before the commission against hard-coal rates, but all in which a finding was made affected only individual roads.

Thus, the so called Marian Coal Co. case filed in 1910 which resulted in reductions of rates from the Wyoming district to Hoboken affected the Lackawanna. The celebrated Meeker complaint involved rates on the Lehigh Valley to Perth Amboy and in that case rates on sizes larger than buckwheat were marked down. Going further back, the suit of Coxe Bros. vs. Lehigh Valley in 1888 and Haddock vs. the Lackawanna in 1890, affected only special rates and the reductions were never put in force.

The so called Hearst case of 1902 was broad in its scope, but as the evidence advanced it was almost entirely rates to tidewater that were discussed, and no finding was ever made. This case was up before the commission in 1905, reopened by the commission in 1906, reargued again that year and then lapsed for almost 8 years, and was finally dismissed only last February, this action undoubtedly being taken in view of the present investigation.

Progress in the Freight Rate Case

Further progress with the freight rate case before the Interstate Commerce Commission has confirmed the belief that the commission does not intend to consider the granting of higher rates to the coal carrying roads if that can in any way be avoided. The turning of the discussion to the financial condition of the roads as has now been ordered by the commission is considered to be an exceedingly favorable symptom by those who have been opposed to the advancing of coal rates. In their judgment the roads chiefly concerned in the carrying of coal are in so favorable a financial situation that they will not be able to make out any sufficient case for higher rates from the standpoint of necessity except insofar as they demand these rates in order that they may be able to equalize their charges with those of the other railways which have been calling for an advance.

It had not been expected that the commission would go into the financial aspect of the roads in connection with this investigation of the proposed advance rates demanded, indeed it had been some time ago expressly stated that the commission thought it unnecessary or undesirable to undertake that phase of study. Just what has changed the point of view in this way is not altogether clear, but it is supposed that the principal factor has been the constant effort of the railroads to show that the advance in the rates is necessary to them from the mere standpoint of keeping their heads above water.

In the judgment of members of the commission, it is understood, the discussion of finance will show that in the case of some roads which are primarily devoted to the carrying of specified classes of commodities, the demand for an increase on this ground is misleading. The coal roads for instance, or those which are largely engaged in the transportation of coal in all parts of the country are believed to be conspicuously in this position.

HARRISBURG, PENN.

Denial of the existence of collusion between the Lehigh & Wilkes-Barre Coal Co. and the Central R.R. of New Jersey, in regard to the settlement of accounts or other financial business, was made on Apr. 14 by officials of the coal company at the resumption of hearings in the anti-trust suit of the Federal Government against the Reading and other groups of anthracite companies.

W. C. Johnson, comptroller of the coal company, testified that coal is sold to the Central R.R. of New Jersey at the same prices as are charged to other consumers. The coal company and the Central R.R., which controlls it through majority stock ownership, keep entirely separate accounts.

Testimony along similar lines was given by C. F. Huber, vice-president and general manager of the Lehigh & Wilkes-Barre Coal Co. He also asserted that the statistics known as the "Griffith" tables prepared about 18 years ago, and purporting to show the extent of the unmined coal in Pennsylvania are erroneous.

S. D. Warriner, president of the Lehigh Coal & Navigation Co., testified that this company is entirely independent of connection or association with railroad business.

Further testimony, intended to show that separate organizations and managements are maintained for the coal mining and coal transporting companies was given on Apr. 17, when hearings for the defense were resumed.

W. G. Brown, secretary of the Philadelphia & Reading Coal & Iron Co., said that his company paid the Philadelphia & Reading Ry. the regular tariffs for transporting coal. On cross-examination for the Government, he admitted that George F. Baer is president of both companies and is an active director of the coal and iron company. He conceded that on monthly balances the coal and iron company was always debtor to the railway, although only the customary 60 days' credit was extended.

W. J. Richards, vice-president and general manager of the coal and iron company, testified as to the great technical difficulties experienced in coal mining in the Schuylkill region. Although the Government objected to his testimony as irrelevant and immaterial, it was embodied in the records.

Mr. Richards said his company had spent $12,374,000 in improvements during the last 12 years, but no new lands were acquired. He gave the cost of production of anthracite coal, in the fiscal year ending June 30, 1913, as $2.35 per ton, although in a statement rendered to the Interstate Commerce Commission the company had given the cost in November, 1912, as $2.282. Mr. Richards explained that the difference was due to the larger amount of coal mined in the fall of 1912, a period of record-breaking production, which lessened the cost per ton somewhat, owing to the fact that certain charges are constant whether much or little coal is produced.

A Lengthy Litigation

A suit started 25 years ago by the Reading Ry., to stop the mining of coal underneath Mahanoy Plane, was decided on Apr. 13. So long drawn out was the litigation that several of the masters appointed to take the testimony died before they could make a report.

Ex-Congressman James B. Reilly, who was appointed as the fourth master, made a report on the above date, which sustains the Reading Co. in obtaining the injunction, which compelled independent operators to allow pillars to remain to support the surface of the earth. But on certain tracts where more pillars were demanded than necessary the independents were awarded $36,696 damages and the costs were also placed on the railroad company.

A large proportion of the anthracite coal sent to market by the Reading Ry. Co. is hoisted over Broad Mountain by means of gigantic stationary engines at Mahanoy Plane and it was important to the railroad to prevent any disturbance to the Plane by mining underneath.

PENNSYLVANIA

Anthracite

Larksville—Orders from Delaware & Hudson officials on Apr. 16 closed three collieries. These are Nos. 4 and 5 and the Boston, giving employment to 1500 men and boys. The officials claim that each of the collieries is in need of repairs and that because of the slight demand for coal these can best be made at this time. It is expected that the collieries will be idle for many weeks.

Freeland—Electricity is displacing steam at the Harwood colliery. The steam hoisting apparatus has been discarded and electric hoists substituted. The boiler house will be abandoned, as there is no further use for it. The only engine operating under steam pressure is a big first-motion hoisting engine which will be displaced in time.

Leviston—The few remaining miners that reside at Leviston have been asked to vacate on account of the stripping of the Lehigh Valley Coal Co., which is in close proximity to the town. The ground that is now occupied by the houses is desired for a dumping ground for the clay and rock that are being removed from the coal beds.

Scotch Valley—Coal-mining operations have taken on a new lease of life at the mines of the Beaver Valley Coal Co., where two steam shovels are now in operation opening a large stripping.

Pottsville—A corporation was made the defendant in a criminal suit for the first time in many years when a case was returned to court Apr. 16 by Justice McShea against the Lehigh & Wilkes-Barre Coal Co. The information sets forth that the defendant corporation operates a coal mine near McAdoo and has failed to keep a record of the number of cars of coal mined and loaded as required by law.

Bituminous

Carrolltown—The No. 1 mine of the Ebensburg Coal Co. at Colver, made a record in production for the month of March when 89,000 tons of coal were shipped. All this came from a single opening, and a 3½-ft. coal bed. It is believed that this record has seldom been surpassed under like conditions.

Pittsburgh—It is reported that Connellsville coke makers have shut down many ovens, the H. C. Frick Coke Co. interests alone having closed 1300 ovens recently.

Indiana—An attempt to destroy a hall being erected for the use of the United Mine Workers at Iselin was recently made. Returning to work after the lunch hour, John Ties, foreman of construction crew, found 26 sticks of dynamite beneath the building. A burning fuse had almost reached the explosives. This was, however, successfully extinguished by the foreman.

Canonsburg—Stringent orders have been issued by the Pittsburgh Coal Co. that hereafter its mine foremen, assistant foremen, firebosses, machine foremen, and drivers must sever their connections with all clubs which have sideboard attachments. This order has been sent to all the company's mines in Washington County.

Sharon—After ten years of successful operation, the coal mine on the Fogel farm near New Wilmington was abandoned Apr. 18. This is the last of about 50 of the smaller mines that have been operated during the past half century between Bethel and Sharpsville.

Rockwood—It is reported here that a Pittsburgh coal syndicate has notified farmers and optioners of the 10,000-acre tract in Milford Township to prepare deeds for the mineral underlying their farms. It is said that the Western Maryland R.R. will cross the river into this new coal field.

WEST VIRGINIA

Fairmont—Fire and an accident effectually put two mines of the Austin Coal & Coke Co., at Austin, out of commission recently. The fire destroyed the tipple of No. 1 mine with a heavy loss, which was partly covered by insurance. A large crowd gathered and someone entered the No. 2 mine, and released an electric motor at the head of a steep slope. This machine ran down the incline and wrecked at the bottom, effectually shutting down Mine No. 2.

Charleston—Declaring that they would rather shut down their mines than operate them at a loss, the coal operators of the Kanawha field on Apr. 17 refused the demand of the United Mine Workers for an advance of 10 per cent. and asked the men to accept a cut. Among other things the operators seek a reduction of four cents per ton run of mine in the Big Vein territory.

Bluefield—Despite the reported depression in other coal fields, the Norfolk & Western region appears to be more than holding its own as is shown by the official report of traffic over that road during the month of March. This showed an increase of 560,140 tons over the shipments for the preceding month, and 460,960 tons over the shipments from the same sources for the corresponding month of last year. The figures for the total shipments are in March, 1913, 1,751,158 tons; March, 1914, 2,112,118 tons. Coke shipments reached a total of 71,620 tons, all coming from the Pocahontas field.

KENTUCKY

Harlan—Coal operators in Harlan County are directly interested in the newly organized Harlan County Forest Protective Association, which represents in its membership the owners of over 150,000 acres of timbered land. Conservation of the lumber through prevention of forest fires is one of the objects of the association, and the coal men are cooperating in the campaign. The timber of Harlan County is of immense value in connection with the coal industry, since it is estimated that one acre of timber will mine about three-quarters of an acre of coal.

Whitesburg—Preliminary work in preparation for extensive coal-mining operations at Penny, just over the Letcher County line, in Pike County, have been begun under the direction of former manager John G. Smyth, of the Consolidated Coal Co. Six hundred houses will be erected and several good business blocks for the accommodation of the several thousand men who are to be given employment.

Jenkins—Coal-mine owners and miners in this section of Kentucky are hopeful for favorable consideration by Congress of Representative John W. Langley's bill providing for the appropriation of $50,000 to establish here a mine-rescue station and an expert station for analyzing and testing coals, lignite and other minerals and substances.

Lexington—Professor H. D. Easton, of the College of Mines and Metallurgy, Lexington, Kentucky, has issued a call to all the men who have attended the Practical Miners' Course to meet on May 8 for their first reunion.

This eight weeks course was first held during the summer of 1908 and has been held each summer until the present year when it was opened on Apr. 1 with an enrollment of 30 practical miners representing all the important mining counties in the state. Kentucky State University was probably the first college to offer instruction of the nature needed by men preparing for mine foreman examinations, but other colleges have now taken up the same line and are offering similar courses.

The date of the reunion has been set so that the men can attend the annual meeting of the Kentucky Mining Institute and the state-wide First Aid Contest to be held in Lexington on May 8 and 9. As a special feature, the U. S. Bureau of Mines will have its explosion gallery on the contest field and give demonstrations with it.

OHIO

Athens—The Luhrig Coal Co., which has been operating a mine on the B. & O. S. W. west of Athens, has started to dismantle the tipple and plant to move into West Virginia.

Cleveland—The Rail and River Coal Co. brought suit Apr. 16 in the Federal Court to test the constitutionality of the Green anti-screen law passed by the last Legislature, which provides that the miners shall be paid for all the coal they dig. The operators closed their mines on Apr. 1 stating that the enforcement of the Green law destroyed their ability to compete with Pennsylvania and Indiana operators. A favorable decision will probably hurry a cessation of the present shut-down of all Ohio mines.

ILLINOIS

Marion—The Donnelly-Koennecke Coal Co., operating for many years north of Carterville, in Williamson County, has been declared bankrupt, and W. O. Potter, of this place, has been appointed receiver.

Royalton—A slope, 50 ft. deep, has been driven from the north workings of the South Mine of the Franklin Coal & Coke Co. here, to the lower vein. Several months ago, in working northward through the mine, the coal disappeared. Borings indicated the vein 50 ft. farther down, and this condition existed for two or three miles across the tract. No more coal will be worked from the upper vein. The coal of the lower vein is of superior quality.

Harrisburg—Several collieries of the O'Gara Coal Co. have closed down for repairs, the time of suspension being indefinite. This will, however, probably last about three months. The mines affected are Nos. 3, 4, 9, 14 and 15. Some of this company's mines in Indiana are also closed down, and two carloads of mules have been shipped therefrom to Illinois where they have been placed in pasture.

Peoria—The coal operators on Apr. 16 flatly refused to accede to the demand of Illinois mine workers for higher wages. The operators have to date rejected practically every demand made upon them.

ARKANSAS

Fort Smith—Sixteen thousand union miners in District No. 21, embracing Arkansas, Oklahoma and Texas, are reported to have voted to accept a renewal of the present wage scale for the next two years at a vote taken on the proposi-

tion on Apr. 14 at Fort Smith, Ark. The alternative was to strike after July 31, when the present agreement expires.

The Bache-Benman Syndicate intends resuming operations under the open-shop policy at Prairie Creek Mine No. 4, Prairie Creek, at an early date. This was indicated recently when it became known that the plant which had been closed for more than a week as the result of a riot had been placed under guard again.

COLORADO

Ludlow—Thirteen men were killed and about 40 wounded on Apr. 20, as the result of a 14-hr. battle waged between militiamen and striking miners. During the fighting the big tent colony was destroyed by fire and hundreds of women and children are being cared for by citizens. It is reported that the militiamen lost three privates, one killed and two wounded, while the remaining casualties were sustained by the strikers. It is reported that "General" Louis Tikas, a strike leader is among the dead.

FOREIGN NEWS

Leeds, England—A settlement of the Yorkshire coal miners strike was reached Apr. 15, when the men voted to resume work. The strikers numbering about 170,000 quit on Apr. 2, demanding the introduction of a minimum wage scale. A conciliation board was appointed to discuss the points at issue, and succeeded in obtaining the men's consent to the taking of a ballot.

PERSONALS

Col. W. R. Lynn, formerly with the Caldwell Coal Co., of Muhlenberg County, Ky., has become general salesman for the Coil Coal Co. and will represent that company in Southern territory.

R. W. Overall has been made general manager of the Reinecke Coal Co. in this city, succeeding the late Fred C. Reinecke. Mr. Overall, who is also assistant secretary, has been connected with the Reinecke company for 26 years.

R. D. Norris was recently elected president of the Anthracite Division of American Institute of Mining Engineers. Four vice-presidents were also elected, W. J. Richards, Edwin Ludlow, Arthur Storr, and B. F. Huber. At the same meeting Charles Enzain was elected secretary treasurer.

G. W. Ireland, through the reorganization of the office management of the Jamison Coal & Coke Co., became sales manager of the coke department. Richard Donaldson was made manager of the coal department, both offices being formerly handled by the late Mr. Johnson as general sales manager.

Edward I. Martin, of Columbus, Kan., has been appointed receiver for the Pratt-Durkee Coal Co., operating near that city. The receivership was established at the request of officers of the company, who found themselves unable to meet their bi-weekly payroll because of lack of ready funds. The mine will be continued by the receiver for the benefit of creditors.

William Hahman was recently appointed receiver for the Lilly Coal Co. This firm is perfectly solvent having no debts whatever, and the duties of the receiver will be to establish the interests of the company in the properties held by it, to collect all indebtedness due the firm and make proper distribution of the assets among the partners. The receivership was caused by the death of Dr. H. J. Evans, some difficulty arising in the settlement of the interests of the estate of the decreased in the valuable property and assets of the company.

OBITUARY

J. S. Wiley, a prominent Iowa operator, died at the Red Cross Hospital in Kansas City on Apr. 17. He was 75 years old. Mr. Wiley retired from active business two years ago. Prior to that time he was president of the Marquette Third Vein Coal Co. The body was taken to Davenport, Iowa, for interment.

U. S. Stafford, outside mine foreman of the Consolidation Coal Co., at Chiefton, W. Va., died recently after an illness of a few days. Mr. Stafford was a native of Preston County, belonging to a well-known family in that section of the state. For the past 15 years he has been located at Chiefton, coming there about the time of the opening of the mining plant. He was an experienced man in the mining business, and was one of the valued and trusted employees of his firm. At the time of his death he was 48 years of age, and is survived by his wife and four children.

Stephen Wolschlag, familiarly known to many residents of Peoria, Ill., as "Steve," died there a short time ago in Proctor Hospital. Mr. Wolschlag was 57 years old. He was born in Peoria County, Ill., spending his early youth on a farm and later working in the distilleries. Some 20 years ago he began his career as a coal operator, forming a partnership with James Milliard, under the firm name of Milliard & Wolschlag. This venture proved a success and 15 years ago he organized the Wolschlag Coöperative Coal Co., which soon became one of the best known coöperative concerns of the state. About a year ago, however, Mr. Wolschlag turned this property over to Ditewig & McElwee, but continued in active management of the mine. In January 1914, he was appointed by Governor Dunne a member of the Illinois Mine Rescue Commission.

RECENT COAL AND COKE PATENTS

Soot Blower. G. P. Brown, Chicago, Ill. 1,086,751, Feb. 10, 1914. Filed Oct. 26, 1911. Serial No. 656,967.

Mine Car. J. J. Roby, Cleveland, Ohio. 1,087,318, Feb. 17, 1914. Filed Nov. 15, 1912. Serial No. 731,479.

Furnace Grate. W. M. Duncan, Alton, Ill. 1,088,773. Mar. 3, 1914. Filed July 18, 1912. Serial No. 710,140.

Mechanical Stoker. W. M. Duncan, Alton, Ill. 1,088,772. Mar. 3, 1914. Filed Apr. 8, 1912. Serial No. 689,214.

Smoke Burning Device. F. T. Farnum, Chicago, Ill. 1,087,358, Feb. 17, 1914. Filed May 31, 1913. Serial No. 770,820.

Mechanical Stoker. W. R. Wood, London, England. 1,087,155, Feb. 17, 1914. Filed Apr. 28, 1913. Serial No. 764,131.

Miner's Acetylene Lamp. U. Daubresse, Novinger, Mo. 1,087,645, Feb. 17, 1914. Filed Apr. 20, 1912. Serial No. 692,052.

Fuel Feeding Apparatus. C. D. Stevens, Muskegon, Mich. 1,087,333, Feb. 17, 1914. Filed Nov. 24, 1905. Serial No. 188,945.

Smoke Preventer. B. F. B Fairbrother, Keene, N. H. 1,088,136. Feb. 24, 1914. Filed Feb. 15, 1912. Serial No. 677,758.

Electric Locomotive. G. F. Perin, assignor to Jeffrey Mfg. Co., Columbus, Ohio. 1,086,396, Feb. 10, 1914. Filed May 15, 1911. Serial No. 627,241.

Grate Bar. G. E. Camp, assignor to International Heater Co., New York, N. Y. 1,089,317. Mar. 3, 1914. Filed Aug. 14, 1912. Serial No. 714,956.

Smoke-Consuming Device. D. Townsend, assignor to Cornell Economizer Co., Philadelphia, Penn. 1,088,639. Feb. 24, 1914. Filed Sept. 10, 1908. Serial No. 452,353.

Device for Signaling the Presence of Explosive Gas Mixtures in Fire Damp Mines. H. Neubauer, Siebleben, Germany. 1,088,611. Feb. 24, 1914. Filed Feb. 25, 1913. Serial No. 750,571.

CONSTRUCTION NEWS

Logan, W. Va.—The Island Creek Co., recently organized, has secured a lease on about 800 acres, and it is expected that development work will start in the next two or three weeks.

Andrew, Ill.—The Roberts & Schaffer Co. recently secured a contract for a Marcus patent coal tipple from the Cora Coal Co. to be installed at Andrew, Ill. This tipple will span five railroad tracks. A similar contract for a like tipple was secured from the Tecumseh Coal Mining Co. to be installed at Bicknell, Ind.

Wheeling, W. Va.—The Richland Coal Co. operating near Warwood, anticipates the building of 10 new houses intended

for the accommodation of employees within the next few days. Last year this firm was obliged to erect about 25 new houses. Expansion, however, has made necessary this additional number of dwellings.

Leavenworth, Kan.—The work of rebuilding the upper works of the Home mine will begin in the near future. The plant was partly destroyed by fire recently. A reorganization of the Home-Riverside Mining Co., also is to be effected. The mine has been operated by C. N. Fish and P. T. White, the latter of Cleveland, Ohio, as receivers for some time past.

Cornettsville, Ky.—The T. C. Seaman Coal Co., recently organized with headquarters at Winchester, Ky., plans the installation of a good-sized coal operation here on the Line Fork tract and the expenditure of several hundred thousand dollars in the development. A five-mile branch line of the Lexington & Eastern is necessary, construction to be started May 1.

Praise, Ky.—Track laying on the Carolina, Clinchfield & Ohio R.R. between Elkhorn City, Ky., and Dante, Va., is being rushed with all possible speed. It is said the work will be completed and train service inaugurated over the entire connection within 60 days. This line will form an important connection between the eastern Kentucky coal field and south Atlantic sea-coast cities.

Hazard, Ky.—The Hazard Town Coal Co., W. M. Jones, president, Williamsburg, Ky., is now doing the initial work on a coal development one mile from Hazard on the Lexington & Eastern R.R. It will ship from 50 to 75 tons per day from the start and make increases from time to time. Two short-line spur branches of the L. & E. will be necessary and the work has been begun.

Viper, Ky.—The Winfrey-Peters Coal Co. here will begin a large coal development on Mason's Creek, three miles from Viper, immediately. The development will consist of the building of a three-mile spur line of the Lexington & Eastern R.R. and the erection of three tipples, several hundred miners' houses, grade work, sawmilling, etc. The lumber necessary is to be manufactured on the ground. C. F. Winfrey is president and will manage the new work.

Dieder, Penn.—Excavation and foundation work incident to the erection of 124 additional coke ovens, and the rebuilding of the present 300 ovens of the Lehigh Coke Works, has been started by F. H. Clement & Co., with a force of about 250 men. It is expected that in a short time this force will be increased to about 500 men. The amount involved in the contract given this company is said to run into the hundreds of thousands of dollars, while the work will require at least two years for completion. When this contract is finished, the Lehigh Coke Co. intends to immediately start the construction of 124 other ovens.

NEW INCORPORATIONS

Seattle, Wash.—The Hyde Coal Co. is to increase its capital stock from $400,000 to $1,000,000 also to increase the number on the board of trustees from three to five.

Pikeville, Ky.—The T. N. Huffman Coal Co. has been organized with a capital stock of $15,000. The incorporators are T. N. Huffman, Hester A. Huffman and Mary C. Leslie.

Charleston, W. Va.—The Michigan & West Virginia Land and Mining Co. has been incorporated with a capital of $100,000, the purpose being to develop coal and mineral land in W. Va.

Birmingham, Ala.—The Canal Export Coal Co. has been organized with a capital stock of $300,000 to develop 400 acres of coal land. The intention is to mine about 1000 tons of coal daily.

Fairmont, W. Va.—The Delmar Coal Co. has been organized with a capital stock of $25,000. The incorporators are, A. H. Philips, of Grafton, W. Va., E. S. Philips, John F. Philips, Ralph A. Courtney and Clarence D. Robertson, of Fairmont, W. Va.

INDUSTRIAL NEWS

Mt. Pulaski, Ill.—The Mt. Pulaski Colliery Co.'s mine here is to be sold under a court order on May 5.

Terre Haute, Ind.—The regular quarterly meeting of the Indiana Fireboss Association was held on Apr. 8, with about 85 per cent. of the membership present.

Berlin, Germany—The Krupp Co. recently purchased the exclusive right to work 60 coalfields on the estate of the Duke of Troy near Duelmen, Austria. The price paid is said to exceed $5,000,000.

Youngstown, Ohio—The 80 new Koppers byproduct ovens of the Republic Iron & Steel Co. will be put in operation for the first time in a few days. About 200 unskilled workmen are being employed.

Greenview, Ill.—Alfred Svenson, a former mine manager and hoisting enginner, is conducting drilling operations with a view to opening a small country mine near this place. He is not, however, sure of finding coal.

Connellsville, Penn.—It has been announced that the Consolidation Coal Co. interests in Sommerset County by a contract entered into recently has received orders for the mining during 1914 of 1,140,000 tons of coal, principally for export.

Columbus, Ohio—The Hocking Valley Ry. Co. and the Sunday Creek Co. have asked the U. S. supreme court to review the recent decision of the federal court assessing a fine of $42,000 against the Hocking Valley Ry. Co. for accepting unsecured notes in payment of prepaid freight charges.

Birmingham, Ala.—There is considerable talk here at the present time of a possible merger of the Woodward Iron Co., the Republic Iron & Steel Co., (southern properties), the Sloss-Sheffield Steel & Iron Co. and the Gulf States Steel Co. The heads of these various firms will not, however, discuss the matter.

Chattanooga, Tenn.—By an amendment to its charter the John R. Barnes Coal Co. changes its name to the Kentucky-Tennessee Coal Co., and increases its capital stock from $50,000 to $100,000. George T. White, H. B. Bonney, W. L. Lawton, J. R. Barnes and W. B. Carvin are the incorporators who filed the amendment.

Galveston, Texas—The Texas City Transportation Co., on Apr. 15, filed suit in the Unitel States District Court, against the Davis Coal & Coke Co., of West Virginia asking damages to the amount of $40,176.90 on the ground of failure to fulfill a contract for the delivery of 180,000 tons of coal to the plaintiff at the rate of 60,000 tons per year.

Chicago, Ill.—The newly formed Chicago section of the American Institute of Mining Engineers held its first annual meeting and dinner on the evening of Apr. 14, at the Sherman House. The officers elected were: Chairman, Robert W. Hunt; Vice-Chairman, J. C. Ede; Secretary-Treasurer, H. W. Nichols; Executive-Committee, F. K. Copeland and G. M. Davidson.

Springfield, Ill.—On petition of the Sangamon Loan & Trust Co., the Williamsville Coal Co. located at Selbytown, was recently placed in the hands of a receiver on failure to provide for the payment of $40,000 worth of bonds. H. J. Linkin was appointed receiver for the company and his bond was placed at $10,000.

Peoria, Ill.—Thomas Fox, Neil Groat, George Green, and Willis McGrew, four Springfield miners, recently purchased the Yocum mine near Lewistown, and will take possession shortly. They plan to place this property in such condition as to increase the output and reduce the cost of operation. Coal will be simply produced for the local market.

Louisville, Ky.—During the two weeks ending Apr. 18, the Monongahela River Consolidated Coal & Coke Co. shipped approximately 100,000 tons through the local harbor for New Orleans, leaving coal enough for a month or so in the local harbor, with little in sight in the way of shipments. G. W. Shaw, traffic manager for the company from Louisville to New Orleans, has been in New Orleans and at the various cities between there and Louisville where the company has branches.

Clarksburgh, W. Va.—Judge A. G. Dayton in the Federal District Court on Apr. 17, imposed sentences on the striking miners of Colliers, W. Va., for violation of the injunction against interference with employees of the West Virginia & Pittsburgh Coal Co. The men sentenced were guilty of preventing a party of 18 strike breakers from going to work. The sentences imposed ranged from small fines to six months imprisonment.

Bluefield, W. Va.—A committee representing the South Carolina Cotton Manufacturers Association recently placed contracts for 350,000 tons of coal with the Blackwood Coal & Coke Co., the Stonega Coal & Coke Co., the Virginia Iron, Coal & Coke Co., and the Black Diamond Coal Co. The competition for the transportation of the coal from the fields of Virginia and Tennessee will fall to the Southern and Chesapeake & Ohio Ry. companies.

Coal Trade Reviews

General Review

Anthracite active but developing signs of weakness. Soft coal restricted without enough demand to absorb the heavily curtailed production. Business confined to negotiations on new contracts. Poor showing in the Lake trade.

Although the anthracite trade is generally active in all departments, contradictions and crosscurrents are beginning to develop uncertainties in the situation. On the one hand it is noted that mines are working up to full capacity, while most of the companies are refusing to accept further business for April delivery, and it is clear that many April orders will be carried over into the next month, particularly on certain short sizes. On the other hand, careful observers point to distinct indications of weakness in basic conditions, such as less surplus orders than customary during the opening month, a light demand in the lake trade, and a request that shipments be discontinued because of lack of further storage room—a most unusual condition in April. In fact, it is generally agreed that the anthracite trade is beginning to feel the effects of the pressure under which bituminous has been laboring for several months.

The soft-coal business is characterized by an entire absence of any demand while the market is dull and restricted, with business confined to small lots. Consignment coal is still coming in, creating a soft condition in the spot market which the operators are making desperate efforts to maintain in order to avoid a decline in quotations on contract business. Interest is concentrated almost entirely upon this latter phase of the situation, and some agencies that have already lost business by holding out for high figures are now showing a disposition to make concessions. It is generally felt that the bottom of the market has been reached, but there is much uncertainty as to how long it will continue at the low level.

Production in the Pittsburgh district is larger than there is any demand for. Business in Ohio is confined entirely to negotiations on contracts for the new year, there being neither any production or apparent demand for coal, the West Virginia product filling what meager call develops. Indications for the lake business are poor so far, and the first half of the season, at any rate, will witness a light movement. The naval maneuvering out of Hampton Roads and the demonstration against Mexico has resulted in a heavy loading at some of the Atlantic Coast ports, which has been supplemented by a fair movement in the customary coastwise and foreign trade. There are indications of some improvement in the nonunion fields, as a result of the more or less complete cessation of mining in the organized districts. However, the large consumers are standing out determinedly for lower prices, and not much business is being definitely closed.

A few isolated mines are reported working in the Middle Western field, but the demand is so light that even these are compelled to operate under restricted capacity. It is a situation of no coal, and likewise no demand.

EASTERN MARKET

BOSTON

Concessions on Pocahontas and New River for season delivery are slight, but yet have an effect on the trade. Spot market continues quiet. Distributors who guaranteed season prices are apprehensive over the amount of "market coal" coming forward. Anthracite shipments heavy, but stove, broken and screenings are short.

Bituminous—A few more of the mill contracts have been closed the past week, generally at prices that net close to the $2.85 figure for Pocahontas and New River at Hampton Roads. The "cuts" that have been made on season business so far have been light, but at the same time even slight concessions have their effect on the market. Part of the disposition to shade prices is due to the determination of certain of the agencies to hold business they acquired last year. Some of the contract business offering in February and March was lost to merchants who were in better position to name attractive water rates.

The spot market is still easy and with practically no new developments. Cargoes continue to arrive on consignment and low prices therefore prevail at the distributing points. A large volume of season business was closed early at $3.80@3.90 f.o.b. Boston, for instance, with a clause guaranteeing the price against a decline, and if spot coal continues to be sold down to $3.63@3.73 it will be interesting to see whether the distributors who made the early contracts will be obliged to scale down their prices. Were it not for these contracts the spot price would probably be put low enough to discourage shipments "on the market."

The market for the Pennsylvania coals is narrow and restricted. The coastwise trade just now is pretty well confined to small lots loading in conjunction with anthracite, and this almost entirely from Philadelphia. New York consignments are mostly to Long Island Sound and the demand there is light. All-rail trade shows no improvement. The staple varieties are having fair business for so dull a season, but most of the operators are clamoring for orders.

Anthracite—Cargoes are coming forward freely and some of the dealers here are rapidly getting to the point where they will have to call a halt on shipments. The retail demand is still exceptional, but a few days of warm weather will put it on a normal basis. Stove size is hard to get and screenings and broken are also in short supply.

Bituminous prices are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@ 1.50	$1.25@ 1.65	$1.67@ 1.77	
New York*	2.20@ 2.75	2.50@ 2.90	2.92@ 3.02	
Philadelphia*	2.50@ 3.05	2.80@ 3.20	3.22@ 3.32	
Baltimore*	.....	.....	2.85@ 2.95	
Hampton Roads*	.....	.....	.....	$2.80@ 2.85
Boston†	.....	.....	.....	3.63@ 3.78
Providence†	.....	.....	.....	3.55@ 3.78

* F.o.b. †On cars.

NEW YORK

Increased activity in anthracite at close of the month. A heavy demand in the line trade. Believed the low point in bituminous has been reached but duration of existing conditions indeterminate. Scarcely any prompt market quotable.

Anthracite—While locally the demand for anthracite coal, particularly the prepared sizes, has not been heavy, the general situation throughout the country has improved materially during the past week or ten days and from the operating end the business is in excellent condition. Contracts are taking full production of broken coal. The general market is absorbing at full circular all of the egg and stove coal, the latter being particularly short. Chestnut is inclined to be dull and inactive and all of the small sizes are in short supply . Some of the companies have already refused to accept further orders on stove coal and have at the same time notified their customers they will not agree to accept any further orders for delivery at the April price. The line demand is heavy and most of the individual coal is being supplied to that trade. The heavy demand for the higher grade steam sizes is subject to comment. While the poorer qualities are available at moderate prices they are moving promptly and with little trouble.

There is a tendency on the part of many of the consumers to shift to bituminous coal or to a mixture of bituminous and No. 2 or No. 3 buckwheat. This mixture is becoming more popular with a large part of the smaller consuming trade while the larger concerns are changing gradually to bituminous entirely.

The dealers around New York have made a set price for April and May and are finding business somewhat dull for April, but appear to be well booked up for May deliveries. It is anticipated that the movement of coal will be heavy for the next month or two at least.

The New York market is now quotable as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.60	$4.60	$4.55	$4.55
Egg	4.85	4.75@4.85	4.80	4.70@4.80
Stove	4.85	4.85	4.80	4.70@4.80
Chestnut	5.10	5.10	5.05	4.95@5.05
Pea	3.55	3.50@3.60	3.50	3.35@3.50
Buckwheat	2.80	2.80@2.90	2.50@2.75	2.35@2.80
Rice	2.30	2.30@2.40	2.00@2.30	1.80@2.25
Barley	1.80	1.80	1.70	1.40@1.75

Bituminous—There has been little or no change in the market on bituminous coal during the past week in spite of the large number of mines idle in the Central Pennsylvania field. There are still many shippers embargoed to Port Reading on account of an over-accumulation. Considerable of this coal is of the cheaper grade from West Virginia, but at the same time some of it comes from the union field, now on suspension, and some from the Pittsburgh district. This is due no doubt to the desire of the shippers to prepare themselves with an extra stock of coal in order to take care of their trade during the suspension. Consumers are well fortified with stocks equivalent to at least four weeks supply and at the same time it is most difficult to make sales on any grade of coal at any price.

While the present situation is probably the most tense we will have to consider for the coming year, it is doubtful if any material increase in demand will develop for the next week or two at least and in any event any increase will likely be very gradual.

It is estimated that about 30% of a normal tonnage is coming from the Central Pennsylvania district, but even those operators still working are finding it most difficult to keep their mines operating on account of the lack of orders. Producers of the better grades are inclined, however, to hold their coal at a moderate price or close down. Coal in the hands of shippers now at the piers and especially the poorer grades is being offered at extremely low figures ranging from $2.10 f.o.b., up. In addition to this there are several loaded cargoes of poor coal offering at very low prices, but the nominal market continues as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

PHILADELPHIA

No apparent falling off in demand for anthracite, and trade looks favorable for the next month or six weeks. Many orders and deliveries behind. Conditions in bituminous show no improvement. Volume of business and prices about the same.

Anthracite—The closing days of the first month of the new anthracite season, find the trade in a favorable position, and it is not expected that there will be any radical change for the next six weeks. This, of course, applies to the prepared sizes. Already the market for pea coal, influenced by the summer weather, has shown a marked inclination to sag, and it is understood that the surplus is being put into stock; No. 1 buckwheat and rice are still finding a ready market, and with the one exception, all sizes are moving off on orders.

Considerable dissatisfaction is always expressed during April, owing to the inability of the producing companies to supply all the demand at the lowest season's prices. The best distribution possible is made, orders being filled consecutively as entered, but with the demand centered on one or two sizes, it is not possible to satisfy any one. As is always the case, there is a large influx of orders during the closing days of the month, those having the space to store, placing orders with the expectation of saving the ten cents per ton.

	Circular	Individual
Broken	$4.25	$4.35
Egg	4.50	4.50
Stove	4.50	4.60 @ 4.70
Chestnut	4.75	4.75
Pea	3.25	

Bituminous—More interest is manifested in the bituminous market. Notwithstanding that fully 75 to 80% of the bituminous operations have suspended the trade does not seem to reflect any abnormal condition. It is evident that the consumers have ample stocks, and are not fearful of being unable to replenish them at other than normal market figures. The general business may be characterized as dull. A slightly better demand was noted early in the week, but the prices realized were those of a week or two past.

BALTIMORE

Shipments on contract practically the only business. Price list steady. Anthracite retailers announce spring and summer prices with addition of Pennsylvania state tax.

The trade as a whole is paying little or no attention to the light spot business now being negotiated at unsatisfactory prices, and instead are bending their energies to make the most out of their contracts. The movement on contract is moderately good when general industrial conditions are considered. Considerable coal is moving to Gulf ports, and the shipments to New England are on the increase. Midsummer is expected to find about a normal movement in that direction.

Meanwhile prices remain fairly steady. Spot coals are being held close to the general basis of contracts. West Virginia fuels are the dullest, three-quarter is selling at the mines at from 80 to 85c. and slack as low as 70 or 75c. Steam fuels from West Virginia are holding well at from 90c. to $1, low grade Pennsylvania line coals at from $1 to $1.15 with the choicer grades around $1.25, and the best at from $1.35 to $1.40.

The retail anthracite circular was announced the past week. It remains the same as last spring with the exception of an addition of 10c. per ton on all grades to cover the assessment of the Pennsylvania tax. The low figure, 40c. off the old fall schedule, will hold until May 31, and will then advance 10c. each month during June, July, August, September and October.

CENTRAL STATES

PITTSBURGH, PENN.

Pittsburgh district mines more than full handed. Production in excess of requirements. Business so light, market prices have scarcely developed. Connellsville coke stagnant, with consumption decreasing.

Bituminous—Miners apparently did not understand conditions as to referendum vote on wage scale and many refused to work at first, there being only about 10 mines in Pittsburgh district operating at beginning of last week. But they have since been returning and there were enough men this week to do all work required, which is not much, because of the large stocks and lake season not having opened. Pittsburgh district is this week producing about 40% of the full tonnage. It is understood that counting of referendum vote in this district is completed, but formal announcement has not been made at this writing. A conference will then be arranged for the usual adjustment of various local matters and this will probably be accomplished by end of month.

There has been little demand for coal and sales have been too light to establish a market. It is probable that concessions could be secured in some cases from the regular prices which continue as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in. steam, $1.50; 1¼-in. domestic, $1.55, per ton at mine, Pittsburgh district. There have been practically no negotiations for lake coal and shipments by the regular interests are not likely to be of any volume for several weeks.

Connellsville Coke—The market has been absolutely stagnant. Some coke is being released through the blowing out of furnaces but operators doubtless intend to restrict production accordingly, for if any coke were forced on the market, prices would undoubtedly suffer. The market is largely nominal, as follows: Prompt furnace, $1.90@1.95; contract furnace, $2; prompt foundry, $2.40@2.50; contract foundry, $2.40@2.50, per ton at ovens.

BUFFALO

No improvement in bituminous market. Slow mining is reducing surplus materially but will take some time yet to affect prices. Coke inactive, but bottom prices appear to have been reached. Anthracite easy when it should be rushing.

Bituminous—There is still some coal on track here and elsewhere, but the congestion is slowly disappearing. Dealers say that it will take till May 15 at least to clean up the supply so that consumers will come back into the market as they are much overstocked. Consumption appears to be slower than a year ago and shows no disposition to increase. As a rule the Buffalo trade is paying little attention to the open market. They all have contracts and regular orders as a rule and it is enough for the present to look after them. The difficulty comes from some misguided mine owners dumping coal on this market after failing to sell it elsewhere. It is seldom possible to sell such consignment coal at a profit. The Allegheny Valley miners are practically all idle and they are not expected to resume work again till May. There is no difficulty as a rule, but the men will seldom work when there is a rate agreement pending. This is quite satisfactory to the operators, who say that the prospect is good for resumption sometime next month on exactly old conditions. A good increase in consumption would insure a paying trade, but such is hardly anticipated.

The prices of bituminous are about as weak as they can be, but quotations remain on the former basis of $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack. The demand for slack is much better than for sizes, but it will ease off as soon as there is more three-quarter made for the lake trade.

The first sailing from this port, on Apr. 16, increased the activity at the docks. The price for three-quarter delivered

on board is $2.90, the same as last year. Nearly all the coal used in that trade is three-quarter.

Coke—There is little demand beyond the regular movement to the furnaces, but the standard ovens refuse to reduce their prices any further. It is said that where a reduction is made it is always on coke that is not of the best. Quotations remain on the basis of $4.50 for best 72-hr. Connellsville foundry.

Anthracite—The trade is good, though April sales will be much smaller than usual. Shippers are not troubled about it, as the prices will be higher next month. Before the end of April they have usually received two or three times the amount of orders that they could fill but this is not the case now and some of them will be practically even with their orders by the opening of May.

Several lake steamers have gone to Ohio ports to load coal for the upper lakes and one or two cargoes will go out soon. The start is slow and it may be sometime before the Sault passage is open. There is never any life to the lake trade till iron ore moves.

COLUMBUS

Attention of industry in Ohio concentrated on the coming conference of operators and miners. Little demand for either domestic or steam grades. All mines are still closed.

The coal trade during the past week was quiet in every way. As none of the mines are in operation the production was nil. Operators and jobbers report few inquiries and it appears that there would be little demand at this time even if the mines were in operation.

The coming lake trade is attracting some attention, although the prospects are not bright. While navigation is practically open, no coal will be landed on the docks at the Northwest prior to May 1 when the tax listing is done in the states of Wisconsin and Minnesota. There is still considerable tonnage on the docks and as a result not a great deal of coal will be shipped early in the season. Even were the mines running there would not be much activity in the lake trade before June 1.

Steam demand is light as most of the steam users have a supply on hand for 60 days. Railroads are not using much coal since many of their trains have been discontinued. Domestic trade is about a thing of the past. Dealers have ample stocks for the time being and will not be in the market before the stocking-up period. Some demand is reported for Pocahontas and other fancy grades of domestic fuel. While this is the time for many steam contracts to expire, little is being done toward renewal pending a settlement of the wage agreement. Railroad contracts will be up as soon as the basis of mining is settled.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.35
¾-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack	0.90@ 0.85		0.90@ 0.85	0.80@ 0.75
Coarse slack	0.80@ 0.75	1.00@ 0.75	0.80@ 0.75	0.70@ 0.65

CLEVELAND

Sales for shipment are being taken at prices hardly better than those offered for spot coal. The spot market has cleaned up. Shipping has started to Lake Michigan, but Lake Superior navigation is still closed. Pocahontas operators have pretty well sold up their May and June output of screened coal.

The lowest prices of the year were made last week to clean up soft coal. Youghiogheny slack was sold at $1.55 and three-quarter Richland, No. 8, brought $1.85. Fairmount coarse coals were sold at around $1.95. Very little coal is being carried over the week end, but what is enroute may change the situation for a day or two.

Sales of Fairmount gas for shipment were made the latter part of the week at $1.90 Cleveland for lump and $1.80 Cleveland for slack. The orders were not large, but indicate the market is beginning to rid itself of storage coal. It will be another ten days before the true strength of the market can be judged.

Rumors that No. 8 mine-run has been sold on contract at $1 f.o.b. mines were quite common the last few days. The general tone of the market is toward slightly lower prices on contract coal during 1914 than last year. Little contracting has been done in Ohio coals because of the unsettled labor condition. Those who have been closely following the market report the larger buyers are not in need of as much coal as last year and estimate a lake movement of 21,000,000 to 22,000,000 tons of bituminous coal as compared with 28,000,000 tons in 1913.

Coal has been loaded at all the lake shipping ports during the last week and a few vessels have sailed, but the traffic will continue light the rest of the month. The Straits of Mackinac have been opened by fish tugs which did not find the ice bothersome. Three boats arrived at Detroit, Mich., Saturday with coal for the Algoma Steel Co. at Sault Ste Marie, Ont., but did not try to proceed until Sunday. The heavy ice in Whitefish Bay at the entrance to Lake Superior is so thick and the extent so great that none of the ships will be able to get through before Apr. 25.

All doubt as to freight rates on the lakes was removed last week when the C. Reiss Coal Co. chartered vessel capacity to transport 2,000,000 tons of bituminous coal to ports on Lakes Michigan and Superior at 30c. It has been customary for the Reiss company to pay less than the Milwaukee rate for coal going to Sheboygan, but the rates this year are too low for a differential. The shippers who were talking a lower rate to Lake Superior ports gave up the idea when the Reiss rate was announced.

Prices of coal for shipment are as follows:

	Pocahontas	Fairmount
Lump	$2.95	$1.90@$1.95
Egg	2.95	
Mine run	2.60	
Slack	2.60	1.80@ 1.85

CINCINNATI

Refusal of West Virginia operators to increase wage rate causes alarm in the local market. Dealers have enough supplies on hand to last thirty days. Trade unusually quiet and dull.

Local dealers are greatly concerned over the action of the operators of West Virginia in not only refusing to meet the demand of the miners for a 10% increase, but in seeking to have the men accept a decrease. This action of the operators was brought out at the joint conference in session at Charleston, W. Va., last week. The operators declare they have reached a point where it is better to shut down than to operate at a loss, and figures are quoted showing that since 1902 advances of 40% have been made in the prices of pick mining while the increase in the selling price has been only 8%.

Most of the coal sold in this market is West Virginia mined and the local dealers are fearful that the operators and miners will not come to an amicable understanding. These dealers state they have enough coal on hand to last probably 30 or 60 days if there be no spirited demand, which they say is hardly likely. There has been no perceptible change in the local market during the past week. Trade has been unusually quiet and dull with prices holding firm.

TOLEDO

Shutdown of the mines has little effect in the local market. West Virginia grades supplying present demand, which is light. Large tonnages at the local docks for lake shipment.

The feature of the present market is the exceedingly light demand for steam coal. Most of the larger plants are sufficiently stocked to meet immediate requirements. With the cessation of work in the Ohio mines, the trade is finding no difficulty in meeting the meager demand with coal from West Virginia. A great many of the Toledo operators are reporting a fair number of inquiries for contracts.

The docks at Toledo are filled with coal awaiting lake shipment. The first boat for Duluth cleared Wednesday having some surplus stock from the Ohio and Pennsylvania fields, but mostly from the West Virginia regions. Because of the comparatively lower rate in lake shipping, many of the shippers are taking advantage of immediate transportation to the upper lake ports. There is a heavy demand for Pocahontas. One of the largest wholesalers reported having already contracted for all the available Pocahontas up to Aug. 1. Prices on available Ohio and Pennsylvania stock have not changed.

DETROIT

Improving tendency but consignment coal still difficult to move. Some activity in contracting. Anthracite in good demand and coming in slowly.

Bituminous—While there are some indications of improvement, it is still a fact that jobbers are busy disposing of coal coming in on consignment, the coarse sizes being particularly hard to move, due to the unusually heavy demand for slack. Consumers are now showing a disposition to cover on contracts, a number of which have been recently closed at prices said to be 5 and occasionally even 10c. a ton above last year's level. On the other hand, some unusually low figures are being quoted on track coal, Hocking lump being offered down to $1.10, as compared with a circular price of $1.75. On the Pocahontas grade the circular is being generally maintained.

Anthracite—Hard coal continues moderately active and strong, particularly on stove and chestnut sizes, which were

practically cleaned up on Apr. 1. There has also been some anxiety on the part of the trade, due to the slow arrivals.

Coke—Coke is the most satisfactory branch of the local trade, a large tonage being moved with comparatively little effort. Connellsville foundry is quoted at $3, with Semet Solvay at $3.25 and gas house $2.90.

HAMPTON ROADS

Fair shipments for the week. Government loadings heavy. No change in prices. Some small movement of high volatile.

Coal shipments from Hampton Roads piers have been fair some large cargoes moving both coastwise and foreign. Government loadings have also been fairly heavy. While there has been no demand for high volatile coals for spot movement there have been some shipments made during the week for New England. No doubt this coal has moved on contract.

Foreign cargoes have gone to Kingston, Santiago, Daker, Coronel, Valparaiso, Naples, Rio de Janeiro, Genoa, Para, Venice, Manos and Canal Zone.

The largest single cargo of the week went into the U. S. Collier "Nereus" which took approximately 12,500 tons. Prices on all grades remain the same as they have been for some time. On account of light demand on coastwise shipments several schooners have been compelled to lay idle in the Roads waiting for charter.

LOUISVILLE

Effects of suspension being felt and some improvement is noted. Steam sizes becoming short. Cuts in new contracts.

Suspension of mining operations in the union fields has tended to improve the outlook in this market. Some improvement is noted, especially in the Eeastern Kentucky and East Tennessee coals, attributed in part to the labor troubles and also to the opening of the shipping season for coal westbound from Lake Erie ports. Though the first of April found heavy stocks, May is expected to see large quantities of these depleted.

The steam market continues slow, some dealers finding it necessary to shade prices sharply in order to dispose of such grades on the open market. One agency for a group of Western Kentucky mines has found it necessary to stock up heavily on lump coal in order to get enough nut and slack to fill its steam orders although this is not usual as yet. It is possible that many of the new contracts for steam coal will have to be at a reduced figure. Large consumers are demanding reductions and numbers of large contracts have been renewed at 5c. and even 10c. under the price of a year ago; on the other hand many important contracts have been closed at the same level.

It is necessary frequently to make concessions in both domestic and steam coal to secure a regular amount of business in Louisville. The advent of natural gas has not as yet had any apparent effect on the coal market, though the retail dealers are disturbed as to what may happen next fall and winter. Prices are quoted at from 50c. for pea and slack and 75c. for nut and slack in the Western Kentucky fields to from 65 to 75c. for the best and 40 to 50c. for inferior grades of nut and slack in the Eastern Kentucky fields. Eastern Kentucky block coal to the retail trade is quoted at from $1.30 to $1.60 with egg at from $1 to $1.30, all f.o.b. the mines.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Dealers delaying placing orders for lump coal. Steam grades still quiet. Tests of Alabama fuels being made in Cuba. Furnace and foundry coke quiet, and blacksmith normal.

The dealers are still putting off booking lump coal for summer and fall shipment, as has been the usual custom, waiting to see if the operators intend to lower prices as an incentive for larger orders. But it seems to be the opinion that the producers are going to hold to original quotations, as they feel that to make concessions would set a precedent that would have to be repeated every year. Though some few contracts are being let on steam coal, the market is still quiet, and no improvement is looked for until the brick and oil manufacturers contract for their supply, which runs through the summer and fall. However, prices on steam coal remain firm.

One Alabama operator has shipped a large consignment of coal to Cuba, by a specially charted steamer, having made arrangements with several Cuban manufacturers to make an exhaustive test of the coal. Should it prove satisfactory, it will mean that a large tonnage will be contracted for. Both furnace and foundry coke are quiet, with practically no sales larger than carload lots. Blacksmith coal is about normal, with no change in price. There is practically no pig iron being sold, though shipments are being made in the normal tonnage; production is not being curtailed to any extent, and no immediate relief is looked for. The car supply is plentiful.

NEW ORLEANS

Anthracite commanding a slight premium, but weakness in other grades is pronounced. Decreases in fuel oil prices affect the market. Marine demand above normal. Alabama waterways soon to be ready for perennial navigation.

While anthracite is a trifle higher than last year, all grades of bituminous are selling at a decidedly lower level. The mines in Alabama are operating at 50% capacity and there are prospects of further decreases. Much interest is being taken in the contract soon to be let by the American Sugar Refining Co. as it will give an idea as to just how low different companies are prepared to go.

Due to the activity in shipping, as well as the frequent visits of American war vessels stationed in Mexican waters, the demand for coal has been brisk along the harbor front. This has been offset, however, by quietness in the interior, due to the falling price of fuel oil.

High water in the Alabama river system has permitted the transportation of considerable coal by the water route to Mobile and New Orleans. Government engineers, in charge of the work at locks Nos. 2 and 3 on the Tombigbee River, state that the work will be completed earlier than had been expected and perennial navigation will then be assured. Work is being pushed, night and day shifts and Sundays and holidays.

In laying in stocks for this summer, all dealers are taking into consideration the probable increase in the requirements of the bunker trade, following the early opening of the Panama Canal. Several new steamship lines, having this port as their terminus, will begin operation at that time, which will mean that their entire coal supply will come from this port.

ST. LOUIS

Production practically cut off altogether but no buyers are to be found for what small tonnages are offering.

There is no coal to offer, at least, very little, and with no buyers for even this. At no time was the situation so completely dead as it is at present. A few buyers are showing a little anxiety over the future prospect for screenings and the smaller sizes of coal. Buyers who pay cash for this kind of coal can get it at their own figure, while those asking 30 to 60 days can seldom get the coal.

For the most part the operating mines in the Standard field, that is the fifth and ninth districts are coöperative and must have their money on the fifteenth and thirtieth of every month for coal shipped in the preceding two weeks; hence they must sell to cash customers who consequently, are able to buy the coal at their own figure. Coöperative coal mining means working for less than the regular scale and putting the operator who is paying the scale at a disadvantage.

Standard 2-in. lump coal has been sold as low as 85c., while the screenings are bringing from 75 to 80c. In the Carterville-Franklin County field a few mines are working in isolated places, but even their limit seems to be about two days a week. One Chicago operator, with mines at Marion, Ill., is offering lump and egg at $1.05 the mines, and a Franklin County producer at West Frankfort is a close second. The better grades of coal from Williamson and Franklin Counties, lump and egg, are bringing from $1.25 to $1.45, while No. 1 nut is in some demand. Carterville screenings are good for about 80 to 90c., while in some cases 2-in. screenings are bringing 95c. and $1. A great many operators seem to figure that there will be no increase in the scale, and are contracting accordingly.

There is a fair tonnage of anthracite moving in, but nothing in the way of coke, and very little smokeless.

The market at the closing of the month was:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	.....	$0.90 @ 1.00	$1.15
3-in. lump	.....	.....	$1.35	.....	.....
6-in. lump	$1.35 @ 1.50	.....	1.50	1.10 @ 1.25	1.35
Lump and egg	1.85 @ 2.15	$2.25	.....	.....	1.15
No. 1 nut	1.20 @ 1.45	.....	.....	.....	.....
Screenings	0.85 @ 0.90	.....	.....	0.65 @ 0.70	0.75 @ 0.80
Mine-run	1.10 @ 1.20	.....	.....	0.80 @ 0.85	.....
No. 1 washed nut	1.50 @ 1.60	2.25	1.50	.....	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.80 @ 0.85	.....	.....	.....	.....

FOREIGN MARKETS

GREAT BRITAIN

Apr. 9—The market is quiet and owing to the holiday influence, business is on a small scale. Quotations are approximately as follows:

Best Welsh steam	$4.50	Best Monmouthshires	$4.11
Best seconds	4.38	Seconds	3.96
Seconds	4.23	Best Cardiff smalls	2.82
Best dry coals	4.20	Seconds	2.70

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry, $5.28@5.52; furnace, $4.32@4.56.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February of the current year in short tons.

Pocahontas Field	942,477
Tug River District	204,074
Thacker District	198,228
Kenova District	71,401
Clinch Valley District	152,769
Other N. & W., Territory	3,694
Total N. & W. Fields	1,572,643
Williamson & Pond Creek R.R.	26,314
All other railroads	67,518
Grand total	1,666,475

Following is a comparative statement of the N. & W. tonnage for March, 1913 and 14:

	Shipped		Tipple		Total	
Field	1914	1913	1914	1913	1914	1913
Pocahontas.	1,055,756	1,003,352	18,137	16,363	1,073,893	1,019,715
Tug River..	243,546	184,658	2,944	3,169	246,490	187,827
Thacker....	266,579	238,340	8,207	8,978	274,786	247,318
Kenova....	79,331	59,345	9,285	7,470	88,616	66,815
Totals...	1,645,212	1,485,695	38,573	35,980	1,683,785	1,521,675

Shipments of coke, entirely from the Pocahontas field, were 71,620 tons in March of this year as compared with 116,219 last year.

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for January, 1912-13-14, and for the seven months ending January, 1912-13-14, in long tons:

	7 Months			January	
Imports from:	1912	1913	1914	1913	1914
United Kingdom	5,644	7,218	4,913	1,168	2,120
Canada	513,569	843,962	579,071	109,520	84,092
Japan	7,057	30,004	74,306	5,494	11,385
Australia and Tasmania	143,140	98,308	141,284	10,113	14,626
Other countries.	915	448	1,967	.....	80
Total	670,325	979,940	801,541	126,295	112,303
Exports:					
Anthracite					
Canada	2,034,695	2,812,753	2,242,101	299,977	191,968
Uruguay	.....	.....	84	.....	.....
Other countries..	34,798	50,358	41,677	5,592	5,447
Total	2,069,493	2,863,111	2,283,862	305,569	197,415
Bituminous,					
Canada	7,079,617	7,002,875	8,516,274	565,196	563,848
Panama	250,273	269,759	241,054	54,567	30,075
Mexico	185,302	155,216	182,973	43,778	38,37
Cuba	638,032	706,776	685,759	117,109	94,493
West Indies	375,620	329,436	337,271	72,233	72,7379
Argentina	.....	.....	52,861	.....	10,480
Brazil	.....	.....	170,521	.....	27,352
Uruguay	.....	.....	16,858	.....	.....
Other countries	439,717	563,114	675,118	113,080	86,391
Total	8,968,561	9,027,176	10,878,629	975,963	923,760
Bunker coal...	3,913,684	4,230,690	4,575,059	612,689	607,652

COAL FREIGHT DECISIONS

I. C. C. No. 5558—Hughes Creek Coal Co., and Kelly's Creek Colliery Co. (No. 5558 Sub.—No. 1) vs. Kanawha & Michigan Ry. Co.

1. Complainants' request for through routes and joint rates between stations on the Kanawha & Michigan Railway and its branches and the points specified in the complaint in eastern and southeastern territory on the lines of the Chesapeake & Ohio and its connections should be granted. As reasonable rates for these routes defendants should apply rates not in excess of those now applying to these destinations for shipments from the mines on the Chesapeake & Ohio. The factor of the two-line haul in the routes sought by complainants is negligible, since the switching connection between the Kanawha & Michigan and the Chesapeake & Ohio is simple, and the average haul to destination is more than 500 miles. Sheridan Chamber of Commerce v. C., B. & Q. R.R. Co., 26 I. C. C., 638, 647-649; Investigation of Alleged Unreasonable Rates on Meats, 23 I. C. C., 656,661. The policy of the Chesapeake & Ohio to restrict the movement of coal on its line confined solely to coal originating on its own line held not to be justified.

2. Complainants' request for a through route and joint rate to the Cincinnati switching territory over the Kanawha & Michigan and the Chesapeake & Ohio and its connections should not be granted. Such a route would give the Kanawha & Michigan a short haul of very much less than the entire length of its line.

3. The fact that the defendants have established through routes and joint rates from Chesapeake & Ohio mines to Kanawha & Michigan destinations while refusing complainants the through routes and joint rates sought does not constitute unlawful discrimination when viewed in the light of the principles applied in Coke Producers Asso. of Connellsville Region v. B. & O. R.R. Co., 27 I. C. C., 125, and the cases there cited, which hold a test of discrimination to be the ability of one of the carriers participating in the two through routes to put an end to the discrimination by its own act.

4. The charge that since the Chesapeake & Ohio and the Kanawha & Michigan are practically one road it is unjustly discriminatory for them to deny the Kanawha & Michigan mines access to markets which have been made available for Chesapeake & Ohio mines held not to be established. For the purposes in question no such identity between the two roads as complainants assert has been proven.

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending Apr. 18.

	Week's Range			Year's Range	
Stocks	High	Low	Last	High	Low
American Coal Products	83¾	83¾	83¾	86¼	83¾
American Coal Products Pref.	104½	104½	104½	106	104
Colorado Fuel & Iron	30½	28¼	28¾	34½	28¼
Colorado Fuel & Iron Pref.	140	140	140	140	140
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com	49	48	49	....	....
Island Creek Coal Pref.	86	85½	85½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20½	20	20	23½	17⅞
Pittsburgh Coal Pref.	90⅞	87¾	88¾	93½	86
Pond Creek	18	17	17½	....	....
Reading	165⅞	161	161⅞	172¼	161
Reading 1st Pref.	89⅛	88⅛	88⅛	89	87½
Reading 2nd Pref.	90	90	90	93	90
Virginia Iron, Coal & Coke	46¼	45	45	52	40

	Closing		Week's Range		Year's
Bonds	Bid	Asked	r	Last Sale	Range
Colo. F. & I. gen. s.f.g. 5s	97	98½	98	Mar. '14	91½ 99
Colo. F. & I. gen. 6s	104	..	107¼	June '12	.. ..
Col. Ind. 1st & coll. 5s. gu	75¼	76⅞	76	77	76 82
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	73 79
Cons. Coal 1st and ref. 5s	89	92	89	Mar. '14	89 89
Gr. Riv. Coal & C. 1st g 6s	91	..	99½	Feb. '14	99½ 99½
K. & H. C. & C. 1st s f g 5s	..	98½	102⅜	Apr. '06	.. ..
Pocah. Con. Coll. 1st s f 5s	90	..	93	Mar. '14	93 93½
St. L. Rky. Mt. & Pac. 1st 5s	..	88½	88	88	84 88½
Tenn. Coal gen. 5s	77	79½	80¼	Mar. '14	77 82
Birm. Div. 1st consol. 6s	100⅛	..	103	Apr. '14	97⅛ 103⅛
Tenn. Div. 1st g 6s	102	Sale	102	102	101½ 103
Cah. C. M. Co. 1st g 6s	101⅞	103	102	Mar. '14	101 102½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼ 101¼
Victor Fuel 1st s f 5s	..	75	80	May '13	.. ..
Va. I. Coal & Coke 1st g 5s	92⅛	93	92⅛	92¾	92½ 95

DIVIDENDS

Reading Co.—Regular quarterly of 1% on the first preferred payable June 11 to holders of record May 26.

Burns Bros.—Regular quarterly No. 3 on the common of $1.25 payable May 15 to holders of record May 1 and regular quarterly No. 5 on the preferred of $1.75 payable May 1 to holders of record Apr. 15.

Consolidation Coal—Regular quarterly of 1½% payable Apr. 30 to holders of record Apr. 25.

Pacific Coast—Regular quarterly on the first preferred of 1¼% and 1½% on the second preferred; and common, all payable May 1 to holders of record Apr. 25 to May 1.

Financial Department

Nova Scotia Steel & Coal Co.

President Robt. E. Harris reports for the year ended Dec. 31, 1913 as follows:

The profits for the year were $1,255,954, as compared with $1,000,610 for 1912. Dividends at the rate of 8% on the preferred and 6% on the common stock have been paid quarterly.

The sum of $32,659 has been applied to the sinking fund for retiring bonds, $70,185 has been added to the reserve funds, and $107,682, expended for improvements and betterments, has been written off. The aggregate of these sums is $210,527, and is considerably in excess of the amount deemed necessary to provide for depreciation.

During the year $2,000,000 of debenture stock was sold and the proceeds applied in payment of the amounts expended in 1912 and 1913 on capital account. The amount charged to capital account in respect to the expenditure of the past year is $1,158,462.

The Eastern Car Co. (whose entire issued common stock is held by your company) has been continuously engaged since September in the manufacture of cars, and its operations indicate that it will prove a valuable asset to our shareholders.

Work on the new Jubilee shaft at Sydney Mines has been carried on throughout the year, and it is expected that this colliery will be fully equipped early in the year 1915. An additional open-hearth steel furnace has been erected at Sydney Mines. A large amount of work has been done in further developing our submarine iron ore areas at Wabana and many additions and improvements have been completed during the past year.

RESULTS FOR CALENDAR YEARS

	1913	1912	1911	1910
Profits for the year	$1,255,954	$1,000,610	$1,019,392	$1,140,504
Balance brought forward	452,601	508,545	500,603	336,807
Total available	$1,708,555	$1,509,155	$1,519,995	$1,477,311
Interest on bonds, etc.	395,576	352,311	291,169	248,000
Int. on debenture stock	109,560	60,000	60,000	60,000
Depreciation, renewals	70,186	92,196	96,124	79,371
Div. on pref. stock (8%)	82,400	82,400	82,400	82,400
Div. on common stock	(6%) 360,000	(6%) 360,000	(6%) 360,000	(4½) 270,000
Disc. etc., on bds. issued	.....	.....	.....	218,103
Improv'ts and betterm'ts	107,682	61,010	73,881	
Sinking fund and misc.	55,264	48,637	47,876	18,834
Total	$1,180,668	$1,056,554	$1,011,450	$976,708
Surplus carried forward	527,887	452,601	508,545	500,603

BALANCE SHEET DECEMBER 31

Assets—	1913	1912	1911	1910
Property and mines	$16,829,075	$15,670,614	$14,489,286	$13,490,554
Inventories	1,776,575	1,714,184	1,338,128	1,245,682
Ledger acc'ts and bills rec.	488,161	907,485	590,543	606,857
Cash	268,,416	328,594	397,289	498,788
Total	$19,362,228	$18,620,877	$16,815,247	$15,841,881
Liabilities—				
Preferred stock	$1,030,000	$1,030,000	$1,030,000	$1,030,000
Common stock	6,000,000	6,000,000	6,000,000	6,000,000
Bonds	5,911,809	5,946,809	4,933,900	4,960,000
Sinking fund	88,278	53,556	26,101	.....
Debenture stock	3,000,000	1,000,000	1,000,000	1,000,000
General reserve	750,000	750,000	750,000	750,000
Bills payable	200,000	490,000	775,000	.....
Pay-rolls and acct's not due	389,930	534,020	440,691	304,597
Fds. cred. East. Car Co.	.....	971,599	.....	.....
Coupons (January)	147,795	148,670	123,347	124,000
Coupons not presented	2,522	1,529	1,540	843
Deb. stock int. Jan. 1	88,560	30,000	30,000	30,000
Div. on pref. Jan. 15	20,600	20,600	20,600	20,600
Div. on common Jan. 15	90,000	90,000	90,000	75,000
Reserve for depr., etc.	1,085,694	1,029,270	1,023,332	994,624
Insurance funds	29,153	72,223	62,191	51,614
Profit and loss	527,887	452,601	508,545	500,603
Total	$19,362,228	$18,620,877	$16,815,247	$15,841,881

Note:—For the previous annual report of this company see Coal Age Vol. 3, page 284.

Victor-American Fuel Co.

In the fourth annual report of this company, for the year ending June 30, 1913, Vice-President W. J. Murray says in part:

The net income was $591,542. After providing for fixed charges and depreciation reserves, a balance of $257,107 (being $101,357 less than in 1911-12) was carried to credit of profit and loss. On Nov. 5, 1912, a dividend of 1½% on the capital stock for the six months ending June 30, 1912, was paid, and on June 3, 1913, a further 1½% for the half-year ending Dec. 30, 1912. After making allowances for these dividends and other minor adjustments, the credit balance in profit and loss account Jun 30, 1913, was $198,513. The decrease in tonnage of coal produced was 73,390 tons; in tonnage of coke, 10,981 tons.

The decrease in surplus income was brought about by a number of causes, mainly of a temporary character. On Apr. 1, 1912, an advance in wages to all mine employees of 10% was put into effect, and on Mar. 5, 1913, in Colorado, and Aug. 1, 1913, in New Mexico, an 8-hr. day was put into effect, causing a reduction of 20% in the hours the mines were operated daily without any corresponding reduction in wages. On most of our steam-coal contracts an equal increase in the price of coal was secured, but the price of domestic coals could only be increased gradually to meet this.

On June 18, 1912, an explosion of gas in the Hastings mine caused the death of twelve miners and a considerable property loss, and greatly curtailed the production of coal throughout the year and increased the cost of the smaller tonnage produced. Unusual expenditures in painting and repair of tenant houses, increase in taxes, payments for personal injuries and reduced dividends from the Western Stores Co. account for fully one-half of the decrease in surplus income.

The Stores Co. suffered a large loss in the volume of business transacted in an effort to check the growing evil of credit sales, but by the close of the year the business had resumed its normal proportions.

During the year there was a great scarcity of mine labor, resulting in a loss of tonnage and an abnormal expense in shipping men into the mining districts. This shortage of mine employees was general throughout the United States and was to some extent occasioned by the large number of Slavs, Greeks, Bulgarians, etc., who returned home during the Balkan War.

The New Mexico mines showed a material increase in earnings, confirming the expectations expressed in the last annual report.

RESULTS FOR YEARS ENDING JUNE 30

Short Tons	1912-13	1911-12	1910-11	1909-10
Coal produced	2,155,059	2,228,448	2,256,041	2,358,909
Coal sold	2,043,251	2,069,361	2,033,699	2,063,085
Coke produced	43,619	54,600	84,943	108,409
Coke sold	44,685	52,625	85,213	108,693
Coal purchased and sold	42,192	6,459	103,353	206,833
Gross earnings	$3,458,169	$3,457,062	$3,592,344	$3,669,070
Operating expenses	2,888,602	2,805,471	2,788,625	2,832,720
Net earnings	$569,567	$651,591	$803,719	$836,350
Total net income	641,799	739,980	879,610	923,250
Deduct—				
Taxes	25,920	20,339	21,597	20,152
Insurance	9,135	10,008	10,041	9,312
Miscellaneous	23,742	28,256	10,131	9,277
Int. on V.-A. F. bonds	135,908	127,325	126,000	152,500
Int. on V. F. bonds	91,100	92,350	93,550	95,000
Depreciation	98,887	103,238	107,603	116,580
Dividends	(3)282,000	(22) 258,500	(5) 470,000	(32) 305,000
Total deductions	$666,692	$640,016	$838,922	$707,821
Bal., sur. or def.	def 24,893	sur 99,964	sur 40,688	sur 215,429

BALANCE SHEET JUNE 30

Assets—	1913	1912	*Liabilities*—	1913	1912
Real estate	$9,913,003	$9,850,844	Capital stock	$9,400,000	$9,400,000
Equipment	2,918,796	2,691,530	1st and ref. M. 6s	2,675,000	2,153,000
West Stores Co. stock	210,000	210,000	Victor Fuel Co. bds	1,822,000	1,847,000
Col. & S.E. RR. stock	100,000	100,000	Interest accrued	113,577	100,900
Col. & S.E.Ry. bds	300,000	300,000	Bills payable	175,000	107,900
Mtn. Tel. Co. stock	15,000	15,000	Vouch. and pay-rolls	192,660	161,163
Bond redem. accounts	121,092	71,067	Taxes accer. unpaid	14,000	10,350
Development	204,825	199,485	Unpaid coupons	195	505
Advance royalty	44,955	42,928	Net liability to sub. cos. on current account	57,190	50,875
Supplies	104,549	100,561	Res. for bond redem	68,110	70,781
Cash in banks	130,170	131,977	Disc. on V. F. Co. bonds red	851	45
Accounts and bills rec.	389,830	390,900	Profit and loss	*198,513	268,869
Treasury bonds (V.-A.F. Co.)	226,000	53,000			
Coal and coke on hand	5,120	14,314			
Miscellaneous	48,330	10,227			
Total	$14,731,670	$14,181,833	Total	$14,731,670	$14,181,833

* After deducting losses of $19,823 for Hastings accident; $21,465 for general employment and $9,831 miscellaneous, and adding miscellaneous credits of $5,673.

Note:—For the previous annual report of this company see Coal Age, Vol. 3 page 474.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 18
Issued Every Saturday
Hill Publishing Company

NEW YORK, MAY 2, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

See This Waste Coal Dump?

It was made BEFORE the advent of The MASSCO Coal Washing Table and with the best Coal Jigs available.



THE Steam Shovel is now loading this Dump on cars for Re-treatment on MASSCO TABLES, the cleaned slack going direct to the coke ovens. Especially adapted for cleaning coal too fine for jigs. Capacity 5 to 8 tons per hour.



Send for descriptive Bulletin No. 28.

The Mine & Smelter Supply Co.

Denver, Colorado



A Barsteel Gathering Locomotive
That Will Operate in a 29-Inch Clearance

Here is an illustration of a Baldwin-Westinghouse Barsteel electric gathering locomotive that operates successfully in a clearance of twenty-nine inches—36 inches was heretofore considered about the limit for locomotives.

Great care has been exercised in keeping the overall height to a minimum, as is shown in the general construction of the locomotive and the location of the reel.

There is not a projection above the top of the frame anywhere and ample room has been provided to permit the operator to crouch upon his seat.

The reel is driven by an independent motor contained inside the reel drum. This motor is in effect an electrical spring. It tends to wind the cable up and its turning force acts as a brake and keeps the cable taut when the locomotive enters the room and promptly takes up all slack when the locomotive returns.

With this type of reel there is easy access to the locomotive motors, because of its being located out of the way on the rear of the frame. The armature of the reel motor can be readily removed for inspection and overhauling.

Locomotives of this type have successfully solved the problem of gathering in very low rooms. Our specialists in mine haulage, who make a careful study of various mining problems will be glad to assist you in selecting the proper equipment for your mines.

Get in touch with them by writing to either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MAY 2, 1914 NUMBER 18

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 713

When the Cap Burns Blue. Poem by Berton Braley.

IDEAS AND SUGGESTIONS: *Pages* 714-715

Educating the Public—An Ounce of Prevention versus a Pound of Cure.

*THE AMHERST COMPANY'S PLANT IN WEST VIRGINIA: *Pages* 716-717

Description of a plant equipped with some elaborate retarding conveyors ,and also an effective screening arrangement. Two seams are mined about 200 ft. vertically apart. W. M. Judd. COAL AGE, Vol. 5.

*OVERCASTS AND STOPPINGS IN MINES: *Pages* 718-719

Terra-cotta building blocks are now in satisfactory use for the construction of stoppings and for overcast walls. They are 40 to 50 per cent. cheaper than concrete walls and stoppings, though about equally more expensive than wood. A. W. Hesse. COAL AGE, Vol. 5.

*A GERMAN COAL-SCREENING PLANT: *Pages* 720-721

A typical German installation, preparing many different sizes of coal for market and for coking. COAL AGE, Vol. 5.

THE PASSING OF THE MINE MULE: *Page* 721

*A NEW ROTARY COAL-WASHING JIG: *Page* 722

*COAL-WASHING EFFICIENCY CALCULATIONS: *Pages* 723-728

There are several kinds of jig efficiency. One depends on the ash removed, another on the desirable coal saved and a third on the power used or wasted in washing. The last efficiency is relatively important. G. R. Delamater. COAL AGE, Vol. 5.

AN AUTOMATIC CONTINUOUS COAL DRIER: *Pages* 728-729

RECENT SCALE CONFERENCES: *Page* 729

SNAPSHOTS IN COAL MINING: *Pages* 730-731

Miscellaneous views of surface and underground equipment gathered from all parts of the world.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 744

COAL AND COKE NEWS: *Pages* 745-748

THE COLORADO STRIKE: *Page* 732

The disturbance in Colorado has been permitted to grow until no longer a strike it has assumed the proportions of war. Both northern and southern Colorado are affected. COAL AGE, Vol. 5.

*A PREPARATION PLANT IN A RIVER TIPPLE: *Pages* 733-734

THE ECCLES EXPLOSION: *Page* 734

WIRELESS TELEPHONY IN ENGLISH MINES: *Page* 734

WHO'S WHO IN COAL MINING: *Page* 735

Brief sketches of the lives of Major Robt. U. Patterson, Medical Corps, U. S. A., in charge of the first-aid department of the American Red Cross, and John Hewitt, general manager of the Vandalia Coal Co., Terre Haute, Ind.

EDITORIALS: *Pages* 738-737

The Senate and the Railroads—The Situation in Colorado—Scientific Preparation of Coal—Absenteeism—The Coal Age.

SOCIOLOGICAL DEPARTMENT: *Pages* 738-739

*COAL COMPANY MAKES AN EXHIBIT OF PRACTICAL HOUSEKEEPING:
At Lambert, Penn., and Gary, W. Va., an attempt is being made to encourage a higher standard of living by training the women and children in the arts of housekeeping by a practical demonstration in a simple but model house. COAL AGE, Vol. 5.

DISCUSSION BY READERS: *Pages* 740-742

*A Useful Hitch—Safety or Refuge Chambers in Mines. Letter No. 3—The Air Factor in Mine Explosions—Gasoline Motors in Mines.

STUDY COURSE IN COAL MINING: *Page* 742

INQUIRIES OF GENERAL INTEREST: *Page* 743

Mine Resistance in Fan Ventilation—Height of Barometer in Millimeters.

COAL TRADE REVIEWS: *Pages* 749-754

ADVERTISING INDEX: *Page* 64

NUMBER OF COPIES PRINTED THIS ISSUE 12,250

None sent free regularly, no returns from news companies, no back numbers.

Don't Fool Yourself

The Weekly Ad-Talk Page

¶ Don't fool yourself into believing that the way of yesterday is the way of today in doing things in the coal mine. ¶ Something new is discovered every day. ¶ Don't fool yourself into believing that the manufacturers of mining equipment and supplies are sleeping. ¶ They are on tip-toes every day in the week and every week of the year, bringing out better machinery and more economical ways of mining. ¶ Don't fool yourself into believing that ads of today are mere names and addresses and blatant assertions of superiority. ¶ They are true stories of the progress being made in equipment and supplies in your field—they are your best opportunity to keep abreast of the fast moving times.

¶ *Read the Ads!*

COAL AGE

Vol. 5 NEW YORK, MAY 2, 1914 No. 18

When the Cap Burns Blue

By Berton Braley

Written expressly for Coal Age

I

It's waiting, waiting, waiting,
Though you don't know where,
It's lurking 'round the corner
And you must take care,
It's deadly as the lightning
When it strikes at you,
And you want to take no chances
When the cap burns blue!

II

You cannot smell or see it,
Where it lies in wait
To wrap you in the mantle
Of its deadly hate;
Perhaps you'll never meet it
All your whole life through,
But you'd better hike for safety
When the cap burns blue!

III

It steals upon you softly
It breathes upon your lamp,
Which should give an indication
Of the presence of the damp.
So if you love your children,
And your good wife, too,
You'll try to make your exit
When the cap burns blue!

IV

There's a lot of little tombstones,
Which would not be there
If the fellows lying under
Just had taken care,
But they monkeyed 'round with danger,
As some men WILL do,
And they didn't pay attention
When the cap burned blue!

V

So all you greeny miners,
You just watch your step,
There's a need of sense in mining
And I'll put you hep;
You watch the roof above you,
And the coal dust, too,
And don't you play with firedamp
When the cap burns blue!

Ideas and Suggestions

Educating the Public

By Mine Inspector

SYNOPSIS—An attack on present socialistic tendencies, with arguments opposing the nationalization of mines.

In any enterprise, whether individual or corporate, labor and capital combine through their energy, skill and financial resources to supply a product for the public in a satisfactory manner.

If labor and capital estimate correctly the public's wishes, industry flourishes, and labor and capital find the maximum of employment. If, however, in supplying that which the public wishes, labor or capital is not satisfactorily employed, they must look to the public for redress.

In the early days of feudalism, much wrong existed and no one will say that the world's democratic movement has been without a rational end, but labor has been so insatiable that today we may say new enterprise is dead, because the spirit of economic adventure has been paralyzed by the uncertain outcome of the world-wide social unrest. Great Britain has been on the verge of civil war. The Caillaux affair was only an incident in the politics of that thriftiest of all nations, France. In our own affairs, the extent to which radicalism has gone can best be illustrated by the new conception of property as expressed by Secretary of Labor Wilson or by the changes already wrought in lines of business legality.

Dangerous Doctrines

Demagogues, parasites on the body politic, that prey upon the public, aided and abetted by their kind in our Congress and among the counselors of the nation, are to be found in every industrial community in the country, teaching the most insidious of all doctrines—that capital should not partake of the fruits of industry, for it does nothing toward the production of the nation's wealth; and that in the government ownership and operation of all industry lies the only solution of the problem. In their dangerous doctrines, they do not "appeal to reason."

Today the "Arteries of the Nation" are fighting for existence, not because of their inefficiency, as these same demagogues would have the public believe, for the railroads of this country are the grandest achievement in the science and art of transportation that the world has ever witnessed; but because the laborers of these great factors in the nation's prosperity have educated the public into believing that they are underpaid and overworked, notwithstanding that they are the highest paid railroad men in the world.

In their clamorings, these same teachers of the public do not "appeal to reason" and present for the public's consideration that the state-owned railroads of Prussia do not show a profit of six per cent., and these figures do not include a capital charge on the railway debt, or a fund for betterment, or the redemption of capital. Yet the state-owned railroads of Prussia are notorious for their inefficiency, red tape and their special tariffs.

Nor do these same counselors of the nation explain that the state-owned railroads of Austria are a constant drain on the tax payers, yielding only two to three per cent. and paying no taxes. Economists have noted that three conditions arise in the state-owned railroads: First, where they are profitable and the public treasury absorbs the profit, in which event the interests of the shippers and passengers are sacrificed to those of the government; second, where the roads are operated at a loss and the deficiency is made up by taxation, i.e., the interests of the taxpayers are sacrificed to those of the shippers and passengers; third, where all other interests are sacrificed to those of the employees, political considerations transcending those of transportation, a condition asserted to be in a varying degree an unavoidable attendant upon state ownership.

The connection between railroading and coal-mining is at once apparent when the fact is stated that sixty-five per cent. of the freight in this country is offered by the coal industry.

Nationalization of Mines

While the problems of the railroads seriously affect the coal industry, of more genuine concern is the crisis confronting England in the proposition presented by the Mining Federation for the Nationalization of Mines, wherein it is proposed to confiscate the mineral from the present owners. The same propagandists that educate the public in the United States have as a champion of the above proposition in England Councilor Chapman of the Northumberland Miners Association who would have the public believe that in the nationalization of mines: (1) Less waste of valuable coal would occur; (2) cheaper coal for the consumers would result; (3) conditions of employees would be improved, fatalities would be less, wages would be higher; and (4) profits from the operations would be greater; but Councilor Chapman does not "appeal to 'the' reason" of the public and submit for their consideration the results of state ownership of mineral and operation of mines in France, Germany, Belgium and Australia. As a matter of fact, none of the benefits claimed for the state management of mines by Councilor Chapman have been secured by the nations which have adopted it.

A striking example of the inefficiency of state ownership of mines, mentioned by Prof. Henry Louis, in an address before the Newcastle-upon-Tyne Economic Society, is that of the Wonthaggi mine owned by the Victoria Government. Prof. Louis states that this mine is without competition, but the profits from operations were only 10c. per ton and the mines were idle during the year 1912 for six weeks while the coal diggers struck to obtain the *average* wage rate of coal diggers throughout the country.

New Laws in Ohio

In the United States, the public is immediately concerned with the recommendations of the Ohio State Min-

ing Commission to the Governor of Ohio, dealing with the regulation of mines and the law enacted by the state legislature prescribing the basis upon which the miner shall be paid.

If the results of state ownership of mines are presented to the public in a clear and concise manner devoid of technicalities, even the most fatuous will not deny that the public would refuse to be mulcted of the heavy tax necessary to pay for the evils brought about by the state management of mines.

The problems confronting coal operators are not so much that of their relationship with labor, but rather that of their relations with the public. Today this relationship is strained and unfriendly, due to the envy and snarlings of the labor agitators who have misguided the public while the operators sit idly by. Let the publicity bureaus of the several coal operators' associations be publicity bureaus, and not bureaus of censorship from which only negative results may be expected. There is no doubt a genuine desire on the part of the public to be advised, and there is no greater work to which the operator might cheerfully contribute than that of cultivating the intellect of the public to which the rapid vaporings of the agitator do not appeal.

The Great Issue Today

The politicians would have the public believe that the great issue of today is that of the "Workingmen's Rights," but that with which we are really concerned is the public's rights, whether the principle of private property upon which our democracy stands shall hold.

At no time in the past have the communistic theories been so strongly before the public. At no time in the past has the public been so insistent that they are paying the bills. At no time in the past has the public so strongly appealed for relief from the political octopus whose tentacles are sucking its life blood at every pore. The common sense, fairness and self interest of the public have never been greater, for it has become apparent that the high cost of living is the price paid for following the teachings of the socialistic demagogues and political campaigners.

That the lesson to the public, as exemplified in the present hard times, should be allowed by the mine operators to pass unnoticed, is almost unbelievable.

An Ounce of Prevention versus a Pound of Cure

By Anthracite Engineer

Some time ago, I had occasion to go into one of Pennsylvania's largest coal mines, and while climbing a breast with the fireboss, we noticed two miners tamping their holes with a piece of steel. I remarked to the fireboss how dangerous and unlawful this practice was, and my suggestion brought forth the reply, "They've probably left their tamping stick in the gangway, and there is no use to say anything, for they'll use their steel again as soon as my back is turned."

In how many mines of the country is this same thing being duplicated day after day. In every catalog of high explosives, in the rules of practically every mining company, and in the state laws, it expressly implies that none but a wooden or soft-metal tamping stick should be used. Is this rule inserted merely to fill space? No! "There's a reason," as every mining man with any common sense knows. The number of deaths caused by the wilful violation of this simple rule will never be known, as there are rarely any witnesses left.

The Company Officials Are Responsible

Now, Mr. Foreman and Mr. Fireboss, it's up to you. You know that a steel tamping bar is used in violation of all rules and good practice; therefore, why do you allow it? Because the miner won't pay attention to you if you do tell him? That's not sufficient. A nurse girl leaves her charge, thinking he will not burn himself with the safety matches with which he is playing. He does burn himself, however, and morally, if not legally, the careless nurse is responsible. Now are you not in the same position as the nurse girl. "No," you say, "the men know better, and if they take a fool chance I'm not to blame." But you are. The men in your mine are employed by your company, and that company is to a greater or less extent responsible for anything that happens to those men.

Now whose business is it to see that those men do a good day's work? Your business. Then, is it not also your business to protect your company by not allowing the men to do anything which will be of danger to themselves or to the mine?

Fire the First Man Who Disobeys

What can be done if a man persists in using steel for a tamping bar? Why, fire him on the spot. You say, "Good miners are scarce." We believe you, but fire one or two and see if the others don't get in line. Oh, yes! —the Union. Well do you think any sane body of men could say much against your protecting the miners under you from their own carelessness?

But wait. Some weeks ago a man demonstrating dynamite, informed me that in the mines of one fairly large company he loaded over 800 holes and could not find a tamping stick more than half a dozen times. The foreman had ordered tamping bars, but someone with an eye toward making a hit with the "big boss" decided that this was a place to economize. Economy is a great thing, we all admit, but when carried to the extent of being "pound foolish and penny wise," it sometimes borders on being criminal.

There is an old adage, which says, "an ounce of prevention is worth a pound of cure." Now, we've spent thousands in hospitals and first-aid, and have our pound of cure; but why not apply the ounce of prevention first, as the cure can never bring back a life.

It is the conviction of James Lomax that a systematic microscopical survey of the various coals will lead to results of the utmost value in (1) determining the geological age; (2) the identification and correlation of seams, and (3) the various constituents therein and their effect on the causes of spontaneous combustion and inflammable dust.

When testing for gas with a lamp, the length of the "cap" with a given percentage of gas is not necessarily unalterable. As lately pointed out, with the very best intentions in the world and with the best management, the oil employed in the lamps at the colliery may vary; the wicks may vary; the method of trimming the lamp, both in the lamp room and when making the test underground, may vary; there may be more dust about the lamp at one time than another. These and other causes may easily affect the "cap."

The Amherst Company's Plant in West Virginia

By W. M. Judd*

SYNOPSIS—Description of a plant equipped with some elaborate retarding conveyors and also an effective screening arrangement. Two seams are mined about 200 ft. vertically apart.

During the past year the Amherst Coal Co. has completed and put in operation a new plant at Amherst, Logan County, W. Va. The lease upon which the company is operating is situated about five miles from the Guyandotte River on Buffalo Creek and is reached by the Buffalo Creek branch of the Chesapeake & Ohio R.R. Its lease comprises about 1300 acres and is underlaid by at least three merchantable seams, as follows:

1. The "Eagle," which does not outcrop within the limits of the lease and is not being developed at the present, although the company has recently acquired the adjoining lease upon which the "Eagle" seam is being worked. The tipple on this latter lease is about half a mile downstream from the Amherst Coal Co. tipple. The elevation of the bottom of coal at the pit mouth is 880 and the coal is 6 to 7 ft. thick at the faces of headings. Eventually all three seams will be operated from drift mines under the Amherst lease.

2. The "Island Creek," outcrops almost 200 ft. above the railroad at an elevation of 1092 ft. above sea level. There are about 1000 acres of this seam upon the lease, averaging approximately 5 ft. in thickness. This is the seam in which the pioneer developments of the United States Coal & Oil Co., at Holden, W. Va., were made in 1903, and which has established the trade name of "Island Creek Coal," on account of its fine quality for steam and domestic service.

3. The "Winifrede" outcropping at an elevation 1355 ft., underlays about 700 acres and averages about 9 ft. thick.

Amherst is typical in many ways of the small mining settlements that are being developed in Logan County as rapidly as the railroads can provide transportation for the output of the mines. A slight widening of the narrow valley is occupied by the tipple, railroad tracks and a portion of the town, while perforce many of the miners' houses must be placed on the side of the steep foot hills.

The Tipple and Retarding Conveyor

As has been previously stated, the Island Creek seam outcrops about 200 ft. above the railroad. The run-of-mine coal is brought to the tipple by a retarding conveyor 420 ft. long, having a maximum slope of 30 deg. from the horizontal.



View of Power Plant, Tipple and Part of Town

The headhouse, located directly in front of the pit mouth of the loaded-car haulage heading, contains the hopper bin into which the mine cars are emptied by a kick-back dump. The coal is delivered from the hopper bin to the retarding conveyor by an apron-type feeder, driven by the same motor that operates the retarding conveyor. Between the feeder and conveyor the coal passes over a short section of bar screen. The fine coal is thus deposited on the conveyor in advance of the lump. The section of the conveyor directly under the screen is horizontal, passing thence over a vertical curve to the 30-deg. slope section. The lump coal coming to rest on the bed of fine coal never shows any tendency to roll when it reaches the steep section.

The retarding conveyor, of the double-beaded pan type, is driven by a motor located in the headhouse. Maxi-

*Engineer, the W. G. Wilkins Co., Westinghouse Bldg., Pittsburgh, Penn.

mum power is required when the conveyor is running empty, and when it is running full, the motor becomes a generator and throws power back into the line. The conveyor traveling 60 ft. per min., has a capacity of 200 tons of run-of-mine coal per hour.

Screens and Gravity Plane

The conveyor delivers the coal over a chute to the shaking screens. The screens are in two sections, driven by eccentrics placed 90 in. apart on the same shaft, which latter is driven by a belt from a motor. The upper screen is 4 ft. long and has bars spaced ¾ in. The fine coal passing through this bar screen is received by a small drop-bottom car for delivery to the boiler house. The remaining portion of the upper screen is a perforated steel plate, taking out all coal 1¼ in. in size and under. A hopper bin receives the combined nut and slack coal for loading on the first railroad track.

The screening surface of the lower screen is a stepped-steel plate with perforations 3x10 in. The egg coal pass-

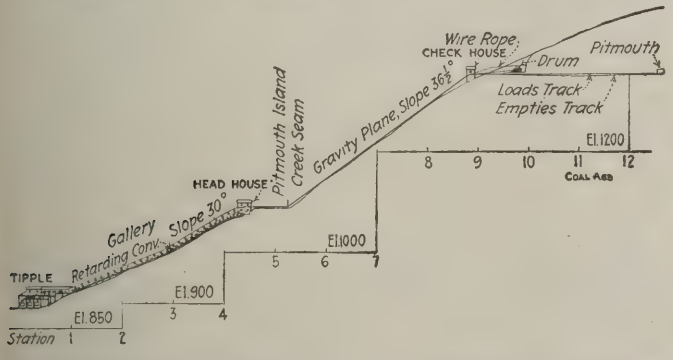


Diagram Showing Method of Handling Coal from Pit Mouth to Tipple

ing through the perforations is received by a hopper bin over the second railroad track. The lump coal passing over the screens is carried by a radial chute with adjustable apron for loading cars endwise on the third railroad track. A retarding gate in the radial chute enables the car loader to control the flow of coal, so that there is a minimum breakage of lumps in the car. The resultant egg and lump coal produced by this screening equipment has proved highly satisfactory to the trade. The retarding conveyor and tipple equipment was furnished and installed by the Pittsburgh Coal Washer Co.

The analysis and physical characteristics of the Winifrede and Island Creek seams are remarkably similar at this point, so that there is no necessity for the separation of the two coals in loading. The mine cars from the upper seam are lowered over a gravity plane and the coal dumped into the same hopper with that from the Island Creek seam. The plane is 450 ft. long between knuckles and has an average slope of 37 deg. from the horizontal. The plane is operated by a drum 8 ft. in diameter, supported by a heavy timber framework anchored into the rock about 90 ft. back of the knuckle. There is an outside tramroad about 375 ft. between the head of the incline and the pit mouth.

Methods of Mining and Power Plant

In both seams the headings and rooms are driven practically on, or at right angles to the cleavage of the coal and the main headings in the upper seam are located vertically over the main headings of the lower seam. The development of the upper seam will be kept well in advance of the lower, so that the mining of the upper seam will not be affected by rib-drawing in the lower.

The power house is a stone building, containing one battery of boilers, one direct-connected, engine-driven, 250-volt, direct-current generating unit, water-supply and boiler-feed pumps and feed-water heater. Sufficient space for the duplication of the power plant has also been provided.

Views of the power plant, retarding conveyor, a portion of the town and the gravity plane from the upper seam, are shown in the accompanying halftones. The W. G. Wilkins Co., of Pittsburgh, were the engineers for



Side View of Retarding Conveyor

the Amherst Coal Co., and all construction work was under the direct charge of their resident engineer at Logan. All the work was personally supervised by J. E. Schweitzer, general manager of the Amherst Coal Co., to whose efficient management is due the early date at which the entire plant was put upon a successful operating basis.

BY THE WAY

Precaution is better than repentance.

Do not wade where you see no bottom.

Some men change their principles oftener than their shirt.

Modesty, like a diver, gathers pearls by keeping his head low.

Promises may make friends, but 'tis performance keeps them.

Overcasts and Stoppings in Mines

By A. W. Hesse*

SYNOPSIS—Terra-cotta building blocks are now in satisfactory use for the construction of stoppings and for overcast walls. They are 40 to 50 per cent. cheaper than concrete walls and stoppings, though about equally more expensive than wood. The roofs of overcasts have been made successfully of plastered expanded-metal lath and it is probable that stoppings of similar material would give equal satisfaction.

In an article published in Coal Age (Vol. II, No. 6, Aug. 10, 1912), the use of terra-cotta building blocks was advocated for stoppings and overcasts. It was also suggested that expanded metal or wire mesh be used in place of scrap-iron pipe and steel mine rails when using concrete for such work, especially for the tops of overcasts.

Since that time the terra-cotta blocks have proven beyond a doubt their usefulness in a mine, as well as for the

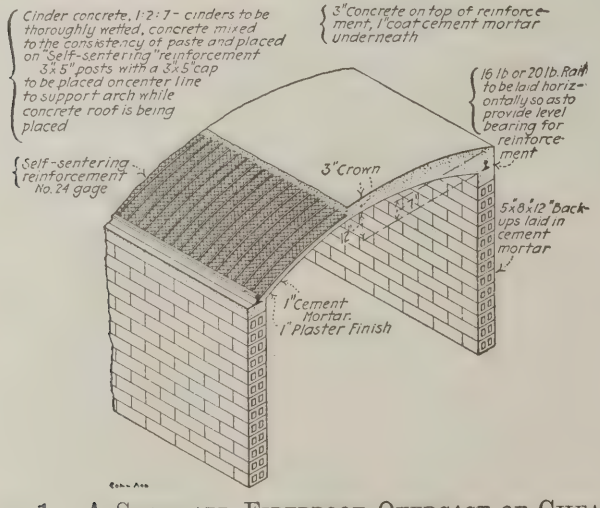


Fig. 1. A Standard Fireproof Overcast of Cheap and Permanent Design

purposes to which they are put outside. Not only have they been used economically for stoppings along the main air courses, but they are now being adopted successfully for the walls of overcasts. It appears also that scrap iron is to be displaced by a reinforcement which gives a concrete structure not only more artistic but more economical and more quickly erected.

Terra-Cotta Stoppings 40 Per Cent. Cheaper Than Concrete

The Consolidation Coal Co., as a preventative of fire at the same time as a safety-first measure, decided to eliminate wood stoppings and wood overcasts where practicable and to allow no more new overcasts anywhere to be constructed of combustible material, the same to apply to permanent stoppings along main entries.

The most natural step was to use the cinders from the boiler house at the mine and to build these structures of concrete. However, investigation proved that too much money was being spent for these improvements. The stoppings were reduced to a thickness of 4 in., but the cost still appeared too large.

*Assistant chief engineer, The Consolidation Coal Co., Fairmont, W. Va.

The terra-cotta blocks were first used for stoppings and their success was readily apparent. As the 4-in. cinder-concrete stopping had proven stable, a hollow block of 4-in. width was at first advocated; but the 5x8x12-in. block was finally adopted and has been used as a standard ever since.

On main entries where the stoppings are intended to remain for a considerable length of time they are bonded with a mortar composed of one part cement to two parts sand. On room headings where these stoppings have been built, lime was used in place of the cement, this making it possible to tear down the stopping when desired, without destroying the tile.

Sufficient cost data have been obtained on the construction of this type of stopping at the mines using this material to show a saving of from 40 to 50 per cent. in every instance as against the use of concrete. The cost compared to wood stoppings for room headings shows about the same difference in favor of the wood. It was thought that by the recovery of the blocks and their reuse this difference could be more than offset; but accurate costs kept on this work shows that it would be necessary to

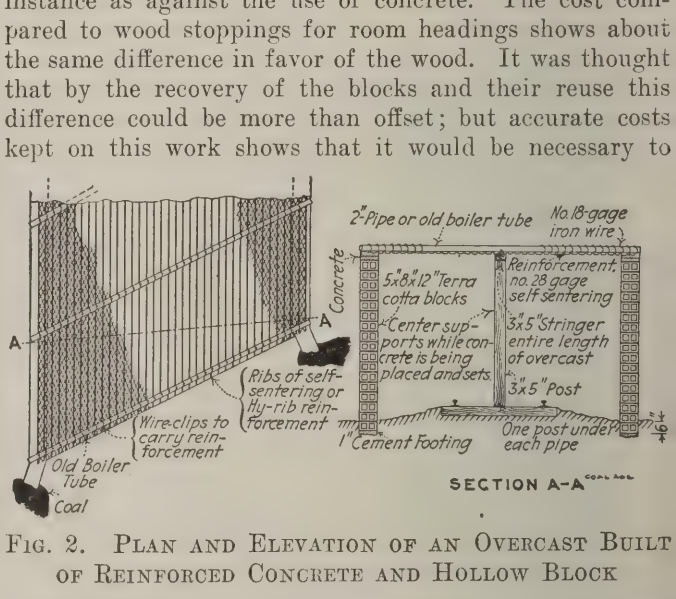


Fig. 2. Plan and Elevation of an Overcast Built of Reinforced Concrete and Hollow Block

recover these blocks several times over to do this. Therefore, it is not advisable to use the blocks for temporary structures unless for other reasons than economy.

The crosscuts in the mines of the Fairmont Region run about 10 to 12 ft. wide and 7 to 8 ft. high, and average about 80 sq.ft. in area. It has been found that two men will construct three or four stoppings per day, providing the material is placed ready for their use.

Brattices Made as Screens of Lath Coated with Cement or Lime Mortar

We might be able to reduce the cost of stoppings further by the use of "Self-sentering," "Hy-Rib," or "Rib-Lath," plastering these with a cement mortar an inch or two thick. A stopping made with any of these materials properly placed, should carry as much as, or more pressure than, the ordinary wood stopping. The plan of erection would be simple, consisting of trenching the ribs, roof and bottom an inch or two, slipping the adopted metal in place and plastering with cement or lime mortar, the material depending upon the desired life of the stopping. Price and the strength which could be secured should govern the selection of the reinforcement. A heaving of the bottom would in all probability be cut by

the stopping, since heaving is caused by the swelling of the fireclay, this material at the same time softening markedly. If the pressure comes from the top or roof there might be much deflection in the stopping without doing it any material injury, besides it could be as easily repaired as the wood stopping in case of sufficient pressure to cause cracks in the plaster.

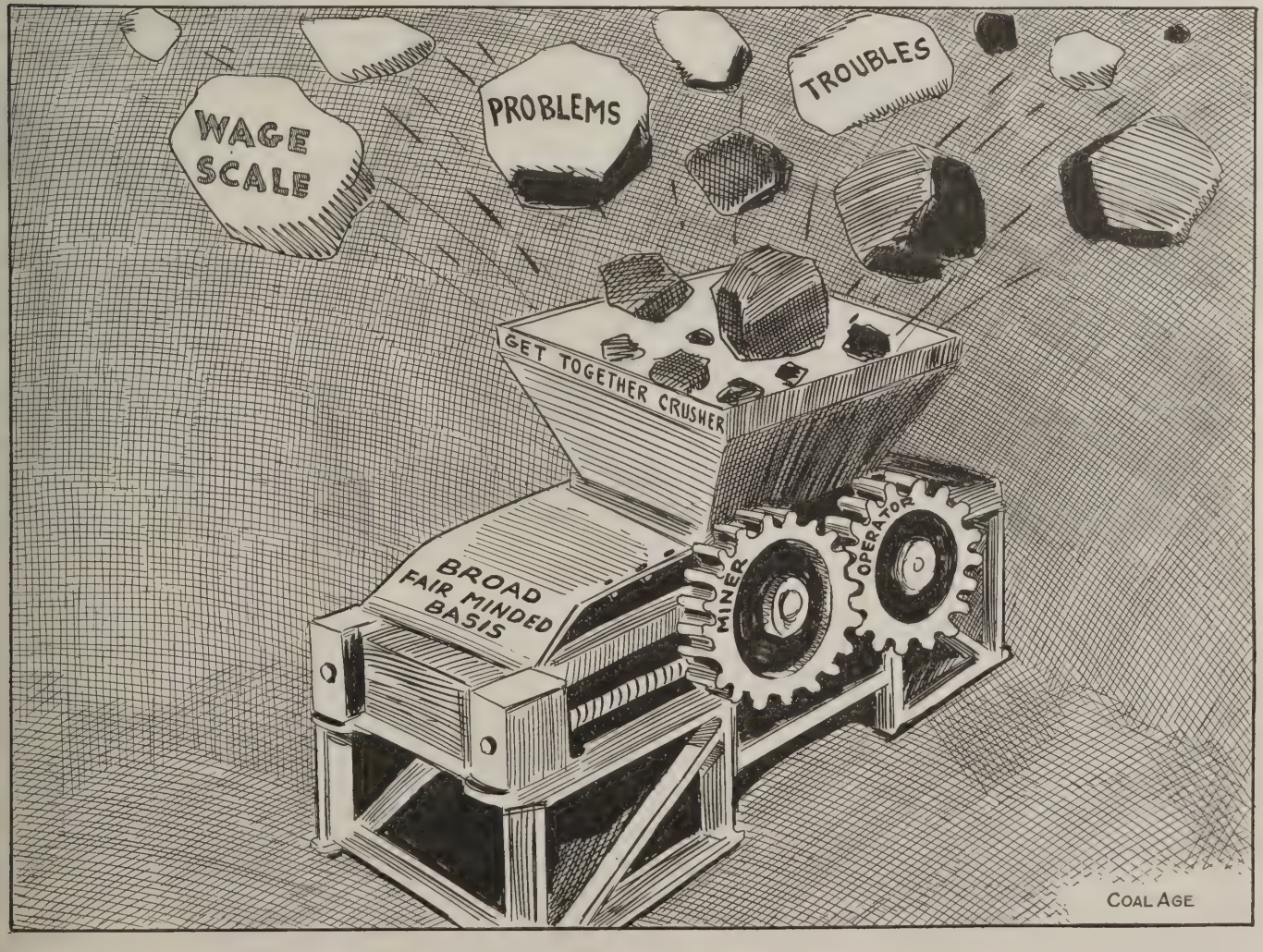
Overcasts with Air Crossing of Expanded-Metal Lath Plastered with Cement Mortar

All well ventilated mines must contain overcasts, and the costs of these structures soon run into considerable amounts, if they are not carefully planned and constructed. There are few mine foremen or even superintendents who take the trouble to ascertain accurately just what it costs to erect an overcast so that he can tell you how much was spent per cubic yard for concrete or what the walls and roof cost separately.

Fig. 1 shows the type of overcast now being constructed in the mines of The Consolidation Coal Co. in the Fairmont Region. Blank spaces are left in the blueprints, and dimensions to suit the location are supplied. Since the sheets of "Self-sentering" are sold in even foot lengths, the distances between walls are made to correspond. Thus for an 11-ft. sheet 2 in. are deducted for the 12-in. rise and two or more inches on each side for bearing spaces, leaving the distance between walls 10 ft. 6 in.

This style of overcast makes use of the terra-cotta blocks, the 5x8x12-in. block being laid to give 8-in. walls. On top of each wall is placed a layer of concrete on which is set a small steel rail 2 in. from the edge of the wall. Then the reinforcing sheets of "Self-sentering," which come already shaped, are placed abutting on the flanges of the rails and the center line or middle of the reinforcement supported by a 3x5-in. wood stringer; then the concrete is spread on the top as required on the plan. After the concrete sets, the wood stringer is knocked down and a coat of cement mortar plastered underneath. Not a single wood form is required on the whole structure, except around the iron rails on top of the walls, and even this can be eliminated by standing a row of the terra-cotta blocks on the 5-in. side just outside of the rails, thus making them serve as forms.

There are times when it is necessary to deviate from the arched-roof type on account of the skew of the air bridge, in which case it is more economical to use the flat roof. Fig. 2 presents a design of this kind where the roof is supported by three or four old boiler tubes, the reinforcement being suspended from these tubes or pipes by means of wire of sufficient strength to carry the weight. This type of overcast also needs only temporary supports along the middle while the concrete is being placed, thus saving considerable labor and material in the construction and emplacement of forms.



The New Coal Crusher That Must Soon Be Installed over the Land

A German Coal-Screening Plant

Special Corespondence

SYNOPSIS—A typical German installation, preparing many different sizes of coal for market and for coking.

The universal attention which is being given to the development of up-to-date coal-handling equipment and practice is as pronounced in Germany as elsewhere. The accompanying illustration shows a coal screening and washing plant installed at Shaft No. V, of the Rheinpreussen coal mine.

At this plant, the loaded pit cars arriving at the height of 9 m. (approximately 10 ft.) above the first pit-bank level, are sent direct to the screening plant. Brakes on cars taken from the second and third pit-bank levels, permit of their being lowered to the first level. The track from this point has a gradient of 2 per cent., allowing the cars to run by gravity to the dumps, which are mechanically operated and which discharge the coal onto the shaking screens.

The screens are double decked, the upper openings being 85 mm. (approximately 3¼ in.), while the lower deck has small perforations. The screens are provided with veil plates. By this arrangement the coal below 3¼ in. is discharged into a storage hopper, while the larger coal goes onto picking tables and loading booms. If the veil plates are closed no separation is made, and the entire run of mine is loaded directly into railway cars.

Two additional shaking screens are provided, being furnished with rectangular holes of adjustable size, varying from 40 mm. to 80 mm. (from approximately 1½ in. to 3 in.). These produce what is called best mixed coal, which is loaded into railway cars by means of loading booms, which are raised and lowered by power.

In order to be able to weigh the loaded railway cars immediately, scales are built into the tracks and are operated from the picking-table platform. The refuse which is removed from the coal on the picking belt is thrown into trucks, which are hoisted to the pit-bank level, from whence they are run to a dump or otherwise disposed of in stowing processes.

Each screening system is driven by a shaft and belts from an electric motor, which is installed in an inclosure. The empty cars after dumping return to the shaft by gravity, and are there lifted to the pit-bank level by means of creepers or car hauls.



General View of Tipple, Washery and Coke Ovens

A coal-washing plant of two units is directly attached to the screening plant, and has a capacity of approximately 200 tons per hour. The dust coal, or that under 5 mm. ($\frac{3}{16}$ in.) is screened dry and mixed with the washed fines. Four varieties of nut and coke coal are produced, the shale being rewashed. The nut coal stored in bunkers under the pit-bank floor is delivered to the dust screens in the washery by two bucket elevators, the feed for which is mechanically controlled. After the removal of particles under 5 mm. in diameter, which is stored

in a steel tank underneath the screen, the coarser material flows in a launder to a main washery, where it is cleaned.

Provision is made by reversing shutters in the nut launder to flush the washed nuts to the bell mills, above the dredger sump, into which they fall after reduction, and are treated like fines.

In order to be able to mix foreign fines with those here produced, a bucket elevator is installed, which conveys this material arriving in railway cars, which are dumped into a storage pit, onto the distributing tray above the tower.

Above the coking-coal storage tower, which has a capacity of about 4000 tons, four distributing trays are installed, with four scrapers each. The fines arriving here on the draining belt are discharged onto these trays by two parallel screw conveyors, one for each system. By reversing the direction of rotation of these conveyors, provision is made to fill the whole tower from the belt conveyors of one system if the other is not in operation. In the bottom of the storage tower 96 discharge gates are fitted. These deliver the drained fines into larries, which carry them direct to the coke ovens.

The shale from the washers is discharged into conveyors, from whence it is delivered into bucket elevators. These discharge onto belt conveyors, where draining is accomplished. The refuse material is then delivered to shale crushers. Provision is also made for washing this material over again after being crushed.

The coal separated from the shale in the washing process flows to the dredger sump, while the shale is delivered to a tower by a bucket elevator. From this tower it is discharged into trucks, by which it is conveyed to the dump, or transported elsewhere for stowing purposes.

Shale, rock, etc., arriving on pit-bank level are dumped and uniformly fed to jaw crushers erected on the level of the picking belts. These crushers reduce it to the desired size, and discharge into a steel storage box underneath. From here the crushed material can be delivered into railway cars or into the shaft for stowing purposes. The former arrangement is at present in use; the latter may be supplied later on.

The water from the preliminary draining screens and belts flows into clarifying spitzkasten, where the sludge gradually settles. This is discharged from time to time through launders into the sludge sump, from whence it is delivered onto the preliminary draining screen by a centrifugal pump.

The washed nut coal is conveyed by water to the nut screen where it is classified into five sizes—four nut sizes and one fines. The four nut sizes are carefully transported by spiral conveyors into their corresponding storage bunkers, from whence they are delivered to a fixed spraying screen, and after being rinsed with fresh water are directed onto the nut-loading belt, thence by adjustable loading booms into the railway trucks. The raising and lowering of these booms is effected by power, the dead weight being counterbalanced.

If the washer is not in operation, the nut coal is delivered directly into the nut bunker by reversing the shutters of the feeding bucket elevators. It is then loaded into railway cars by adjustable chutes. The fines are carried by the wash-water from the nut-classifying screens into dredger sumps, from whence they are delivered into the two fines washers by two bucket elevators. After being rewashed they are conveyed by launders into preliminary draining screens above the draining belts, and thereafter onto the draining-belt conveyors, which move slowly, thus giving ample time for the water to be removed.

The Passing of the Mine Mule

Quite some time after the close of the Civil War and old negress, seeing for the first time a motor-driven street car, exclaimed: "Fore Gawd, dem Yankees ain't satisfied wid 'mancipating de niggers, dey dun freed de mules."

Yankee ingenuity today is taking another great stride in the emancipation of these humble but faithful servitors. The mine mule is giving place before the encroachments of mechanical equipment, and the prediction is made that a few years will suffice to complete its displacement in all of the larger workings.

The mule-drawn car is a relic of the past that has come down to the present. A time-honored institution, but a detriment to efficiency in modern coal-mining methods. The mule, also, has been one factor in the haulage problem constituting a considerable item of expense. Its elimination was foreordained.

Recently, the Long Branch Coal Co., of Long Branch, W. Va., made public certain comparative data regarding the relative costs per month of mule haulage and gasoline haulage, which may be summarized as follows:

Total cost mule haulage, $810 per month.
Total cost gasoline haulage, $529.63 per month.
Decrease in haulage cost, $280.37 per month.
Total coal tonnage by gasoline locomotive, 11,601 tons.
Total coal tonnage by mules, 7848 tons.
Increase in coal tonnage output, 3753 tons.
Operating cost per day, gasoline haulage, $21.19.
Operating cost per ton gasoline haulage, $0.046.
Operating cost per ton-mile gasoline haulage, $0.0304.
Reduction in haulage cost per ton, $0.058.
Reduction in haulage cost per ton-mile, $0.0696.

In short, the comparison shows an increase in mine tonnage, and a decrease in haulage cost.

The gasoline locomotive used in the preceding test was manufactured by the Milwaukee Locomotive Mfg. Co. It is an effective combination of automobile propulsion and locomotive construction. It is a vertical-type engine with vertical cylinders. The important parts are six or eight times as large as those used on the ordinary automobile. The bearings are larger and the whole idea of construction is that the machine shall be fit for heavy work. There is a three-dog arrangement on the flywheel, which prevents the chance of back-firing when the engine starts. The governor is worked with a worm gearing which prevents the locomotive from racing and also cuts down the consumption of gasoline. It has lever control throughout and dry-plate transmission.

The Long Branch Co. found their locomotives capable of hauling eight loaded mine cars at a trip, over a 3000-ft. haul, with an average grade against the load of 3 per cent.

Assuredly, the course of the mine mule is almost run.

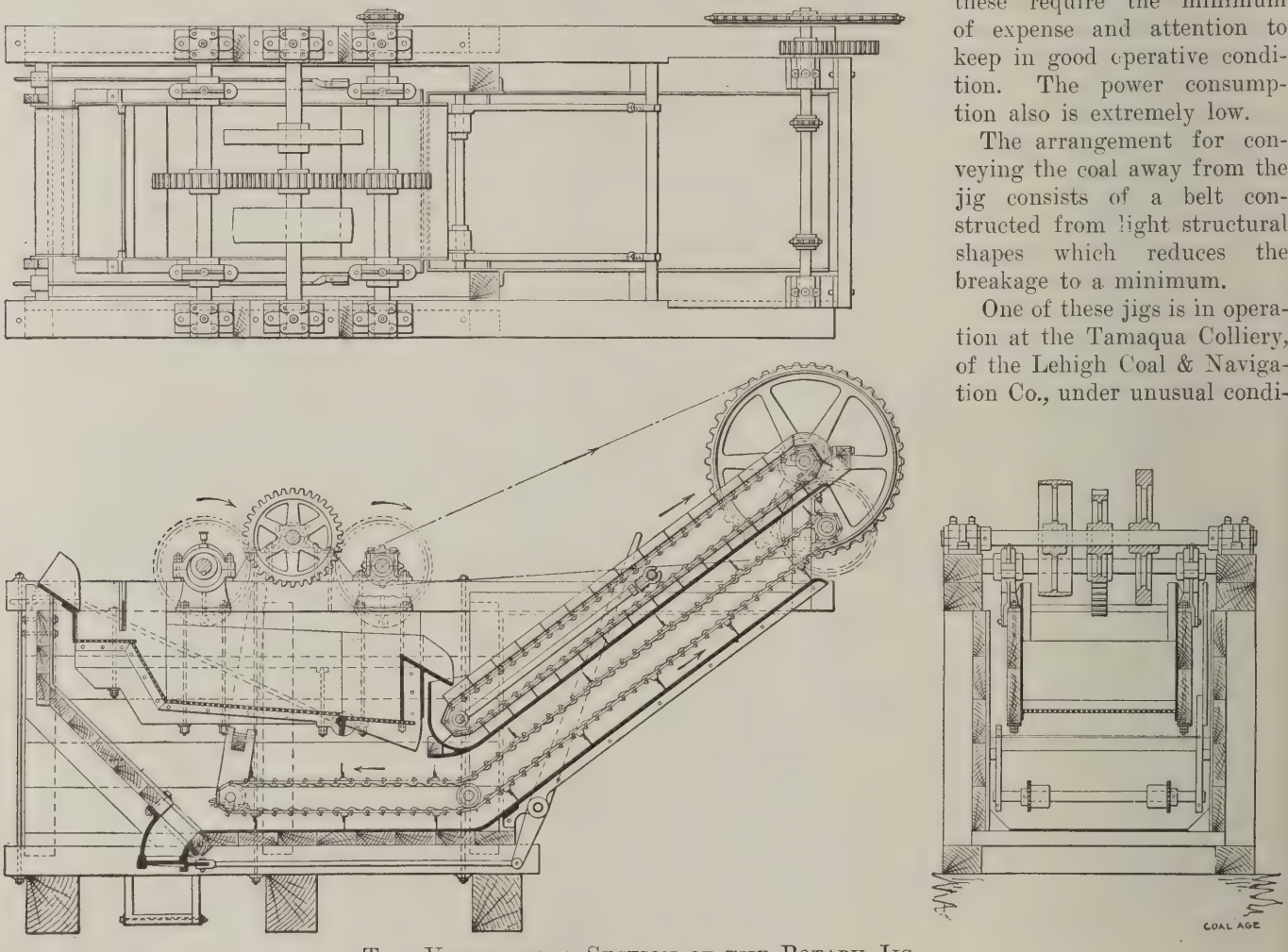
Some authorities doubt the efficiency of stone dust to prevent explosions, especially if firedamp is present in greater or less quantities. The Altofts collieries of England have abandoned the stone dust zones and substituted a general scattering of the stone dust wherever coal dust is found. Experiments made at Liévin, France, have shown that this method is useless as far as stopping a powerful explosive wave that has gotten a good start.

A New Rotary Coal-Washing Jig

By E. A. James*

A new departure in coal- and ore-jig design is shown in the accompanying drawing of the "Rotary Jig," manufactured by the Mauch Chunk Iron Works, Mauch Chunk, Penn., under the Rotary Separator & Engineering Co. patents.

Since the water tank of this machine is suspended from eccentrics, this jig gives a rotary impetus to the material to be separated, thus overcoming the sluggish travel produced by the jigs having only straight vertical acceleration, thereby, approximately doubling the capacity.



Two Views and a Section of the Rotary Jig

Anyone familiar with jigs and jigging realizes that the capacity of a machine of this kind is not governed by the time taken to make the separation, but rather by that consumed in freeing the apparatus of both the coal and slate after the separation has been accomplished, preventing meanwhile the remixing of the coal with the impurities.

The rotary motion gives a forward and upward acceleration to the material and during the recovery, when the laws of freely falling bodies in a liquid medium have full controll, the coal and impurities settle to their distinct and separate positions. Thus, the rate of travel and efficiency of separation are greatly increased. By means of the variable directions of the lines of force, pieces of flat material cannot keep their greatest resistance area opposed to the action of the jig; consequently their separation is accomplished as readily as cubical or fractured material.

This machine is equipped with an automatic slate discharge, which works with the highest efficiency due to the rotary motion. Another advantageous feature is the self-flushing design, in as much as the tank requires no flushing, whatever, as all waste material no matter how small, is removed with the slate and other impurities. It is claimed that this feature gives the "Rotary" the distinction of consuming less water than any other type of jig.

The general design is compact and simple, occupying little floor space. There are but few wearing parts, and these require the minimum of expense and attention to keep in good operative condition. The power consumption also is extremely low.

The arrangement for conveying the coal away from the jig consists of a belt constructed from light structural shapes which reduces the breakage to a minimum.

One of these jigs is in operation at the Tamaqua Colliery, of the Lehigh Coal & Navigation Co., under unusual conditions. It is taking all material that passes through a 2⅝-in. mesh and over a ½-in. mesh from the slate ends of 17 Lehigh Valley jigs and washing all sizes simultaneously.

The material fed to this jig contains from 90 to 95 per cent. of rock and slate, which taken in connection with the wide range of sizes makes the test a severe one. The percentage of coal in the slate discharge from the "Rotary" jig, based on the average obtained from daily tests, is about one-half of one per cent. The coal from this machine is conveyed back to the breaker and rejigged.

While the above instance is cited to show the efficiency of this machine, its use is not limited to separating the slate tailings from other jigs as it is designed for general work.

*Mauch Chunk, Penn.

Coal-Washing Efficiency Calculations

By G. R. Delamater

SYNOPSIS—There are several kinds of jig efficiency. One depends on the ash removed, another on the coal saved and a third on the power used or wasted in washing. The last efficiency is relatively unimportant. The washery expert should endeavor to obtain not pure coal but a fuel of such purity as will secure the most profit on the market. Learning how much of such fuel there is in the coal as he receives it, it is his duty to obtain as much of it as possible, eliminating as far as he can all parts of the coal which would give an inferior ash analysis.

In the issue of *Mines and Minerals,* of March, 1912, I presented a paper under the title of "Standardization in Coal Washing." Little discussion followed, as a result, in the columns of the engineering journals, but the subject has been taken up with me in a personal way many times, some approving of my method of calculating coal-washing efficiencies and others pointing out possible faults but none offering a solution of the problem.

I have applied that method of calculating the efficiency of washing to a great many tests which I have made in different parts of the country and have found it impossible to apply it in some washeries and in many others I have found that the resulting figures were not all that could be desired, though they were helpful to a certain extent.

From the objections given by those who have investigated the subject with me, together with a careful study of the various conditions I have found existing in different washeries, I have compiled a new set of formulas, which I have applied to many washing plants and found satisfactory.

In presenting these new formulas, it is my hope that those interested in the subject will, through the columns of Coal Age and other engineering papers, point out any features which appear to them to be objectionable or in error, and if possible, offer suggestions which will assist in devising a satisfactory method of calculating coal-washing efficiencies.

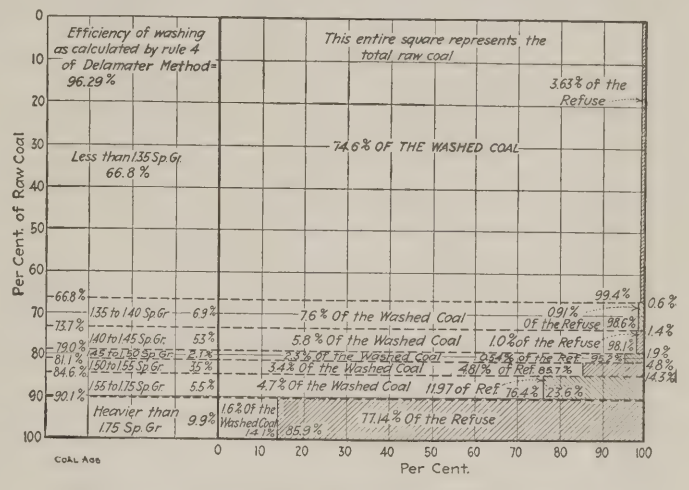
Hancock's Table

One of the replies to my previous paper was received from Arthur Langerfeld, in which he speaks of the necessity of making float-and-sink tests with baths of different densities, in order that the amounts of the materials of various specific gravities may be determined, thus, for instance, showing the amount of "bone coal" present. The reader will, no doubt, be interested in a chart compiled by David Hancock, consulting engineer and chemist, of Birmingham, Ala. A specimen of this chart was included in a paper written by Mr. Hancock, under the title of "Coal Washing in Alabama," published by the Alabama Geological Survey.

As I wish to use this chart in presenting my formulas, I reproduce it here with some slight alterations in the figures shown on the original chart in order that an exact check may result throughout all the calculations, though the figures given by Mr. Hancock check remarkably with the theoretically correct figures resulting from actual float-and-sink tests and analyses made, and show that these were conducted with care and accuracy. The results also indicate careful and accurate sampling.

In his explanation, Mr. Hancock says:

"I have devised a chart upon which can be shown, graphically, the composition of the run-of-mine coal,



Hancock Chart of Washery Performance

washed coal and refuse." The chart here presented is a specimen representing the work done by Stewart jigs cleaning a coal of which separations by the float-and-sink tests, gave the results shown in Table I.

TABLE I. TESTS AND ANALYSES OF RAW COAL

A	B	C	D	E	F	G	H
	Specific Gravity of Materials	Percentage Relation of Each Material to Coal	Percentage of Ash in Each Material	Percentage of Ash in Terms of Raw Coal	Combining Materials of Different Specific Gravities	Percentage Resulting from Combinations	Ash Content of Combinations Per Cent.
a	Less than 1.35	66.8 ×	7.68 =	5.13	a only	66.8	7.68
b	1.35 to 1.40	6.9 ×	14.60 =	1.01	a and b	73.7	8.33
c	1.40 to 1.45	5.3 ×	18.54 =	0.98	a, b and c	79.0	9.01
d	1.45 to 1.50	2.1 ×	23.82 =	0.50	a, b, c and d	81.1	9.40
e	1.50 to 1.55	3.5 ×	28.42 =	0.99	a, b, c, d and e	84.6	10.18
f	1.55 to 1.75	5.5 ×	35.78 =	1.97	a, b, c, d, e and f	90.1	11.74
g	Heavier than 1.75	9.9 ×	55.66 =	5.51	a, b, c, d, e, f, and g	100.0	16.09
Raw coal		100.0 ×	16.09 =	16.09			

Note:—From the above data, the theoretically correct ash content of the raw coal is 16.09 per cent. Mr. Hancock's analysis is 15.94 per cent. a difference of only 0.15 per cent.

The raw coal was thus divided by float tests into seven parts representing materials of seven different specific gravities. The ash content of the lightest of these is 7.68 per cent. while that of the heaviest is 55.66 per cent. The percentages of these different materials are also given in Table I.

Explanation of the Hancock Chart

In constructing the chart, a perfect square is drawn to a convenient scale, the area of this representing the total raw coal. At the left side and bottom, scales reading from 0 to 100 are laid off as shown. On the left-hand scale, the percentages of each of the materials shown in Table I are laid off and dotted lines are projected across the chart from these points. Thus, all that area within the square

between the top of the chart and the first dotted line represents the material of a specific gravity less than 1.35, while that area between the first and second dotted lines represents all that material of a specific gravity between 1.35 and 1.40, and so on through all the parts of the raw coal shown in Table I.

Using baths of the same specific gravities as used in the raw-coal tests, exactly similar float-and-sink tests are made of the washed coal and the refuse produced by the jigs.

The percentages of these several materials in the washed coal and refuse as determined by the float-and-sink tests will be in terms of the washed coal or refuse. To complete the chart, the percentages of each specific-gravity material (in terms of that material) found in the washed coal and in the refuse must be determined. Tables II and III show the way in which these figures are obtained.

TABLE No. II. TESTS OF WASHED COAL AND CALCULATIONS THEREFROM.

A	B		C		D	E	F
Specific Gravity of Materials	Percentage of Each Material Obtained by Float and Sink Tests of Washed Coal.		Percentage Relation between Washed and Raw Coal.		Percentages in Column B Converted to Terms of the Raw Coal.	Percentage Relation of Each Material to Raw Coal. (C in Table I.)	D ÷ E Percentage of Each Material Carried by the Washed Coal.
Less than 1.35....	74.6	×	89.0	×	66.4	66.8	99.4
1.35 to 1.40.....	7.6	×	89.0	×	6.8	6.9	98.6
1.40 to 1.45.....	5.8	×	89.0	×	5.2	5.3	98.1
1.45 to 1.50.....	2.3	×	89.0	×	2.0	2.1	95.2
1.50 to 1.55.....	3.4	×	89.0	×	3.0	3.5	85.7
1.55 to 1.75.....	4.7	×	89.0	×	4.2	5.5	76.4
Heavier than 1.75.	1.6	×	89.0	×	1.4	9.9	14.1
Totals.....	100.0		....		89.0	100.0	....

TABLE No. III. TESTS OF REFUSE AND CALCULATIONS THEREFROM.

A	B		C		D	E	F
Specific Gravity of Materials	Percentage of Each Material Obtained by Float and Sink Tests of the Refuse.		Percentage Relation between Refuse and Raw Coal.		Percentages in Column B Converted to Terms of the Raw Coal.	Percentage Composition of the Raw Coal. (C in Table I.)	D ÷ E Percentage of Each Material Carried by the Refuse.
Less than 1.35....	3.63	×	11.0	=	0.4	66.8	0.6
1.35 to 1.40.....	0.91	×	11.0	=	0.1	6.9	1.4
1.40 to 1.45.....	1.00	×	11.0	=	0.1	5.3	1.9
1.45 to 1.50.....	0.54	×	11.0	=	0.1	2.1	4.8
1.50 to 1.55.....	4.81	×	11.0	=	0.5	3.5	14.3
1.55 to 1.75.....	11.97	×	11.0	=	1.3	5.5	23.6
Heavier than 1.75.	77.14	×	11.0	=	8.5	9.9	85.9
Totals.....	100.00		....		11.0	100.0	....

The percentages of washed coal and refuse, as given in Column C of these tables, is ordinarily obtained by actual weights. If all the work done is correct, the totals of Columns D should equal in their respective tables the percentages of washed coal and refuse. Mr. Hancock's figures for the percentages were 89.2 and 10.8, respectively, and the correction which I made here is negligible. The totals of Columns D for tables Nos. II and III added together should, of course, equal 100. Likewise, percentages for like materials given in Column F of Tables Nos. II and III, added together, should equal 100, or the total of each material in the raw coal.

Lay off the first figure in Column F. Table III, on the upper dotted line of the chart, using the horizontal scale. Erect a vertical to the solid line at the top of the chart. Thus, all that area to the left of this line represents the material of less than 1.35 specific gravity which is in the washed coal while the area to the right represents the amount of that material in the refuse. Proceed in a similar manner with the second figure in Column F, Table III, but drop the perpendicular down only to the next dotted line on the chart. Proceed similarly for each remaining figure in Column F, Table III. When completed, cross line or shade all that area representing the refuse and the chart then clearly represents the composition of the raw coal, washed coal and refuse.

Limiting Density

Mr. Hancock did not state just what the requirements of this plant were nor does he declare where the division must be made to satisfy the market in a demand for "good coal." He did not speak of a division for "pure coal" being made at a specific gravity of 1.35, that is, the pure coal would only amount to 66.8 per cent. of the raw coal. As this would involve a larger waste of coal than they would probably desire to sustain in that field, and as he has stated that the washed coal as produced by the jigs ordinarily contains 11.9 per cent. ash; and as, moreover, it is understood that the plant where these tests were made was in active operation and producing a washed coal suitable for the requirements of the plant, it is to be taken for granted that this figure of 11.9 per cent. ash was satisfactory. Referring to Table I, having a specific gravity exceeding 1.75, the reader will note that the combined ash content of all the materials on the previous page is equal to but 11.74 per cent., and the division between washed coal and refuse should therefore be made as shown. The specific gravity of the "permissible" bath for float-and-sink tests would, therefore, be 1.75.

Mr. Hancock's chart is certainly valuable and shows clearly just what the jigs are doing. It unquestionably would be of great assistance in locating the causes of low efficiencies of a jig or plant not giving satisfactory results. It would also be helpful in determining the exact cause why one type of jig failed to equal the efficiency of another, or exceeded it, as the case might be.

An Efficient Washer Produces a Coal of a Given Degree of Impurity

Regarding my method of efficiency calculation presented in 1912, one of the objectionable features is that it cannot be employed for the calculation of the efficiency of a plant which is producing a washed coal with an ash or sulphur content higher than that of the float from the permissible bath float-and-sink test. The float resulting from that test will hereafter be termed "standard washed coal." Its percentage we shall describe as the "standard percentage of washed coal."

The use of that method was based entirely upon the analyses of the washed coal being within the limits placed for ash and sulphur. Again, it is certain that any variation in the washed coal must result in a certain proportionate variation in the refuse and it would, therefore, appear that a method of calculation of efficiency should be possible wherein only the washed coal need be considered and such resulting figure should indicate what the refuse is without further calculations with the refuse figures.

A commercial washery may, under ordinary circumstances, produce a washed coal of which the ash and sulphur contents are within the limits set for that plant,

yet the ash and sulphur contents of the washed coal may at times exceed these limits. Again, if the ash or sulphur or both are less than standard, such condition can only exist by virtue of a reduction in the percentage of washed coal produced under that of the standard percentage. In either case the plant is operating at a loss, as compared to standard or perfect separation and the efficiency calculation should properly indicate certain reductions in efficiency.

In reconsidering this efficiency question, I have held these features in mind and the method of calculation presented herein covers all of these conditions insofar as I have been able to determine, though others may be able to point out discrepancies.

In presenting this new method, I have used the data contained in Mr. Hancock's chart to show more clearly the application of the method. In that which follows, the ash only is mentioned, but the method applies in exactly the same manner where sulphur enters into the problem. This is fully explained in the latter part of this article.

The Permissible Ash Content

In any coal-washing proposition, the first step is to ascertain just what is permissible as the maximum ash content of the washed coal, and this is based entirely upon the intended use of the coal, or the competition. For instance, if the washed coal is to be used in the manufacture of coke, and for good and sufficient reasons the ash in the coke cannot exceed 11 per cent., and yet such a percentage is not objectionable, and if it is known that 8 per cent. of the ash in the coal will give 11 per cent. of ash in the coke, then 8 per cent. of ash is the permissible ash content of the washed coal. Reducing the ash below that figure in such a plant causes a loss in percentage of washed coal produced, and, as previously determined, there is no gain by the reduction of ash below 8 per cent. If there is any object in a lower ash, such as an increase in the market value of the coke, then it is necessary to determine whether the valuation of the difference between the amount of washed coal produced with an ash content of 8 per cent., and that of the washed coal of a lower ash content, eliminates the increased profit of the better-grade coke. This should be one of the considerations in determining the permissible ash content of the washed coal.

In considering Mr. Hancock's washing proposition, it is assumed that all material of a specific gravity less than 1.75 is accepted as standard washed coal. The theoretically perfect separation of this coal by washing and one which would represent an efficiency of 100 per cent., is, therefore, as follows:

Ash content of the raw coal = 16.09 per cent.
Washed coal = 90.1 per cent., with ash content = 11.74 per cent.
Refuse = 9.9 per cent., with ash content = 55.66 per cent.

We have seen that Table II shows the composition of the washed coal as produced by the Stewart jigs, as shown on Mr. Hancock's chart, while Table III shows the composition of the refuse.

A permissible bath test of the washed coal would, therefore, show 98.4 per cent. float and 1.6 per cent. sink, while the same test of the refuse would show 22.86 per cent. float and 77.14 per cent. sink.

Table IV shows the calculations to determine the ash content of the washed coal and refuse, as produced by the jigs.

TABLE No. IV. ASH CONTENT IN WASHED COAL AND REFUSE

	Washed Coal.				Refuse.			
	A	B		C	D	E		F
Specific Gravity of Materials	Result of the Float-and-Sink Tests of the Washed Coal.	Percentage Ash Content of each Material.		Percentages in Column B Converted to Terms of the Washed Coal.	Result of the Float-and-Sink Tests of the Refuse.	Percentage Ash Content of each Material.		Percentages in Column E Converted to Terms of the Refuse.
Less than 1.35....	74.6	× 7.68	=	5.73	3.63	× 7.68	=	0.28
1.35 to 1.40.....	7.6	× 14.60	=	1.11	0.91	× 14.60	=	0.13
1.40 to 1.45.....	5.8	× 18.54	=	1.08	1.00	× 18.54	=	0.19
1.45 to 1.50.....	2.3	× 23.82	=	0.55	0.54	× 23.82	=	0.13
1.50 to 1.55.....	3.4	× 28.42	=	0.97	4.81	× 28.42	=	1.37
1.55 to 1.75.....	4.7	× 35.78	=	1.68	11.97	× 35.78	=	4.28
Heavier than 1.75.	1.6	× 55.66	=	0.89	77.14	× 55.66	=	42.94
Totals.....	100.0	.....		12.01	100.00	.....		49.32

From Tables Nos. I, II, III and IV, it is seen that the actual washing test fell short of the theoretically perfect separation in four respects.

(1) The ash content of the washed coal is 12.01 per cent. instead of 11.74 per cent. or a difference of 0.27 per cent.
(2) The percentage of washed coal produced was 89.0 per cent. instead of 90.1 per cent. a difference of 1.1 per cent.
(3) The ash content of the refuse is 49.32 per cent. instead of 55.66 per cent. or a difference of 6.34 per cent.
(4) The percentage of refuse produced was 11.0 per cent. instead of 9.9 per cent. or a difference of 1.10 per cent.

Any variation from the theoretically perfect separation, as shown in Table I, results in a lower efficiency of washing. To make sure that this is true, regardless of the exact location of the several misplaced materials, certain assumptions are made in Table V.

TABLE No. V. EFFICIENCIES RESULTING FROM DIFFERENT ASSUMPTIONS

All Percentages are in Terms of the Raw Coal Except Those Converted as Specified

	Specific Gravity of Materials	1 Percentages of Each Material in Washed Coal. %	1 Ash %	1 Refuse. %	1 Ash %	2 Percentages of Each Material in Washed Coal. %	2 Ash %	2 Refuse. %	2 Ash %	3 Percentages of Each Material in Washed Coal. %	3 Ash %	3 Refuse. %	3 Ash %	4 Percentages of Each Material in Washed Coal. %	4 Ash %	4 Refuse. %	4 Ash %	5 Percentages of Each Material in Washed Coal. %	5 Ash %	5 Refuse. %	5 Ash %
A	Under 1.35	66.8	5.13	....	....	66.8	5.13	....	....	66.8	5.13	....	....	66.8	5.13	....	....	66.8	5.13	....	....
B	1.35 to 1.40	6.9	1.01	....	....	6.9	1.01	....	....	6.9	1.01	....	....	6.9	1.01	....	....	6.9	1.01	....	....
C	1.40 to 1.45	5.3	0.98	....	....	5.3	0.98	....	....	5.3	0.98	....	....	5.3	0.98	....	....	5.3	0.98	....	....
D	1.45 to 1.50	2.1	0.50	....	....	2.1	0.50	....	....	2.1	0.50	....	....	**2.1**	**0.50**	....	....	**2.1**	**0.50**	....	....
E	1.50 to 1.55	3.5	0.99	....	....	3.5	0.99	....	....	3.5	0.99	....	....	**3.5**	**0.99**	....	....	**3.5**	**0.99**	....	....
F	1.55 to 1.75	1.0	0.36	4.5	1.61	2.0	0.72	3.5	1.25	3.0	1.07	2.5	0.89	**4.0**	**1.43**	1.5	0.54	**5.0**	**1.79**	0.5	0.18
	Over 1.75..	4.5	2.50	5.4	3.01	3.5	1.95	6.4	3.56	2.5	1.39	7.4	4.12	**1.5**	**0.84**	8.4	4.68	**0.5**	**0.28**	9.4	5.23
	Totals...	90.1	11.47	9.9	4.62	90.1	11.28	9.9	4.81	90 1	11.07	9.9	5.01	**90.1**	**10.88**	9.9	5.22	90.1	10.68	9.9	5.41
Percentage of Ash in Washed Coal or Refuse.		$\frac{11.47}{90.1}=12.73$		$\frac{4.62}{9.9}=46.56$		$\frac{11.28}{90.1}=12.52$		$\frac{4.81}{9.9}=48.58$		$\frac{11.07}{90.1}=12.28$		$\frac{5.01}{9.9}=50.61$		$\frac{10.88}{90.1}=12.08$		$\frac{5.22}{9.9}=52.73$		$\frac{10.68}{90.1}=11.85$		$\frac{5.41}{9.9}=54.65$	
Efficiency of Washing Calculated by Deimeter Method		By Rule 1 77.3%				By Rule 1 82.1%				By Rule 1 87.6%				By Rule 1 92.1%				By Rule 1 97.5%			

By referring to the Hancock efficiency chart, it is found that the amount of less than 1.35 specific-gravity material found with the refuse from washing is a very

small percentage (0.6 per cent.) of the total of this material carried by the raw coal. In order that the most favorable variation may be shown, or the one most likely to show as high an efficiency as is obtained in the theoretically perfect separation, it is assumed that a test of the washed coal charted on a Hancock chart shows that all of the materials *a, b, c, d* and *e,* in Table I, have gone to the washed coal where they belong, and that the variation from the theoretical occurs in part of material *f,* being found in the refuse, and that this is replaced in the washed coal by an equal amount (by weight) of the material *g,* the percentages of washed coal and refuse remaining the same as the theoretically perfect, or 90.1 and 9.9 per cent., respectively.

In Table V, this interchange of location of these materials is shown in different amounts, the results clearly indicating the effect caused thereby on the efficiency of the separations made.

It will readily be seen from the data given in Table V that any other combination that may be made, with the percentages of washed coal and refuse held to the same figures as the theoretically perfect, will result in a reduced washing efficiency, though in some instances, the reduction may be so slight as to be hardly worth consideration, yet the fact remains and should be considered in determining efficiencies. It is, of course, self-evident that any increase from the theoretically perfect percentage of washed coal will increase its ash content, and any reduction in the percentage of washed coal will decrease its ash content; except, that should there be any sink in the washed coal when tested in the permissible bath (and there always is in commercial washing), there will be a reduction in percentage of washed coal, while the ash content may remain the same as the theoretically perfect.

As an example of this, referring to Table V, suppose the washed coal is made up of materials *a, b, c, d* and *e,* and that *f* has all gone to the refuse and in place of it 3 per cent., in terms of raw coal, of material *g* is found in the washed coal. The result would be a washed coal amounting to 87.6 per cent. instead of the theoretically perfect 90.1 per cent., while the ash content of this washed coal would be 11.74 per cent., or the same as the theoretically perfect.

Table VI is made up in a similar manner to Table V, but differs in that none of material *g* is found in the washed coal, which has the effect of varying the percentages of washed coal and refuse. This again shows the decreased efficiency of washing through variations from the theoretically perfect separation.

From what has been presented, the following facts are derived:

(1) That it is impossible to reduce the ash content of the washed coal below the standard analysis except by a reduction in the percentage of washed coal below that of the standard percentage.

(2) That if the percentage of washed coal agrees with the standard percentage, the ash content will be higher than the standard ash, so long as there is any sink in the washed coal when tested on the permissible bath, and as there always is in commercial washing, it is impossible to reach the perfect percentage of washed coal and stay within the limit for ash.

(3) That a condition may exist wherein both the percentage of washed coal and its ash content will be above the standards.

From these facts and from the data contained in the tables, the following conclusions may be drawn:

To arrive at any method of stating coal-washing efficiencies in figures, which will apply universally, the composition and percentage of the refuse need have no bearing on the proposition, as it is directly affected by the variations in the composition and percentage of the washed coal. The washed coal then may be considered alone in arriving at such a method and in doing so there are four conditions affecting the efficiency. They are:

(1) If the percentage of washed coal is standard, but the ash content is above standard, then the ash analysis alone is the basis for calculating the washery efficiency.

(2) If the percentage of washed coal and also its ash content are above standard, then both of these differences are the basis for calculating the washing efficiency.

(3) If the ash analysis is standard but the percentage of washery coal is below standard, then the percentage of washed coal alone is the basis for calculating the washing efficiency.

(4) If both the ash analysis and the percentage of washed coal are below standard, then both of these differences are the basis for calculating the washing efficiency.

TABLE VI. CALCULATIONS OF EFFICIENCY WITH VARIOUS ASSUMPTIONS

All Percentages are in Terms of the Raw Coal Except Those Converted as Specified

Specific Gravity of Materials	1 Percentages of Each Material in Washed Coal. %	1 Ash %	1 Refuse. %	1 Ash %	2 Percentages of Each Material in Washed Coal. %	2 Ash %	2 Refuse. %	2 Ash %	3 Percentages of Each Material in Washed Coal. %	3 Ash %	3 Refuse. %	3 Ash %	4 Percentages of Each Material in Washed Coal. %	4 Ash %	4 Refuse. %	4 Ash %	5 Percentages of Each Material in Washed Coal. %	5 Ash %	5 Refuse. %	5 Ash %
A Under 1.35	66.8	5.13	....	....	66.8	5.13	.....	....	66.8	5.13	....	....	66.8	5.13	....	....	66.8	5.13	....	....
B 1.35 to 1.40	6.9	1.01	....	....	6.9	1.01	.....	....	6.9	1.01	....	....	6.9	1.01	....	....	6.9	1.01	....	....
C 1.40 to 1.45	5.3	0.98	....	....	5.3	0.98	.....	....	5.3	0.98	....	....	5.3	0.98	....	....	5.3	0.98	....	....
D 1.45 to 1.50	2.1	0.50	....	....	2.1	0.50	.....	....	2.1	0.50	....	....	2.1	0.50	....	....	2.1	0.50	....	....
E 1.50 to 1.55	3.5	0.99	....	....	3.5	0.99	.....	....	3.5	0.99	....	....	3.5	0.99	....	....	3.5	0.99	....	....
F 1.55 to 1.75	1.0	0.36	4.5	1.61	2.0	0.72	3.5	1.25	3.0	1.07	2.5	0.89	4.0	1.43	1.5	0.54	5.0	1.79	0.5	0.18
G Over 1.75..	.....	....	9.9	5.51	.....	....	9.9	5.51	.....	....	9.9	5.51	.....	....	9.9	5.51	.....	....	9.9	5.51
Totals...	85.6	8.97	14.4	7.12	86.6	9.33	13.4	6.76	87.6	9.68	12.4	6.40	88.6	10.04	11.4	6.05	89.6	10.40	10.4	5.69
Percentage of Ash in Washed Coal or Refuse.	$\frac{8.97}{85.6} = 10.48$		$\frac{7.12}{14.4} = 49.44$		$\frac{9.33}{86.6} = 10.77$		$\frac{6.76}{13.4} = 50.45$		$\frac{9.68}{87.6} = 11.05$		$\frac{6.4}{12.4} = 51.61$		$\frac{10.04}{88.6} = 11.33$		$\frac{6.05}{11.4} = 53.07$		$\frac{10.4}{89.6} = 11.61$		$\frac{5.69}{10.4} = 54.71$	
Efficiency of Washing Calculated by Delameter Method		3 92.1%				3 93.9%			By Rule	3 95.7%				3 97.5%				3 99.2%		

Quantity of Washed Coal Standard and Ash Content Excessive

In the first condition, with the percentage of washed coal standard, if the ash content of the washed coal should be the same as that of the raw coal, then no re-

sults have been obtained, and instead, a loss has resulted equal to the percentage of refuse resulting from washing. In such case it can truthfully be said that the efficiency of washing is zero. If the ash content of the washed coal should be standard, then the washing efficiency would be 100 per cent. From this we find that the true method of calculating the efficiency for such a condition would be as follows:

Formula A

$$\text{washing efficiency (condition 1)} = \frac{\text{raw coal ash} - \text{washed coal ash}}{\text{raw coal ash} - \text{standard washed coal ash}}$$

Both Quantity of Washed Coal and Its Ash Too High

In the second condition both the percentage of washed coal and its ash content are higher than standard. It may be said, as in the first condition, that if the ash content of the washed coal is the same as that of the raw coal, the washing efficiency should be considered as zero. But the method of calculation should be applicable for use in the comparison of coal-washing machines. We can imagine two machines (a) and (b) washing the same coal and both producing a washed product having an ash content the same as that of the raw coal. But machine (a) might discharge washed coal of an amount equal to the standard washed-coal percentage, while (b) might produce a higher percentage of washed coal than (a). Thus the loss through the operation of machine (a) will be greater than that occasioned by the working of machine (b). To attain an efficiency figure to use for the comparison of these two machines under such conditions, it is, therefore, necessary to bring the percentages of washed coal into the calculations and the following would apply to such a condition:

Referring to Table I, assume that the washed coal from the jigs contains all materials *a, b, c, d, e* and *f,* and also 4.9 per cent. (in terms of the raw coal) of *g,* making a total washed coal of 95 per cent. The ash content of this mixture would be 14.47 per cent. Applying formula A only:

$$\frac{16.09 - 14.47}{16.09 - 11.74} = \frac{1.62}{4.35} = 0.3724 \text{ or } 37.24 \text{ per cent.}$$

If machine (a) above mentioned is producing 90.1 per cent. washed coal analyzing 14.47 per cent. ash, the efficiency would be 37.24 per cent. If machine (b) is producing (as is possible) 95 per cent. washed coal analyzing 14.47 per cent. ash, it is certainly doing better work than machine (a). Admitting that the following condition cannot exist, but for the purpose of making my contention clear on this point, it could be said that machine (b), producing 100 per cent. washed coal, with an ash content of 14.47 per cent., would have an efficiency of 37.24 per cent. by analysis and 100 per cent. efficiency by percentage of washed coal produced. The average efficiency in such case would be $\frac{100 + 37.24}{2} = 68.62$ per cent. This coincides with formula A, for in that calculation the efficiency by percentage of washed coal produced is disregarded, or would be equal to 100 per cent. To carry out this principle for the calculation of efficiency by percentage of washed coal when higher than standard, the formula *B* at the foot of the page is derived.

The formula *C* for condition 2 will also be found at the bottom of the page.

Applying this to the first above mentioned condition for machine (b):

$$\frac{\frac{95.0 - 90.1}{100.0 - 90.1} + \frac{16.09 - 14.47}{16.09 - 11.74}}{2} = 43.37 \text{ per cent. eff.}$$

Ash Content Standard and Washed Coal below Required Figure

In the consideration of condition 3, the ash content is standard, but the amount of washed coal produced is less than it should be, as figured by a float-and-sink test of the raw coal. It is at once evident that the only way to determine this efficiency is by a direct calculation using only the figures for the percentage of standard washed coal and the actual washed coal produced or, if the standard, washed coal is 90.1 per cent., and the actual production is 85 per cent., the efficiency would be

$$\frac{85.0}{90.1} = 0.9434 \text{ or } 94.34 \text{ per cent. efficiency}$$

As the ash content of the washed coal is standard, that efficiency is 100 per cent., and the true final efficiency is the average of these two, or

$$\frac{94.34 + 100.0}{2} = 97.17 \text{ per cent. efficiency}$$

It is, of course, impossible to have a condition wherein the percentage of washed coal is standard and the ash content below standard, so that need not be considered. For condition 3, the following formula is, therefore, derived:

Formula D

$$\text{washing efficiency (condition 3)} = \frac{100 + \frac{\text{percentage of washed coal produced}}{\text{percentage of standard washed coal}}}{2}$$

From this it is evident that Formula *E* at the bottom of the page should be used for condition 4.

In going back over these formulas, it is quite evident that conditions 3 and 4, as they will always be found in practice, will show a higher efficiency than conditions 1 and 2, which is as it should be, for a washery that is pro-

Formula B

$$\text{efficiency} = \frac{\text{percentage of washed coal produced} - \text{standard percentage of washed coal}}{100 - \text{standard percentage of washed coal}}$$

Formula C

$$\left.\begin{matrix}\text{washing efficiency} \\ \text{(condition 2)}\end{matrix}\right\} = \frac{\frac{\left(\begin{matrix}\text{percentage of washed coal produced} - \\ \text{standard percentage of washed coal}\end{matrix}\right)}{100 - \text{standard percentage of washed coal}} + \frac{\text{raw coal ash} - \text{washed coal ash}}{\text{raw coal ash} - \text{standard washed coal ash}}}{2}$$

Formula E

$$\text{washing efficiency (condition 4)} = \frac{\frac{\text{ash content of washed coal produced}}{\text{ash content of standard washed coal}} + \frac{\text{per cent. of washed coal produced}}{\text{standard per cent. of washed coal}}}{2}$$

ducing a washed coal with an ash content above standard is not desirable because the higher-ash coal would have to be sold at a reduced price.

On the other hand, a coal that carried ash of a lower percentage than standard might bring a higher price and the loss would be only through the reduced amount of coal produced. The maximum amount of such reduction would, as previously stated, be based entirely upon the extent to which it could be carried without eliminating the profit derived from the higher market value of the lower-ash coal. At the same time, it is impossible in actual practice to carry conditions 3 and 4 to the extremes to which 1 and 2 may be carried and the variation of a few per cent. below standard in the percentage of washed coal does not affect the efficiencies nearly as much as would a few per cent. increase in the ash content above the standard figure.

Proposed Rules Algebraically Expressed

From the data presented, I therefore derive the following formulas for the calculation of washery efficiencies and obtain the rules for their use.

Let X = efficiency of washing; a = percentage of raw-coal float from the permissible bath test (standard washed coal); b = percentage of washed coal produced by washing; c = 100 per cent. = raw coal; d = ash content of the raw coal; e = ash content of the raw-coal float from the permissible bath test (standard washed coal); f = ash content of the washed coal produced by washing. Then:

Rule 1—If the ash content of the washed coal is of a higher percentage than standard and the percentage of washed coal is standard, calculate the efficiency of washing by the following formula:

$$\frac{d - f}{d - e}$$

Rule 2—If both the ash content and the percentage of washed coal are of a higher percentage than standard, calculate the efficiency of washing by the following formula:

$$\frac{\frac{b - a}{100 - a} + \frac{d - f}{d - e}}{2}$$

Rule 3—If both the ash content and the percentage of washed coal are standard or, if either one or both are less than standard, calculate the efficiency of washing by the following formula:

$$\frac{\frac{f}{e} + \frac{b}{a}}{2}$$

Rule 4—If the ash content of the washed coal is higher than standard, and the percentage of washed coal is less than standard, calculate the efficiency of washing by the following formula:

$$\frac{\frac{d - f}{d - e} + \frac{b}{a}}{2}$$

If, in stating the efficiency of washing, the rule by which it is calculated, is also given, it will at once be understood whether the plant is producing a washed coal product with an ash or sulphur content above or below standard.

In calculating the efficiency of washing of an entire washery, the formulas as given will apply, providing the percentage of washed coal and its ash content are derived from the entire washed-coal product of the plant. If these figures are derived from each individual jig, then the efficiency figure in each case will represent each individual jig and to determine the total plant efficiency from these figures, multiply the efficiency of each jig by its washed-coal tonnage production. Add the resulting products from all jigs together and divide by the sum of the washed-coal tonnage capacities of all the jigs.

Example:

Jig (a) Efficiency = 98.0 per cent. × washed coal tonnage or 10 tons per hr. = 980
Jig (b) Efficiency = 90.0 per cent. × washed coal tonnage or 20 tons per hr. = 1800
Jig (c) Efficiency = 86.0 per cent. × washed coal tonnage or 30 tons per hr. = 2580

60 5360

Then:

$$\frac{5360}{60} = 89.33 \textit{ per cent.} = \textit{total efficiency}$$

The following calculation gives the efficiency of the Stewart plant, represented by Mr. Hancock's chart:

Ash content of the raw coal = 16.09 per cent.; washed-coal ash = 12.01 per cent.; washed coal = 89 per cent.; standard washed coal = 90.1 per cent.; ash content = 11.74 per cent.; a = 90.1 per cent.; b = 89 per cent.; c = 100 per cent.; d = 16.09 per cent.; e = 11.74 per cent.; f = 12.01 per cent.

Rule 4 would apply to the conditions at this plant.

Efficiency of washing =

$$\frac{\frac{d - f}{d - e} + \frac{b}{a}}{2}$$

or,
$$\frac{\frac{0.1609 - 0.1201}{0.1609 - 0.1174} + \frac{0.890}{0.901}}{2} \textit{ or } 96.29 \textit{ per cent.}$$

If one formula could be compiled that would apply on all the conditions which may exist in washeries as herein outlined, the method of calculation would be simplified, but I have been unable to determine any such formula which would be satisfactory.

An Automatic Continuous Coal Drier

By A. J. Sayers*

The problem of properly drying coal after washing is one which has troubled the industry for many years. It will be pleasing, therefore, to many coal producers to learn that a satisfactory coal-drying machine has been invented by C. A. Wendell. This device is fully protected by patents and the exclusive rights to manufacture and market it have been secured by the Link-Belt Co.

The machine, in general, consists of three main parts, the frame, feed-spouts and the container. There is also a sluice and a hopper. The feed spouts are fastened to an inner solid shaft and are driven by suitable transmission so that they may revolve at any desired speed independent of the container.

The container, which is driven through a hollow shaft consists of a top plate, a bottom plate provided with openings which are closed by trap doors, and an outer inclined wall. This outside wall is made up of screens with suitable perforations. Outside of these, a water col-

*Engineer, Link-Belt Co., Chicago.

lector is set and so arranged that the water which is thrown through the screens is collected and made to follow the sloping sides up to the top edge, where it is discharged by centrifugal force into a sluice to be led away. The container is driven through suitable transmission to any desired speed independent of the feed spouts.

The discharge doors in the bottom plate of the container are made to open and close automatically by means of cams attached to the revolving shaft on which the feed spouts are fastened. The material being dried is continually and automatically discharged from the container after having been kept in the machine for a time sufficiently long to give it the degree of dryness desired. It is discharged into a hopper and removed by a suitable conveying apparatus.

Centrifugal Force Aids Discharge

The easy discharge of the material is accelerated by placing the screen at a certain slope so that when the coal is sufficiently dried and the doors in the bottom are opened, it will slide downward and out into the hopper. The centrifugal force aids in making this operation almost instantaneous.

After the machine has been put in motion and attained its full speed, the material to be dried such as coal, for instance, is fed into the spouts. The centrifugal force will then throw this coal in a steady stream against the perforated frame forming the outside of the container so that a thick bed is gradually formed as the spouts slowly pass by each and every point of the container, the spout traveling faster than the drying screen.

As the spouts slowly gain on the container, the cams which are fastened to the same shaft and thus travel at the same speed and are always in the same fixed relation to the spouts open and close the discharge doors just far enough ahead so that no material can be discharged into that part of the container which is being emptied of its contents. In other words, the distance between the cam and the spouts is just large enough to permit of a gradual opening and closing of the door before the material discharged from the spout can get into this place. This means that there is always an empty section about the size of a door opening just ahead of the spout and just behind the cam.

This empty space is continually being filled and the material to be dried has to stay in position until the cam again opens and closes the door and the then empty space is refilled from the spout which follows close behind it.

As this performance is continually repeated it will be seen that the material handled can be made to stay a longer or shorter time as needed or according to how long it takes to drive the moisture out of the material by simply changing the relative speeds beween the cams and spouts with regard to the container. A similar result may be obtained, or the dryness of the material can be adjusted by a lighter or a heavier feed.

To illustrate how long material is permitted to remain in the machine at a certain combination of speeds, let us assume that the speed of the container is 250 r.p.m., while that of spouts and cams is 251 r.p.m., one revolution per minute faster than the container. As a consequence, each discharge door is opened and closed once every minute by each cam and as two cams are used in this design, each door is operated twice per minute allowing the material to remain in the container about 25 seconds or during 104 revolutions.

This machine is self contained, strongly built with few working parts. These are subjected to but little wear on account of the relatively low speed of the revolving elements in relation to each other. All shafts are supported by babbitted, brass-bushed or ball bearings. All parts are easily accessible for inspection or replacement. The perforated screens against which the material lies while drying and which must take the wear caused by the downslide at the opening of the doors are easily replaced by simply cutting them loose and cold-riveting new parts to the heavy iron frames.

The Wendell drier is a machine which automatically receives and discharges the material and moisture it handles, and while it is intermittent in its drying action, its performance is continuous. The entire operation is accomplished by the aid of centrifugal force and gravity and no scraping or plowing devices are required. Excessive wear is thereby eliminated while the power consumption is comparatively small.

Recent Scale Conferences

The members of the miners' scale committee of District No. 2, which comprises central Pennsylvania, met at Clearfield, Apr. 22, at 11 o'clock. The joint conference of the scale committees of miners and operators met at 2 o'clock the following day in the Dimeling Hotel.

The miners demanded that a uniform wage scale be paid for inside and outside labor, that eight hours constitute a day's work for all men employed in and around the mines, that pillars and stumps be drawn by hand and not by machine, and that local inequalities be taken up locally for adjustment, these differences including pushing of cars and compensation for removing rock in rooms, headings or breakthroughs to make necessary height. The operators refused to make any concessions. On Saturday, the miners agreed to submit the question to a referendum.

Latest reports from Peoria, Ill., on Apr. 28, state that the operators refused to grant a 4 per cent. increase demanded by the miners in the southern field.

Bituminous Examinations

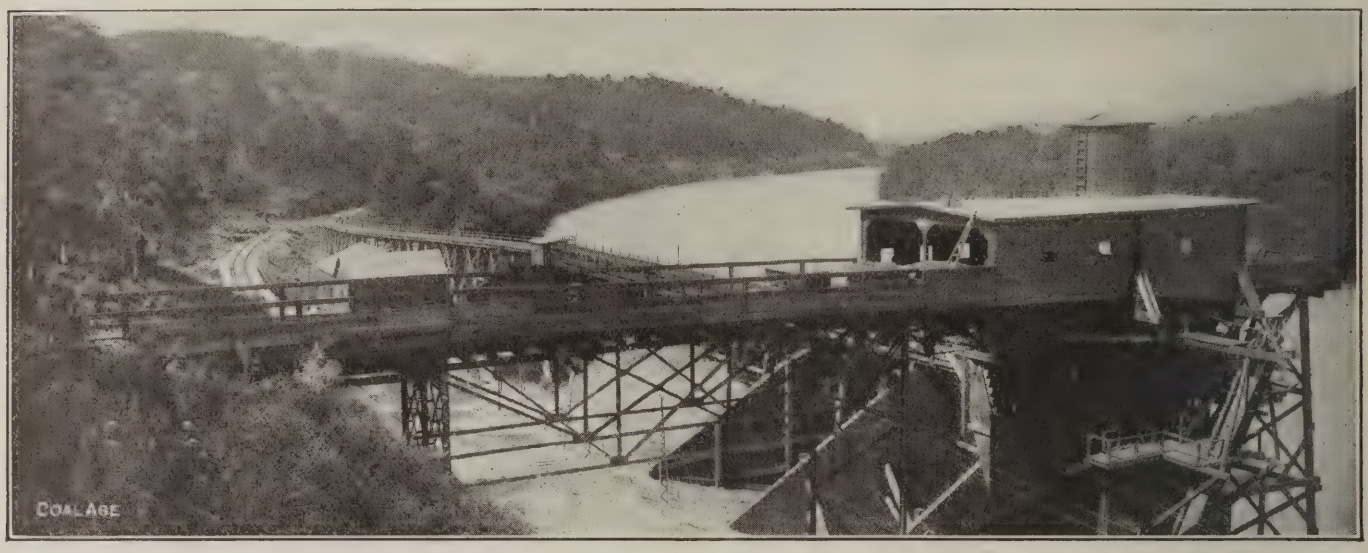
Notices are being sent out, in the several bituminous districts of Pennsylvania, announcing that examinations for certificates of competency for mine foremen, assistant mine foremen and firebosses, will be held May 5, 6, 7 and 8, 1914. In most cases, the examination for fireboss certificates is held on the last day named, May 8. Applicants for certificates must be citizens of the United States, of good moral character and known temperate habits, at least 23 years of age and must have had at least five years' practical experience after 16 years of age, as miners or mining engineers, or men of general work inside of the mines of Pennsylvania.

Mining Meetings

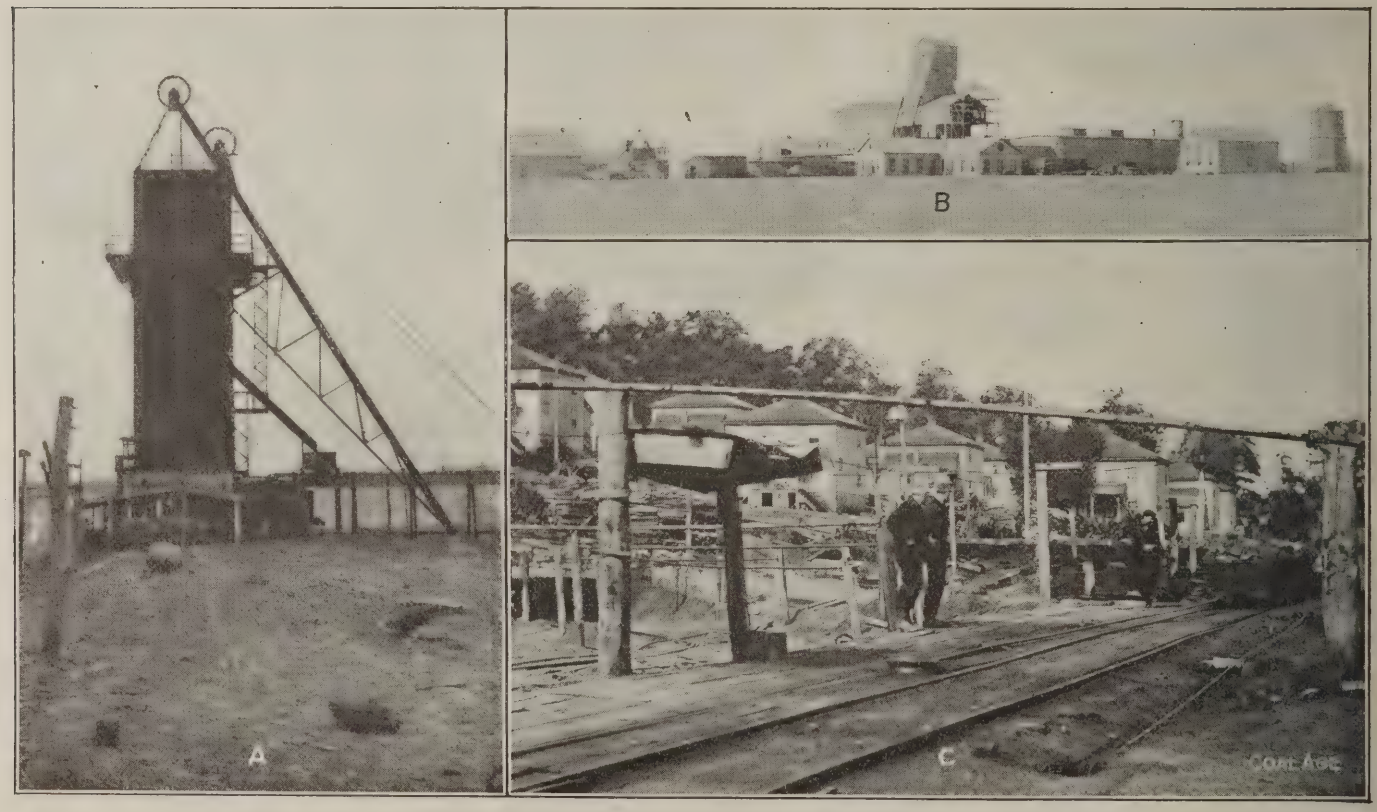
Pennsylvania Anthracite Section of A. I. M. E., in auditorium of Lehigh & Wilkes-Barre Building, Wilkes-Barre, Penn., Saturday evening, May 9.

Kentucky Mining Institute, at State University, Lexington, Ky., May 8 and 9.

Snap Shots In Coal Mining



Coal Tipple on Warrior River at Gilmore, Ala.



A—New Steel Tipple at No. 8 Mine of West Kentucky Coal Co., Sturgis, Ky. Chute and Drag at Lower Right Delivers Coal to Boiler Room. The Seam Is Reached by a Drift, and Mine Is Equipped with Rope Haulage. B—View of Surface Plant at Galt Mines, Lethbridge, Alberta, Canada. C—Rope Haulage at Mine No. 119, Consolidation Coal Co., Jenner, Penn. On Left Is Mouth of Mine No. 118, While Section of Town Is Shown in Background



RADIANT MINE, DRAKESBORO, KY.



TIPPLE OF GREENVILLE COAL CO., POWDERLY, KY.

Mining Coal in Japan



1—CLUB OF FUSHIN COLLIERY COMPANY. 2—OYAMA PITS. 3—SHRINE. 4—RAILWAY STATION. 5—OFFICIAL QUARTERS. 6—COLLIERY HOSPITAL

The Colorado Strike

SYNOPSIS—The disturbance in Colorado has been permitted to grow until, no longer a strike, it has assumed the proportions of a war. Probably 87 persons have been killed and at least 9 plants have been burned. The State militia is without pay and consequently campaigning is hampered. Both northern and southern Colorado are affected.

The investigation of the Colorado strike by Congress has done no good and perhaps much harm. A board of inquiry will never aid peace by allowing men to vituperate one another if, after stirring up strife, it then departs and leaves them to plant blows to match their evil words. Our courts would be a source of weakness rather than strength, if they did not adjudicate and follow up their decision with the civil power. If Congress and the President can do nothing better, let them not invite the disputants to air their grievances in a powerless court. Such action can, at least, only weaken the effectiveness of the local control.

LUDLOW, CENTER OF VIOLENCE

The first breach of the peace in the new development of the Colorado situation occurred near Ludlow, Colo., on Apr. 20. The militia declares that a detachment of 17 soldiers under the command of Lieut. Linderfelt, which had advanced to investigate the origin of certain rifle discharges, was fired upon by strikers in the Berwind Cañon. The militiamen fled and took a position on Tank Hill, the strikers entrenching themselves at Arroyo, half a mile away.

The story told by the strikers declares that the fighting commenced with an exchange of shots between strikers and troops in the Ludlow colony. It is said by J. R. Lawson, Colorado member of the executive board of the United Mine Workers of America, that five militiamen interfered with some Greeks at their sports on Sunday the 19th. No fighting resulted, however, but on Monday the 20th, Major Hamrock, of the militia at Ludlow, sent for Louis Tikas, the leader of the Greeks, to demand of him the release of some men from the camp. Lawson says this Greek leader never returned but he declares he does not know, however, who fired the first shots.

The firing in all lasted 14 hours. Machine-gun fire was directed on the strikers' camp at Ludlow Station, which was burned to the ground. Under the tents, holes had been dug and covered with boards and there were several noncombatants caught in these shotproof pits when the camp burned. As a result of the day's engagement, it is stated that one soldier was killed, one fatally injured and one less seriously wounded. On the other hand, 14 in the strikers' ranks were killed and considerably over 20 wounded. Among the dead was the Greek leader Louis Tikas. The bodies of 11 children, two women and one man were found by a searching party of the American Red Cross on the 22nd.

The situation for the militia was quite serious, there being about 100 soldiers to about 400 armed strikers. The number of these latter was continually increasing.

FIGHTING SPREAD ALL OVER TRINIDAD DISTRICT

On the 22nd, fighting commenced at Delagua, which is at the head of the branch railroad that runs westward from Ludlow. The guards, 15 in number, apparently went out to meet the strikers and a fight occurred about a mile from the camp. After a few minutes' fighting, the guards retreated, pursued by the strikers, who attacked them in the mine building. Militiamen in steel cars sent up from Ludlow reinforced the guards and repulsed the strikers.

The Aguilar district lies over a high range of hills in a different cañon from that in which Delagua, Hastings and Ludlow are located. Aguilar is about seven miles northeast of Ludlow. Shortly after the Delagua battle, hostilities broke out at Aguilar, and soon the strikers had 35 persons, including five women and three children, entrapped in the mine of the Empire Coal Mining Co. They set fire to the tipple house and are alleged to have dynamited the mine with bombs, sealing the exit for those who used the mine as a place of retreat. However, whether this occurred or not, all the persons were ultimately liberated or rescued.

EIGHT PLANTS ARE FIRED

The full force of the Colorado militia was called out on Apr. 22 and ordered to mobilize at Denver and to await further orders. However, as money is lacking, it was impossible to utilize these forces to advantage. The payment of the militia was already scandalously in arrears. On the same day several union miners at El Paso, Curtis, Patterson and other union mines left Colorado Springs for Trinidad, and all the miners quit work.

The following plants were reported on fire on Apr. 23. Primrose mine of the Colorado Fuel & Iron Co. (Primrose Coal Co.) at Rugby, Mine No. 4 of the Southern Colorado Fuel Co., the Empire mine of the Empire Coal Mining Co., the Southwestern mine of the Southwestern Fuel Co., the Green Cañon mine of the National Fuel Co., and the Rugby mine of the Colorado Fuel & Iron Co. The Royal and Brodhead mines are also in ashes. In all, eight mines in the Trinidad field had been destroyed by the strikers, who comprised about 1000 men.

THE TRUCE IN THE TRINIDAD DISTRICT

On the 24th a truce was arranged between Acting Governor Fitzgerald and Horace Hawkins, the attorney for the miners; Governor Ammons being in Washington, D. C., The state militia promised not to fire unless first fired on. The new force of militia had meanwhile arrived in the district and fearing the train might be dynamited, had detrained six miles from Ludlow and marched into that village. Part of the miners had intended to intercept the train at Lynn near Aguilar, but others desired to hold up the forces at another point. As a result of the disembarkation, and the division among the strikers, the troops met with no resistance.

The strikers withdrew from Lynn and Aguilar, and all the persons imprisoned in the Empire and Southwestern mines since the 22nd were found alive and unharmed. Several women and children who had taken refuge in the mine had been permitted by the strikers to leave on the 23rd, before the evacuation, and were escorted from the district by their captors.

HOSTILITIES BREAK OUT EVERYWHERE

On Apr. 26 the Chandler mine, over 80 miles in a straight line northeast of Ludlow, situated in Fremont County, and being the property of the Victor-American Fuel Co., was taken by the strikers. On the 27th two companies of militiamen drove off the invaders, but a mine of the Colorado Fuel & Iron Co., known as the McNally plant, was burned down. This mine is ¾ of a mile west of Walsenburg. During the night seven mine guards were shot at the Walsen mine near Walsenburg.

On the 27th evidences of the unrest appeared at Hecla, a mine of the Rocky Mountain Fuel Co., 22 miles north of Denver and about 190 miles in a direct line from Ludlow. The mine was attacked by strikers, but none of the 49 guards was injured. A posse of 200 men was reported as speeding from Boulder to the rescue.

At the Vulcan mine, near Lafayette, there was trouble at 10:30 p.m., and for half an hour a fight was waged between miners and mine guards. The Gorman mine near Marshall was also attacked by strikers at the same hour, but machine guns on the tipple were brought into action, and the attack was repelled.

This northern field had been comparatively quiet, but when the militiamen were moved to the south to cope with the trouble there, violence developed in the sections thus vacated.

THE PRESIDENT ACTS

On Monday, Apr. 27, a long conference was held between the President, Secretary Garrison and Senator Thomas. No decision was reached as to the advisability of sending troops to Colorado. On the previous day, Martin D. Foster, chairman of the Committee of Mines and Mining in the House of Representatives, met John D. Rockefeller, Jr., and is said to have discussed the possibility of arbitration. He declared that his mission was without result.

On the 28th President Wilson ordered three troops of the Sixth Cavalry at Fort Leavenworth, Kan., to go to Trinidad, and two troops of the Twelfth Cavalry at Fort D. A. Russell, Wyo., to go to Cañon City. He issued a proclamation urging that domestic violence cease, and in a telegram to the Governor urged that the militia withdraw.

The number of lives lost in the events just described is, at least, 87. It is likely that no accurate estimate will ever be made.

A Preparation Plant in a River Tipple

The majority of coal mines throughout the country ship their product by rail only. In certain localities, however, particularly along the Ohio River and its tributaries, many tipples are equipped for shipping by either rail or water, and some few by water only.

ing screenings to the barges and baskets for lowering the lump.

As the structure must be above flood level, the distance to the barges is considerable at low water, and varies decidedly with the stage of the river. Hence, while the screenings may with impunity be spouted down, the lump must be lowered more carefully to avoid breakage.

Mine cars are brought to the upper floor of the tipple



General View of the Tipple

The plant of the Crucible Coal Co., located at Arensberg, on the Monongahela River, just above Connellsville, has a tipple of the latter type. The building extends out over the river and is equipped with spouts for deliver-

by electric locomotives. The plant is duplicate, that is, there are two dumps, two sets of screens and two picking belts. The fine coal passing through the screens drops into chutes below, which underneath the lower tipple



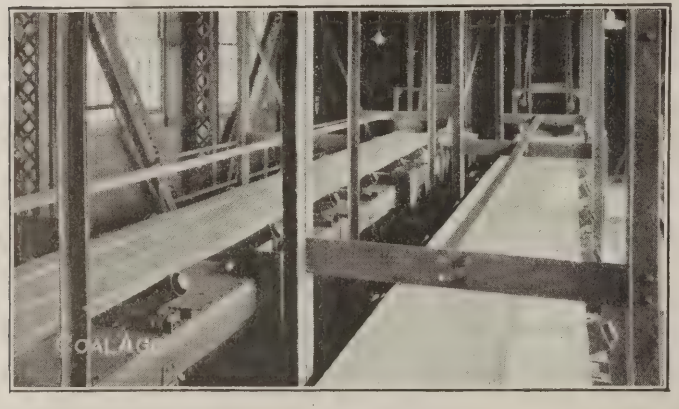
The Delivery Ends of Picking Belts, Spouts for Screenings and Lump Chutes to Picking Belts

floor unite into a single spout leading down to the barges.

The lump coal, passing over the screen, is fed onto two rubber picking belts, which pass between two files of men, who remove the bone from the product. The number of pickers is, of course, varied, according to the quality of the coal.

Each of these picking belts is 42 in. wide and runs over 34x36-in. head pulleys, and 30x44-in. tail pulleys, these being placed about 62 ft. apart on centers. Troughing idlers, placed every 5 ft., carry the upper part of the belt, while flat return idlers placed on 10-ft. centers carry the lower part. The power is applied through belts, gearing and chains, from a 60-hp. motor, which operates the entire tipple equipment. The speed of the picking belts is 60 ft. per minute, at which rate they will carry 130 tons each per hour, or 260 tons for the two.

Below the level of the picking platform and between the two belts is a third belt conveyor, running in the opposite direction. Onto this narrower belt the pieces of bone removed from the coal are chuted. This refuse is carried out of the shore end of the tipple to the bank, and discharged into pit cars for hauling away to the dump.



THE TWO PICKING BELTS, LOOKING TOWARD SCREENS

The capacity of the refuse conveyor is 60 tons per hour, thus allowing for the disposal of impurities equal to nearly one-quarter of the total tonnage handled. This is, of course, an excessive allowance, but provides capacity for handling all the bone and slate which may be removed during the most irregular feeding.

This belt is of rubber, 26 in. wide, with a thick wearing surface. The head and tail pulleys are on approximately 108-ft. centers, allowing the conveyance of refuse from the extreme outer end of the tipple to the bone track on the shore.

The head pulley of this conveyor, which travels at 60 ft. per minute, as do the picking bands, is at the shore end, the drive being accomplished by a long riveted drive chain.

The desired results are here obtained in a satisfactory and efficient manner. The market coal proceeds continuously from the mine car to the river barge, while the bone or refuse is effectively separated by hand picking, which, if carefully and thoroughly done, is the surest and best means, and returned to the shore for disposal, either to a dump or if desired, for filling. The complete installation was designed and furnished by Dempcy-Degener Co., of Pittsburgh, representing the Webster Mfg. Co., in the Pittsburgh district.

The Eccles Explosion

A severe explosion took place, in the afternoon of Apr. 28, at Mines Nos. 5 and 6, of the New River Collieries Co. These workings are located at Eccles, Raleigh County, on the Virginian R.R. It is believed that 203 miners are entombed and perhaps none of these can be rescued alive. However, only 4 dead bodies have as yet been recovered. Fifty-nine men, all from mine No.6 , have been rescued. The two shafts in mine No. 5 were rendered useless by the explosion. One shaft in No. 6 was also so severely injured as to be unavailable for escape or rescue.

The explosion occurred in No. 5 mine and was communicated to No. 6. However, all but 13 men of those who entered the shaft at this latter mine this morning have been accounted for. The shafts are about 600 ft. deep. Apparently no smoke appeared at the mouths of the shafts.

Superintendent Thomas Donaldson, from No. 3 mine, Superintendent M. E. Kent and General Superintendent F. B. Bayles, all of the New River Collieries Co., and an expert rescue crew, were lowered down the only shaft in working order at No. 6 mine and brought up several living and four dead men.

West Virginia Institute to Meet in Cumberland, Md.

The summer meeting of the West Virginia Coal Mining Institute will be held in Cumberland, Md., on June 2, 3 and 4. The announcement to this effect was made today by Prof. E. N. Zern, of the School of Mines at the University of West Virginia, the secretary of the organization. Prof. Zern made his announcement after the choice of Cumberland by the members of the executive committee had been confirmed by President Neil Robinson.

The invitation, which came from the business organizations of Cumberland, was received some time ago as were invitations from several cities in the northern part of the state. Cumberland was selected because of its easy accessibility and because a number of the Maryland operators and miners wanted to entertain the West Virginians.

The coming session of the Institute will be "practical." A number of interesting papers will be read on practical mining questions rather than theoretical subjects. Practical mining men from the surrounding coal-mining states will attend the Institute meeting and will take part in the proceedings. The detailed program will be announced later.

More Wireless Telephony in English Mines

The Fife Coal Co. has introduced "wireless" telephony into its Lindsay colliery, at Kelty, in the county of Fife, Scotland. The current is carried through the rails in the gangways. Only four receivers have been installed, one in the hoist room, another at the foot of the shaft, a third at 2850, and a fourth 4950 ft., respectively, from that point. The receivers weigh about 50 lb. Each instrument has a battery of four cells, any of which will produce a current at 15 volts pressure.

Who's Who in Coal Mining

Robert U. Patterson

Major Robert U. Patterson, Medical Corps, U. S. A., is one of the most prominent figures in the first-aid work that is now being carried on by American coal-mining companies. Major Patterson is in charge of the first-aid department of the American Red Cross, and a considerable part of his time and attention has been taken up with the development of first-aid work in coal mining.

He was born June 16, 1877, and graduated from McGill University, Montreal, Canada, in 1898. Major Patterson was an interne in the Montreal General Hospital from 1898 to 1900. Following this, he served one year as surgeon at the coal mines of the Anaconda Copper Co., Belt, Mont.

In June, 1901, Robert Patterson was commissioned 1st Lieutenant of the Medical Corps, United States Army. He was an honor graduate of the Army medical school in 1902. He then served in the Philippine Islands until 1905, experiencing active service in the Department of Mindanao under Generals Pershing and Wood against the Moros. During this time much of his attention was devoted to combating the epidemic of Asiatic cholera in the Philippines.

He served at Presidio, San Francisco, 1905, to 1906. Was present and took part in the relief work following the earthquake and fire. After this Major Patterson served with the U. S. army in the Cuban pacification from 1906 to 1909, following which service, he was stationed in Washington, D. C., and Fort Niagara, N. Y.

From 1910 to 1913 Major Patterson acted as director of ambulance companies for the maneuver division, Fort Banks, Mass., and San Antonio, Tex. He reported for duty in charge of the first-aid department of the American National Red Cross, June 5, 1913.

Coal men throughout the country have a warm affection for Major Patterson and appreciate in full the valuable service he has rendered the "Safety Movement" in American coal mining.

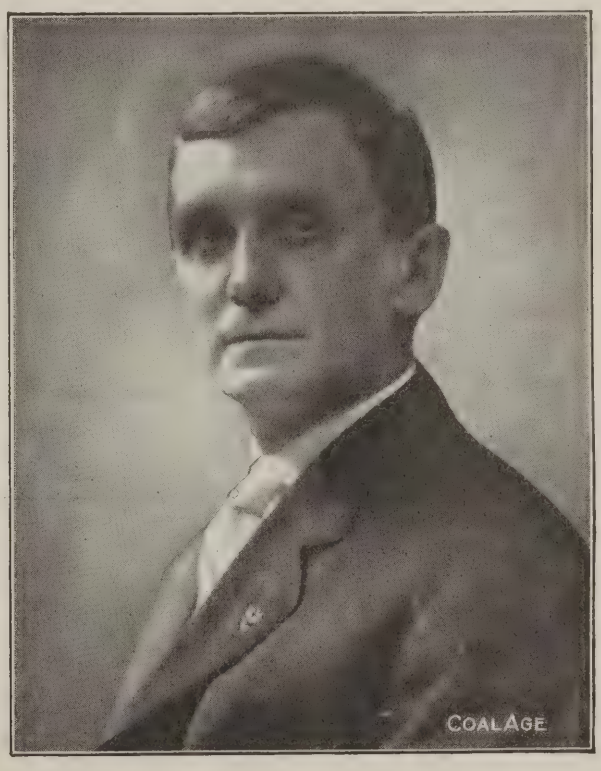


MAJOR ROBERT PATTERSON

John Hewitt

John Hewitt, general manager of the Vandalia Coal Co., Terre Haute, Ind., is one of the live wires of mining in the middle west. Born in England in 1860, Mr. Hewitt started life in this country as a coal miner, at which occupation he worked until 1888. He had obtained a fair education in the common schools of England, and this enabled him to serve as bookkeeper for the Island Coal Co. from 1888 until 1890. In this latter year he was promoted to mine superintendent for the same company and held this position until 1905.

He severed his connection with the Island Coal Co. to become district superintendent of the Vandalia Coal Co., in Indiana, which position he held until 1911, when he was appointed general superintendent of all operations for the same concern. At the present time he is general manager of all the mines of the Vandalia company, besides serving as a director of that corporation.



JOHN HEWITT

Editorials

The Senate and the Railroads

We are about to make our first experiment in the national ownership of railroads. We intend to build a railroad in Alaska, and we will probably administer it in the same manner as, hitherto, such roads have always been conducted under private ownership.

A correspondent writing from Washington, D. C., tells us that the Committee on Public Lands of the United States Senate believes that an economical and adequate protection of coal lands is essential to the development of the territory and the successful construction and operation of the government railway. Consequently, the committee suggests that the government should retain control over all coal-mining operations.

For so believing and for so acting in the conduct of their own business the privately owned railroads in the United States have been haled into court, for, in public opinion, private capital may not protect itself by any such manner of prudent precaution. Many railroads have feared that rivals paralleling them up the same creek or river might give their property no reason for existence and in order to secure their share of trade, have opened mines themselves. But it is wrong, all wrong, so to do unless the trick is turned by Congress.

Congress may let the government destroy private property by every form of discrimination and profitless operation, but it will not allow private capital to build up a competitive enterprise which might starve by careful and enterprising management such public utilities as have been or are well suckled by Congressional appropriations. We cannot blame Congress for looking after the interest of the Nation. For what other purpose are Congressmen appointed? But we do blame them for so bitterly opposing private capital which has exercised only the most elementary forethought.

The Situation in Colorado

The labor troubles in Colorado could hardly be worse and we can well understand why there has been a demand that United States troops be sent to the scene of action. No matter how responsible state troops may be, there is always possible the suggestion that they are controlled by the fear of local capitalistists or by the apprehension of the labor vote. Especially is this true at this time in Colorado, where the coal-operating concerns are large and labor organizations active, and either may well be dominant forces politically.

It cannot be said that United States troops can be controlled either by the operators or the labor element and their integrity will be less questioned because their ranks have not been recruited for the particular service they will render in Colorado, so that animus against the labor element or against the companies cannot be said to affect the quality of the personnel. Unfortunately the militia of Colorado is said to be full of irresponsible gunmen, and the people of the United States are unable to determine if malice or right judgment is back of such attacks on its integrity.

In the United States troops, which are the arm of the whole country, the people of the United States have probably as much confidence as the people of Colorado have in their militia. They are willing to remain ignorant of the cause of the trouble so long as the men on whom they rely are in charge of the situation.

It is well, therefore, for Colorado to seek that help, not so much because its militia is inadequate, but because it cannot but fear the effect of the current aspersions on its honesty of purpose. Moreover, if peace is desired, as surely it is, nothing is more sure to effect it without bloodshed than the overmastering power of the United States army.

Let us hope that no state pride, no desire for anarchy, no mere love of states' rights, no fear of injury to private political interests, will prevent the Colorado people from asking, and Washington from granting, every needed assistance in settling this disturbance.

Congressional investigations are foolish waste of time, and create worse conditions rather than better. But the United States army will see to it that harmful conditions do not continue in the territory in its charge and will achieve that which no inquiry can ever do. It will guarantee the freedom of the law-abiding people in Colorado, to work or refrain from working and to come and go without restraint. In doing so, perhaps it may be necessary to do some things for which the militia of Colorado has been unsparingly condemned, but with good reason we permit the army to do what we are chary of conceding to the militia of any single state.

We are sorry to see that the President is only sending 360 men to quiet an uprising scattered over an area of several hundred square miles and is asking that the militia disband. We have no doubt that the companies detailed to the service are sufficient to do the fighting, but the force is wholly inadequate for the policing of so vast an area, especially if the operators are asked to give up the guns with which they are defending what is left of their properties.

Scientific Preparation of Coal

Hopelessly unscientific is the attitude of many operators to washer problems. They have never yet determined what is the percentage of ash, it will pay them best to leave in the coal. They decide that to meet the demand of the market some removal of impurities is necessary; they are aware that they cannot by any method attain to an ashless product, but they do not seriously apply themselves to the questions: How much ash may I leave in my coal? What proportion of the whole product of my mine will I then be able to sell? and What percentage of ash will enable me to secure the largest profit?

When coal is purchased by a standard specification

throughout a large part of the operator's selling field, it is possible to know just what degree of coal waste the purchaser is willing to pay for. In other fields where better coals are on the market the operator can determine for himself just what purity his coal must have, to meet competition. Better coal than that, it is not well for him to supply except at a higher price.

It seems a crime to the general public for an operator to figure just how much dirt he will sell as coal, but as the dirt is so integrally a part of his product, he would have to throw all his coal away if the public wanted an absolutely pure fuel. The purchaser who buys washed coal has in a sense to decide how much of the coal he is willing to pay the operator to discard.

It will be well for operators to read G. R. Delamater's article in this issue. Perhaps the method of determining the efficiency of washers, he there propounds, may not meet with general approval. We believe that perhaps efficiency in extracting ash should be stated separately from the efficiency in saving coal. There is no advantage in combining such figures by any such crude arrangement as summing them and dividing them by two. In some places the saving of coal is more important than the efficient removal of the ash; in other cases ash is more to be feared than coal loss. Until we know the location we cannot weight efficiencies or decide with nonchalance that the arithmetical mean gives even a reasonable result.

But we think that Mr. Delamater's paper will set the reader thinking of the technical and business questions involved even if he get somewhat weary of the figures and doubtful of their determinative value. He will learn what 100 per cent. efficiency in coal washing is, even if he never finds just what proportion of that efficiency he is obtaining in practice. He can say at least, I am losing such a percentage of coal above what the float-and-sink test determines is necessary and my ash percentage is higher than it should be with the percentage of coal I am discarding. This ability to analyze conditions is a great advance over the old hit-or-miss methods of the past.

Absenteeism

A few years ago many of our mining corporations were directed from the nearest presentable village, usually the county seat. But that time has passed away. The center of control is now at some big city. Though the directors and the president are absentees, they naturally want to keep in touch with the mines, so they bring their general managers up to the cities also.

And they, in turn, desiring to keep posted on their work, bring the chief engineers and some other men. And if this does not happen, these men leave and return to the mines repeatedly with the rhythmic rebound of a ball, and thus lose time, expend energy and waste money in the ceaseless travel. Every man who moves cityward brings others with him or spends his time traveling in the opposite direction.

Meanwhile the mines are neglected; the human side of mining is overlooked; improvements, residences, churches, which should be built in the villages, go to the city. The uplifting effect of superior mental culture and the exhibit of refining comfort are removed to urban centers. The problem which is personified by Ireland develops uninterruptedly in the United States. The time given to the mines is short, unsympathetic and begrudged, and the consideration the mines receive is wholly financial. The whole question to the owner is whether the mines are profitable to him, or not.

The criticism of Rockefeller, Jr., in the recent Colorado investigation revealed the difficulties of absenteeism, but did not explain how it could be avoided. But much of it can and will be removed if people once realize how unfortunate a condition it creates.

The Coal Age

Very glibly the coal men refer to this as the Coal Age, the period in which human effort is replaced by the energy of fuel and the burden of humanity is laid on the broad back of stored solar energy.

But he who would feel assured that we are in the Coal Age will do well to stay away from a coal mine and travel to some place where coal is expensive. For we who are most vociferous about the reign of coal are most deplorably lacking in the use of its energy.

Almost every ton of coal produced in the United States is loaded into mine cars by hand and much of it is double shoveled. Hardly any of the coal is drilled by machinery preparatory to shooting. A large proportion of it is still hand mined, pushed by men to the heading and hauled by mules to the tipple or at least to a parting. Dumping is usually partly performed by the strong arms of the dumpers as dump feeders are but rarely installed.

All in all, we doubt whether the mine managers are aware that this is really a Coal Age in any real sense of the word. It is true there are difficulties confronting mine managers, for the material is not brought to the machine as in a shop but *vice versa* and the factory is continually being extended and is often so poorly roofed as to be unsafe without continual care and even then the roof is so treacherous as to prohibit the use of workshop methods. But there are many mines where the roof is good and conditions favorable for installations of real mechanical efficiency. Yet even there we do not have them and, on second thought, why should we?

Very rarely, we will even risk contradiction by saying never, do we find a mechanical engineer in charge of mines. They come, these managers, from almost all lines of human endeavor except the machine shop or the department of mechanical engineering of a college. We never think of putting a machinery man in charge of a coal corporation.

No wonder we find such a slight resemblance between a mine and a factory but see instead large and rambling workings, two men or even one man to a room, no routing of work, no concentration of effort and really no adequate attempt at control.

We wonder at the cheapness of coal, yet how grossly inefficient our methods are. As we go along the aisles of a machine shop, every one is working but at a mine the hoisting engineer on a slope sometimes waits half an hour for a hoist, the dumpers are taking a meal in the middle of the forenoon as there are no cars. The motormen are waiting on the gatherers, and these in turn on the miners. Everywhere we go, a crowd of waiting, not working, men confronts us. It is all so cheerful and easy. Let us sit down now and take a smoke or a bite! After all the only place to enjoy a listless life such as David Grayson sketches is not on the country road but in the mine.

Sociological Department

Coal Company Makes an Exhibit of Practical Housekeeping

SYNOPSIS—At Lambert, Penn., and Gary, W. Va., an attempt is being made to encourage a higher standard of living through training the women and children in the arts of housekeeping by a practical demonstration in a simple, but model house.

The coal mining subsidiaries of the United States Steel Corporation have started an experiment in training their employees in practical housekeeping. Among the companies which have engaged in this work are the H. C. Frick Coke Co. and the United States Coal & Coke Co.

Some time ago, Miss Ida Tarbell, the well known publicist, introduced C. L. Close, manager of the Bureau of Safety and Sanitation of the United States Steel Corporation, to the practical housekeeping center of Miss Mable Kittredge on the East Side of New York. There is nothing pretentious in this work, only three rooms modestly furnished and they are only small rooms such as the poorer people of that section of the city inhabit.

Not an Elaborate Experiment

But training in sanitation and housework should be done in such homes as the students are living in. At least, the excellence of such rooms should but little exceed that of those which have to be kept in order by the pupils. A little interest in better furniture and equipment may be advantageously stimulated, but on the whole, the main lesson is how to do with what the pupils already possess.

And this lesson taught by Miss Kittredge has been followed by the coal-mining subsidiaries of the United States Steel Corporation of which Thomas Lynch is president. At Gary, W. Va., and Lambert, Penn., two ordinary miner's houses were taken and fitted up. At Lambert, the H. C. Frick Co. has taken one side of an 8-roomed house and furnished the 4 rooms at an expense of $259.32, a cost of $64.83 per room. The United States Coal & Coke Co. expended, at Gary, $210.89 in furnishing a 3-roomed house at an expense of $70.29 per room.

District Nurses Placed in Charge

The district nurses actually live in these houses and they exhibit how a house can be orderly and yet serve as a home. All the furniture was bought at the store in the vicinity of the houses equipped. The nurses show their pupils how to clean house, to cook, to sew, to take care of garbage, to clean up the yard, to plant flowers, to trade at the store, to ventilate the rooms, to take care of the sick and the babies, and teach anything which tends toward good morals.

The experiment is new, but we can easily see how it will reduce drunkenness by increasing the comfort of the houses and by providing a rival to the saloon for the possession of the earnings of the workers. It will advance the real patriotism of the families. Some people regard Americanization as the mere accepting of a new nationality, where as Americanism is better regarded as a creed, a belief of the workingman in himself, his future, his duty, his mission and his self respect. These things the practical housekeeping experiment will foster.

The Foreign-Born Adopt Lower Scale of Living Here Than at Home

The hope animating this experiment is that the foreign-born population will adopt an American standard of living. Strange to say, it is seriously to be suspected that the alien does not live as well here as in his own country, for he looks upon the United States as a temporary abiding place, a country in which to make money to be spent at his native home.

Moreover, the spirit of the pioneer is in the wanderer and no family restraints compel him to maintain appearances. When he returns to his home in Southern Europe, you find for the first time, that he has an appreciation of good clothes and creature comforts, for he prepares to dazzle the companions of his youth by purchasing an entirely new and pretentious outfit.

We do not suppose that the United States Steel Corporation has in view its personal advantage primarily in this development. But surely, it will be no small gain to have its working men and their families healthy and happy. Work will be steadier, a better class of men will be secured, the tonnage will be increased, and the houses will be better kept.

The Work of the District Nurses

The nurses will continue their duties as general wards of the health of the towns. They will make their house-to-house visitations, instructing the mothers and children as they go. The need is indeed great. A doctor, not with the Steel Corporation, once stated that delirium tremens was not uncommon among the children of foreign miners. The men divide up their potations with the younger members of the family who are even less able than their elders to assimilate the alcohol.

It may be remarked that Miss Kittredge has written a little book on "Practical Homemaking," which is published by the N. Y. Century Co. It is a simple little book and contains no reference to what is often pretentiously called "Social Science." So much of what is published is suitable to college graduates and Chatauqua students. This book is a simple description of how to live, and there is more to learn about that than some people think.

We forget how much we have already assimilated and what a large amount the more ignorant of our immigrants need to learn. Many of our cleanly habits are now no longer "reasoned" but a result of a second nature. To some of our less fortunate employees, we must use much reasoning and demonstration, to make them appreciate what we are mentally incapable of doubting.

Practical Housekeeping Center at Lambert Mines, Penn.



A Double-House, Half of Which Is Used as a Model Home



The Rear Side of the Same House, Taken in the Winter



The Bedroom



The Sitting Room



Nurse Teaching Children to Cook



A Lesson in Plain Sewing



The School of Practical Housekeeping



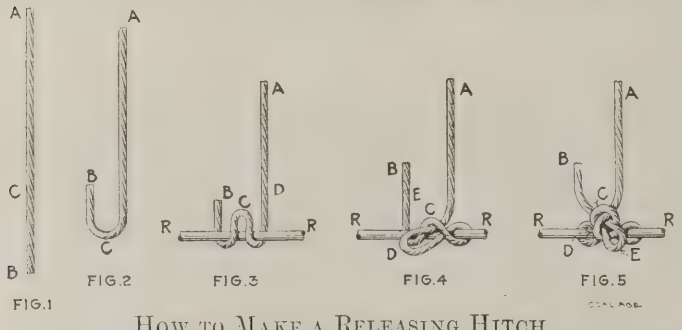
A View of the Parlor

Discussion By Readers

A Useful Hitch

Referring to the description of a useful hitch, given in Coal Age, Mar. 14, p. 435, I want to describe another hitch that will serve the same purpose but permit the load to be released with greater ease, provided it is a rod or bar that cannot be slipped out of a knot. I thought this would be of interest to readers who are sometimes required to make such a hitch.

Referring to the accompanying illustration, *AB* represents the rope to which it is desired to attach a load, say



How to Make a Releasing Hitch

at a point *C*, Fig. 1. First make a loop at *C*, as shown in Fig. 2, and wrap the double end around the load *RR*, as shown in Fig. 3. Now, doubling the rope at *D*, insert it through the loop *C* and tighten by pulling on the end of the rope at *B*, which will give the knot shown in Fig. 4.

Finally, again doubling the rope at a point *E*, pass this through the loops *C* and *D*, in a similar manner as before, and tighten the entire knot by taking a strain on the rope *A*. The finished knot will appear as shown in Fig. 5.

To unfasten the knot and release the load, it is simply necessary to pull the end *B* of the rope, when the entire knot will fall to pieces. This knot was shown to me by an old boatman on the upper reaches of the river Thames, England. He used this knot to tie the painters of his boats to the iron rings in the wharf.

J. B. de Hart.

Coleman, Alta., Canada.

Safety or Refuge Chambers in Mines

Letter No. 3—The article by Charlton Dixon, Coal Age, Mar. 21, p. 498, drawing attention to the need of providing refuge chambers in mines, is a most important and timely subject to discuss in Coal Age, especially at this time when "Safety First" is being so much preached, and practiced to such an extent by some of the largest coal corporations in the United States and Canada.

Personally, I believe that such refuge chambers should be provided in every coal mine that employs 50 or more men underground, and that this should be made compulsory by law, in every state or province in which coal mines are located. I advocated the installation of refuge chambers in coal mines, some time since, in an article entitled Safety First—the Slogan Cry, Coal Age, Vol. 3, p. 790. In that article, I advised that such a station should be provided for each district in the mine and connected to the surface by a compressed-air line carried through boreholes. I suggested telephone connection with the offices on the surface, and an equipment of first-aid cabinets, stretchers, medicine chests and supplies of concentrated food packed in damp-proof cases; also electric lamp installation, rescue apparatus, compressed-oxygen cylinders and pulmotors, for use if needed.

To observe how previous disasters testify to the need and value of such refuge stations in mines, we need only to take a glance backward at the history of coal mining in this and other countries. The Courrières mine explosion that occurred in France, Mar. 10, 1906, and which was the greatest disaster in mining history, claimed the lives of practically 1200 men. There is evidence that hundreds of these men lived for days after the explosion and some of them existed for two weeks on the bark of mine timber and the putrid flesh of horses.

At the Monongah disaster, Dec. 6, 1907, which claimed 361 lives, a refuge chamber in the mine would have been the means of saving a large number of those who were lost. In that disaster, some of the men were found with their heads in the ditch, striving to obtain a breath of fresh air traveling along the floor of the entry.

At the Primero explosion, Jan. 31, 1910, when 75 lives were sacrificed, at least eleven men must have lived for hours after the disaster, since one man found with these eleven was resuscitated after hard work and lived.

At the Fernie disaster, in British Columbia, May 23, 1902, when 127 men lost their lives, 58 of these lived for 48 hours, when they finally succumbed to the gas which leaked through the stoppings.

A refuge chamber would have saved 26 men, at the Bellevue mine explosion, in Alberta, Dec. 9, 1910, when 31 men were killed, including one of the rescue party. Had such a chamber been provided in this mine, the number killed would have been reduced to five. I found 21 men lying along the ditch, at a compressed-air charging station near chute No. 84, striving for fresh air. All of these would have been saved, had a refuge hole been available. In this disaster, eight men were rescued on the same entry, 10 hours later, at a point over 2000 ft. inby. All entrapped in the mine might have been saved, had they known that that portion of the mine was unaffected by the explosion and fled hither.

At the mine fire that occurred at Cherry, Ill., Nov. 13, 1909, where, according to the Illinois Coal Report, 267 lives were lost, written messages, several of them very pathetic, addressed to the dear ones on the surface, were found with the bodies of the victims. One of these messages showed that some of the men were conscious up to 48 hours after the fire started. The men had constructed several paddle fans, from parts of drilling ma-

chinery and pieces of boards. As stated in one message, these were made with the forlorn hope of stirring up the air, to enable them to reach the shaft. In this disaster, 21 men saved their lives by erecting a barricade or stopping in one of the entries, building it with powder cans, stones and mud. These men were rescued seven days after the fire occurred.

At Delagua, Colo., Nov. 8, 1910, there was a fire and an explosion in which 33 men were killed by the deadly gas or afterdamp and 46 by the violence of the explosion. It is probable that a large percentage of those killed by the afterdamp, could have been saved had a refuge chamber been provided in this mine. Four men were rescued seven or eight hours after the explosion occurred. These were found behind a brattice, which they had erected to keep back the afterdamp.

In the Price-Pancoast mine fire, at Throop, Penn., Apr. 7, 1911, when 73 lives were lost, it is possible that many could have been saved in a refuge chamber.

The above are only a few cases that can be produced to demonstrate the fact that many lives can be saved by providing refuge chambers to which men entrapped in the mine could retreat. I want to again urge that there should be such a provision made in every mining law.

J. W. Powell, Supt.,
Cottonwood Coal Co.

Windham, Mont.

The Air Factor in Mine Explosions

The article by John Verner, Coal Age, Apr. 11, p. 603, revives the subject to which he has often drawn attention; namely, the counter-current as a strong factor in propagating a mine explosion.

In this connection, I would like to ask Mr. Verner to explain, on his theory, the effects produced by two experiments made in England and one made in France. These are No. 25, of the Altofts series and No. 263, of the Eskmeals series, in England; and No. 287, of the Liévin series, in France.

In each of these cases, an extraordinary or abnormal force was developed; but, so far as the writer knows, no lucid explanation for the phenomena observed was offered by the committee in charge of the experiment. I have suggested that "detonation" was the only possible explanation of these phenomena. I would ask Mr. Verner where he can find any evidence of a "counter-current" in the cases I have named.

The fifth report of the Explosions in Mines Committee, p. 8, says:

> The method that we have employed in our large gallery has been to use one cannon only, and to place in front of its muzzle a tube about 3 ft. in diameter and 10 ft. long, with a layer of coal dust strewn evenly along it. On the cannon being discharged into this tube a dense cloud of ignited dust is driven forward, and this displaces and ignites coal dust placed on shelves around the gallery. No air current is used.
>
> That this means of ignition produces an inflammation capable of developing into an explosion of great violence, under suitable conditions, is evident from an experiment (No. 263), in which an explosion in the large gallery was communicated, through a funnel-shaped junction, to the 3-ft. gallery strewn with coal dust (½ lb. to each linear foot).
>
> In this case the violence of the explosion set up in the small gallery was such as to rip it open at four separate places, after the flame had traveled 200 ft. down the small gallery. This experiment shows that we have at command a method of ignition of coal dust by which explosion both of moderate and of a violent character can be developed in our experimental galleries.

In experiment No. 263, coal dust was laid for 200 ft. on the floor of the large gallery, and for 400 ft. along the small gallery and at the bend joining these two galleries. I wish to direct Mr. Verner's attention, particularly, to the difference between these two experiments, quoted from the British records; namely, that in one case there was no ventilating current, while, in the other case, the ventilating current was present; but explosion developed in both cases.

Many authorities claim that a dense cloud of coal dust is necessary to produce an explosion; but later experiments have shown that so little as 0.023 oz. per cu.ft. of air is quite sufficient to propagate an explosion. This quantity is so slight that it cannot be detected with the naked eye. It remains yet to be proved that inert dust will prevent the extension of an explosion, to the degree that its advocates claim. On the other hand, the fresh coal dust continually arising from cars in transit and floating in the mine air will, in most cases, amount to more than the amount stated above (0.023 oz. per cu.ft. of air) as necessary to produce explosion.

In closing, permit me to say that I do not recall a single case of mine explosion where the explosive combustion of suspended dust occurred under conditions restricting the power of the "reverse impulse" to induce a strong draft of dust-laden air moving in an opposite direction to that of the flame. In the cases I have mentioned, the speed of the explosive wave must have been far too great to allow of the operation of a reverse impulse such as Mr. Verner suggests.

James Ashworth, Mining Engineer.

Vancouver, B. C., Canada.

Gasoline Motors in Mines

In view of the fact that much has been written regarding the advantages of gasoline motors in respect to mine haulage, I think it would be well to discuss or draw attention to some disadvantages of this class of locomotives for use in coal mines. It seems strange that many writers in dealing with this subject seem to attach little importance to the discharge of the engine as vitiating the mine air. It has even been advocated that these motors be used on intake haulage roads. In my own experience, as mine inspector, I have only come into contact with one instance where gasoline motors were employed in the mine. I regard them as a nuisance, because of the pollution of the mine atmosphere by the exhaust gases of combustion. The trouble and danger are greatly aggravated by the use of a poor quality of gasoline, or by a defective engine, resulting in the incomplete combustion of the gasoline. In one instance, I recall, when the air was badly fouled in the entry, only three of the four cylinders of the engine were working, with the result that the gasoline from that cylinder was vaporized without being consumed and exhausted into the air. Complaints, in this mine, were numerous, although there was 2000 cu.ft. of air in circulation, per ton of weight of the motor, which is double the allowance stated in the Article, Coal Age, Vol. 4, p. 979.

Mine Inspector.

———, Ill.

Fan Ventilation

Referring to the discussion in regard to the installation of a 6-ft. disk fan to improve the circulation in a mine ventilated, at the present time by a 12-ft. centrifugal fan producing 80,000 cu.ft. of air per min. under a 3.5-in. water-gage, COAL AGE, Apr. 18, p. 658, permit me to ask:

Assuming the above circulation is insufficient and that it is suggested to install a 6-ft. disk fan on the other side of the mine from the present fan, both fans to work in parallel, while ventilating separate sections of the mine but using the same return air course for a distance of one mile; if the resistance of the return air course is, say 1.5 in. water gage and the 6-ft. disk will only produce 1.2-in. water gage, will these fans work successfully together? I have never seen a 6-ft. disk fan, in operation at a mine, produce over 1.2-in. water gage.

I have in mind an instance where an 8-ft. disk fan was installed to improve the circulation in a mine, under similar conditions to those suggested by Mr. Hopkins, except that, instead of one main-return airway, both fans discharged into an upcast shaft 80 ft. deep; but this plan did not work successfully.

CONSTANT READER.

Punxsutawney, Penn.

When two fans are operated in parallel, that is to say, both fans blowing or both exhausting, there is no reason why the installation should not be effective, to the extent of the capacity of each fan. As stated previously, COAL AGE, Mar. 28, p. 539, it is always necessary, in such case, to balance the respective circulations. It is also necessary not to expect or demand a greater service of either fan than that of which it is capable. For instance, Constant Reader here assumes that the resistance of the return airway used in common by both fans will equal a 1.5-in. water gage, and states that the 6-ft. disk fan to be installed will only produce a 1.2-in. water gage, which, if true, would not be a successful installation.

The statement on p. 539, relating to the capacity of a disk fan, should read 50,000 cu.ft. per min., against a water gage varying from 1 to 1.5 in. For the same power driving the ventilator and allowing for a decrease in efficiency when working under a higher gage, it might be assumed that the 6-ft. disk fan would circulate, say 20,000 cu.ft. of air against a water gage of 3 in., which would make due allowance for the resistance of the section of mine ventilated by this fan, in addition to the assumed resistance of the main-return airway. Whether or not this quantity of air would be sufficient for the ventilation of that section would depend wholly on the conditions in the mine in question.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Dividing by 10, 100, 1000, Etc.—To divide a whole number by 10, 100, 1000, etc., point off as many places from the right of the number as there are ciphers in the divisor. Thus,

$$52{,}687 \div 100 = 526.87.$$

To divide a decimal number by 10, 100, 1000, etc., move the decimal point as many places to the left as there are ciphers in the divisor, prefixing ciphers, if necessary, to complete the number. Thus,

$$145.675 \div 10 = 14.5675$$
$$3.463 \div 100 = 0.03463$$
$$0.025 \div 1000 = 0.000025$$

DECIMAL EQUIVALENTS OF FRACTIONS

Fraction	Decimal	Fraction	Decimal	Fraction	Decimal	Fraction	Decimal
1/64	0.015625	17/64	0.265625	33/64	0.515624	49/64	0.765625
1/32	0.03125	9/32	0.28125	17/32	0.53125	25/32	0.78125
3/64	0.046875	19/64	0.296875	35/64	0.546875	51/64	0.796875
1/16	0.0625	5/16	0.3125		0.5625	13/16	0.8125
5/64	0.078125	21/64	0.328125	37/64	0.578125	53/64	0.828125
3/32	0.09375	11/32	0.34375	19/32	0.59375	27/32	0.84375
7/64	0.109375	23/64	0.359375	39/64	0.609375	55/64	0.859375
1/8	0.125	3/8	0.375	5/8	0.625	7/8	0.875
9/64	0.140625	25/64	0.390625	41/64	0.640625	57/64	0.890625
5/32	0.15625	13/32	0.40625	21/32	0.65625	29/32	0.90625
11/64	0.171875	27/64	0.421875	43/64	0.671875	59/64	0.921875
3/16	0.1875	7/16	0.4375	11/16	0.6875	15/16	0.9375
13/64	0.203125	29/64	0.453125	45/64	0.703125	61/64	0.953125
7/32	0.21875	15/32	0.46875	23/32	0.71875	31/32	0.96875
15/64	0.234375	31/64	0.484375	47/64	0.734375	63/64	0.984375
1/4	0.25	1/2	0.5	3/4	0.75	1	1.

For the sake of illustration, the following example is given, showing two methods of operation.

Example—Reduce the fraction 1/64 to a decimal.

Solution—Annex decimal ciphers to the numerator and divide by the denominator, continuing the operation as far as desired, or until the division is complete. Thus,

```
64)1.000000(0.015625
   64
  ---
  360
  320
  ---
   400
   384
   ---
    160
    128
    ---
     320
     320
     ---
```

A shorter method is to divide by any simple factors of 64, by short division; thus,

```
8)1.000
  ---
8)0.125000
  ---
0.015625
```

The Coal Age Pocket Book

When the division is complete and there is no remainder the decimal expressed by the quotient is the exact equivalent of the original fraction; otherwise the value of the decimal is only approximate.

PERCENTAGE

The term "percentage" is derived from the Latin words "per centum," meaning, by the hundred. This is abbreviated in English and written "per cent."

The expression indicates a certain rate or proportion referred to 100, and any given percentage, therefore, expresses the number of parts in one hundred or the parts per hundred.

How Written—Percentage, expressing hundredths, is usually written numerically as a decimal; thus, 3 per cent. (3/100) is written 0.03; 15 per cent., 0.15; 40 per cent., 0.40; 2½ per cent., 0.025, etc.

Illustration—The return-air current, in a certain mine, contains, say 5 per cent. of gas. This means that in each 100 volumes of the current, there are 5 volumes of gas. The gas, therefore, forms 5/100 of the total volume of the current. If the current measures 100,000 cu.ft. per min. the quantity of gas is

$$0.05 \times 100{,}000 = 5000 \text{ cu.ft. per min.}$$

Again, a certain slope road in a mine, has a grade of 12.5 per cent., which means that the slope dips 12½ ft. in each 100 ft. of its length. If the length of the slope is 2000 ft. the total dip or fall is

$$0.125 \times 2000 = 250 \text{ ft.}$$

In other words, the elevation of the mouth of the slope is 250 ft. above that of the foot of the incline.

Example—What quantity of marsh gas is being generated in a mine when the return-air current measures 60,000 cu.ft. per min., and a careful test made in that airway shows 2.3 per cent. of gas is present in the current?

Solution—The quantity of gas carried in the return-air current is

$$0.023 \times 60{,}000 = 1380 \text{ cu.ft. per min.}$$

Example—How much air will be required to be circulated in the mine, in the last example, to reduce the percentage of gas in the return airway to 1.5 per cent.?

Solution—The volume of gas generated in the mine is 1380 cu.ft. per min. If this is 1.5 per cent. of the circulation, the latter must be

$$1380 \div 0.015 = 92{,}000 \text{ cu.ft. per min.}$$

Example—In the same mine mentioned in the two previous examples, what would be the percentage of gas in the return airway if the circulation was suddenly reduced from 60,000 to 40,000 cu.ft. per min.?

Solution—Assuming that the quantity of gas given off in the mine remains unchanged, the percentage of gas, after the circulation was reduced would be

$$\frac{1380 \times 100}{40{,}000} = 3.45 \text{ per cent.}$$

Inquiries of General Interest

Mine Resistance in Fan Ventilation

I would like to have the following questions answered in COAL AGE:

1. What effect has mine resistance on the water gage produced by a ventilating fan?

2. Is it not possible for a mine-ventilating fan to develop the same water gage when running at a high speed and discharging into the open atmosphere, that it would if made to discharge into the mine?

3. In my opinion, the speed of the fan and not the mine resistance, governs the water-gage reading. Is this correct?

4. Assuming that a ventilating fan, substantially built and 25 ft. in diameter, produces 250,000 cu.ft. of air per minute, against a 3-in. water gage, at a speed of 70 r.p.m.; is it not possible to double the capacity of this fan, so that it will produce 500,000 cu.ft. per min., by increasing the speed of the fan?

5. Will a fall of such size as to reduce the area of the main-return airway in a mine 75 per cent., be indicated by the water gage in the fan drift showing an increase of pressure?

P. H. DEVERS.

Nanticoke, Penn.

We will endeavor to answer these questions in the order in which they are asked:

1. For the same speed of the fan, any *increase* in the resistance offered by the mine airways to the passage of the ventilating current, is accompanied by a corresponding increase in the water-gage reading in the fan drift; and, likewise, any *decrease* in mine resistance is accompanied by a corresponding decrease in the water-gage reading.

2. There will be, practically, no water-gage reading when a fan discharges directly into the open atmosphere, whatever the speed of the fan, assuming, of course, that the fan is blowing. It should be remembered that whether the fan is blowing or exhausting, the water-gage reading is due to and caused by the resistance of the mine to the passage of the air current. This resistance is sometimes called the "drag" of the air. If this resistance is cut off, the water-gage reading drops at once to practically zero, whatever the speed of the fan. (Beard's Ventilation of Mines, Introduction and pp. 42 and 96.)

3. The speed of the fan governs the water-gage reading *only* by increasing the circulation in the mine and thereby increasing the mine resistance. But, the speed of the fan cannot be said to "govern the water gage," inasmuch as when there is no mine resistance there is no water gage produced, though the speed of the fan be kept constant or even increased.

Properly speaking, *the fan operated at a given speed creates what the mine resistance causes.* The operation of the fan gives velocity to the air, which develops a certain resistance in its passage through the mine, depending on the velocity of the current. This resistance, per unit of sectional area in the fan drift, is measured by the water-gage reading. It is for this reason that the same fan, running at the same speed, produces different water-gage readings, at different mines, according to the quantity of air such mine will pass under a given water gage. The product of the two factors, *quantity* and *pressure,* determines the *power on the air* and is the proper index of the capacity of the fan.

4. It is generally assumed that the volume of air in circulation, in fan ventilation, is proportional to the speed of the fan. By this rule, a fan producing 250,000 cu.ft per min., at 70 r.p.m., would produce 500,000 cu. ft. per min., at a speed of 140 r.p.m., assuming the conditions in the mine remain unchanged. As a matter of fact, however, the *efficiency* of the fan decreases as the speed increases, but not in the same proportion.

Practically, the fourth power of the speed of the fan varies as the fifth power of the quantity of air in circulation, for the same mine or airway. In other words, the fourth power of the speed ratio is equal to the fifth power of the quantity ratio. By this rule, the above fan would produce at 140 r.p.m. about 435,000 cu.ft. per min., in the same mine or airway. To produce 500,000 cu.ft. per min. or double the previous circulation, would require, by the same rule, a speed of 166.5 r.p.m., owing to the decrease in the efficiency of the fan at the higher speed.

5. Assuming the fan is exhausting, a fall in the main-return airway of such size as to reduce its area 75 per cent. or, say from 60 to 15 sq.ft., would certainly add to the resistance of the mine. As a result, for the same power applied to the fan shaft, the fan would run a trifle faster, which, however, would hardly be appreciable; but a smaller circulation of air would be produced under an increased water gage.

In case the fan was blowing and the same fall occurred in the main-return airway, the circulation would be partially blocked, as before; but, in this case, the mine intervenes between the fan and the obstruction; and, as a result, the increase in water gage might be less than in the previous case, owing to greater leakage of air under the increased pressure.

Height of Barometer in Millimeters

Kindly state what is the normal height of the barometer, at sea level, in the metric system.

X.

Shenandoah, Penn.

The universally adopted standard reading, for the normal height of the mercurial barometer at sea level, in the metric or French system, is 760 mm. This is equivalent to a height of $760 \times 0.03937 = 29.92 +$ in., in the English system.

In accurate calculations, all barometer readings are reduced to "standard readings," which assume a temperature of 0° C., or 32° F. of the mercury column.

Examination Questions

Mine Manager's Examination Held at Springfield, Ill., April 20, 1914

Ques.—Commencing at the southwest corner of a piece of land and running a line 1720 ft. north, thence east, 2650 ft.; what will be the length of the remaining side of this piece and how many acres will it contain?

Ans.—This piece of land lies in the form of a right triangle, the third or remaining side being the hypotenuse, and its length is

$$\sqrt{2650^2 + 1720^2} = 3159.25 \; ft.$$

Since there are 43,560 sq.ft. in an acre, the number of acres in this piece is

$$\tfrac{1}{2} \; (2650 \times 1720) \div 43{,}560 = 52.32 \; acres.$$

Ques.—How many tons of coal are there in the above piece of land, the coal seam being 6 ft. thick and the specific gravity of the coal 1.26, allowing 27 cu.ft. per ton of coal in place, and 35 per cent. for waste in mining?

Ans.—The cubic contents of this seam underlying the tract of land described in the previous question, when the thickness of the coal is 6 ft., is

$$\tfrac{1}{2} \; (2650 \times 1720) \times 6 = 13{,}674{,}000 \; cu.ft.$$

Allowing 27 cu.ft. per ton of coal in place and 35 per cent. for waste, making 65 per cent. of the coal mined as lump coal, the weight of coal mined on this basis is

$$0.65 \; (13{,}674{,}000 \div 27) = 329{,}188+ \; tons.$$

The specific gravity of the coal does not, in this case, enter the calculation, since the weight of the coal is given as a ton per cubic yard.

Ques.—The total rubbing surface of a square airway being 160,000 sq.ft., the length of airway, 5000 ft.; if the quantity of air passing is 80,000 cu.ft. per min., what is the velocity of the air current, in feet per minute?

Ans.—The perimeter of this airway is found by dividing the total rubbing surface by the length of the airway; thus, $160{,}000 \div 5000 = 32$ ft. The airway being square, the length of one side is $32 \div 4 = 8$ ft.; and the sectional area of the airway is $8 \times 8 = 64$ sq.ft. The quantity of air in circulation being 80,000 cu.ft. per min., the velocity of the air current is $80{,}000 \div 64 = 1250$ ft. per min.

Ques.—How many cubic yards are there in a rectangular shaft 360 ft. deep, 12 ft. long and 6.5 ft. wide? What will be the cost of excavating this shaft at $1.93 per cubic yard?

Ans.—The sectional area of the shaft is $12 \times 6.5 = 78$ sq.ft. The cubic contents is then $78 \times 360 \div 27 = 1040$ cu.yd.

The cost of excavating this shaft at $1.93 per cu.yd. is $1040 \times 1.93 = \$2007.20$.

Ques.—What horsepower will be expended in circulating 20,000 cu.ft. of air against a mine pressure of 1.75 lb. per sq.ft.? If the quantity of air is increased to 30,000 cu.ft. per min., what will be the horsepower?

Ans.—The horsepower of the first circulation is found thus,

$$H = \frac{Qp}{33{,}000} = \frac{20{,}000 \times 1.75}{33{,}000} = 1.06 \; hp.$$

To increase this circulation in the same mine will require an increase of power in proportion to the cube of the quantity. In other words, the power ratio is equal to the cube of the quantity ratio. The required horsepower, in this case, is

$$H = 1.06\left(\frac{30{,}000}{20{,}000}\right)^3 = 1.06\left(\frac{3}{2}\right)^3 = \frac{1.06 \times 27}{8} = 3.57 \; hp.$$

To circulate the larger quantity of air (30,000 cu.ft. per min.) against the same water gage (1.75 lb. per sq.ft.) will require the power to be increased in the same ratio as the quantity, or half again as much power; thus, $1.06 \times \frac{3}{2} = 1.59$ hp.

Ques.—In what time can an engine of 40 effective hp. pump 4000 cu.ft. of water from a depth of 430 ft.?

Ans.—Since 1 hp. is equal to 33,000 ft.-lb. per min.; and, the weight of 1 cu.ft. of water being 62.5 lb., the time required, in this case, is

$$\frac{4000 \times 62.5 \times 430}{40 \times 33{,}000} = 81.4 \; min.$$

Ques.—What is the breaking strain and safe working load of a good steel hoisting rope 1⅜ in. in diameter?

Ans.—The breaking strain of a crucible-steel, 6-strand, 19-wire, hoisting rope is 39 tons; and, since the strength of rope increases with the square of the diameter, the breaking strain of a 1⅜-in. rope of the same kind is

$$Breaking \; strain = 39 \times 1.375^2 = 73.73 \; tons.$$

Assuming a factor of safety of 5, which is common practice in moderately deep shafts, the safe working load for this rope is $73.73 \div 5 = 14.75$ tons

Ques.—A sample of firedamp taken from the mine is found to have a specific gravity of 0.9; what are the proportions of the mixture?

Ans.—Assuming that this mixture contains only pure mash gas (CH_4) and air, and indicating the percentage of gas in the mixture by x, the specific gravity of the gas referred to air being 0.559, the relative weights of gas and air, in 100 parts of the mixture, are as follows:

$$\text{Gas} = 0.559 \, x$$
$$\text{Air} = 1 \; (100 - x)$$

The total relative weight of 100 parts of this mixture is, therefore, $100 - x + 0.559 \, x = 100 - 0.441 \, x$. The relative weight of the same volume (100 parts) of air is $100 \times 1 = 100$. Since the specific gravity of the mixture is equal to the ratio of the relative weights of equal volumes of the mixture and air, we have

$$\frac{100 - 0.441 \, x}{100} = 0.9$$

and

$$x = \frac{100 - 90}{0.441} = 22.67 \; per \; cent.$$

The proportion of gas in this mixture is, therefore, 22.67 parts in 100 parts of the mixture; or there are 22.67 parts of gas to 77.33 parts of air, or one part of gas to 3.41 parts of air.

Coal and Coke News

Washington

In the advanced rate case before the Interstate Commerce Commission during the hearing on Monday, Apr. 27, exhibits were filed on behalf of the Pittsburgh Coal Co. dealing with the financial condition of railroads in the eastern territory over a period of 16 years. It is claimed that the gross returns of the transportation companies in 1913 were the largest in their history. The charge was made that the increase of these revenues last year over 1912 for all roads exceeded $131,000,000, or more than 10 per cent. The Pennsylvania Lines show an increase of nearly $40,000,000, or 11 per cent.; the New York Central Lines more than $32,000,000, or nearly 12 per cent.; and the Baltimore & Ohio Lines more than $9,000,000, or about 10 per cent.

The exhibits seek to argue that, contrary to the belief of the public, it has not been the increase in wages to employees, but the large increase in expenditures for maintenance of equipment and way and structures that is primarily responsible for the railroads' claim of reduced net earnings. One of the exhibits shows that the principal expense item consisting largely of wages bears a less proportion to the total operating expenses in 1913 than for any single year since 1898; that maintenance of equipment bears a larger proportion to total operating expenses than for any single one of the 16 years preceding, and maintenance of way and structures a larger proportion in 1913 than for any year since 1907. The exhibits show that the two principal items of maintenance expenses have increased enormously over any preceding year and that if these expenditures had not been so unusually large in 1913, the railroads would have been able to show for that year larger net earnings than for any previous year.

On the question of increased wages which the railroads have emphasized in their campaign for an increase in rates, the exhibits show for all the Pennsylvania Lines that in 1913 less than 50c. out of every dollar of operating expenses went for transportation-traffic expenses, the latter item consisting most largely of wages to employees. This 50c. was the lowest of any single year since 1898. For the New York Central Lines nearly 54c. out of every dollar spent in 1913 went to the transportation and traffic item, this amount being the lowest since 1906; and for the Baltimore & Ohio Lines this item in 1913 showed also 54c. out of every dollar of operating expenses, being the lowest since 1908 with the exception of 1910.

In contrast with this wage item of operating expenses, the exhibits show the encroachment of maintenance of equipment and of way and structures upon the total operating expenses of these large systems. In 1913, for every dollar spent for operating expenses by the Pennsylvania Lines, 44c. went to these two maintenance items, exceeding any other single year since 1900; for the New York Central Lines the same general statement is true since 1906, maintenance in 1913 absorbing 43c. out of every dollar. For the Baltimore & Ohio Lines, in 1913, the two maintenance items also required 43c. out of every dollar, being exceeded in only four of the preceding 16 years.

One conclusion that seems inevitable from an examination of these statistics and diagrams is that the question before the Commission, instead of being one of insufficient revenues, or one of increase in rates, is really a question of its approving of these unusual maintenance expenditures by the roads. If these largely increased maintenance expenditures are approved by the Commission and are justified as normal it would seem that an increase in rates might naturally follow; that if this approval is not forthcoming, then it would seem that the increased gross earnings of the railroads in the Eastern territory are more than sufficient for the normal needs of the carriers provided their maintenance expenditures are kept within bounds. The question of these unusual expenses for equipment and way and structures promises to become overshadowing.

HARRISBURG, PENN.

The belief now exists here that the Interstate Commerce Commission will not order a rehearing for the industrial railroad lines which were denied joint rates with other railroads under a recent order. The Commission issued an order in January that the industrial railroads were not entitled to the proportion of the through rate they had been getting, and ruled that such a division amounted to a rebate.

There has been no positive assurance as to what the commission will do, but it is generally understood that the attitude is taken that the industrial railroads have had ample opportunity to present their side of the case without a rehearing. The consensus of opinion is that the order of the Commission will stand.

Shippers depending upon the industrial railroads, other than those controlling the short lines, are complaining that the new arrangement has resulted in serious discrimination against them. With their through rates cancelled, it will be necessary for the industrial lines to increase their tariffs, thus making the through rate much higher than heretofore.

The Consolidated Coal & Coke Co., which has its mines located along the Union R.R., has already filed a complaint with the Commission, declaring that the new tariffs of that line are such that it is impossible for the coal company to compete with the other coal operators of the Pittsburgh district. Because of the new rates the mine has been closed and the miners thrown out of employment.

The Consolidated Co.'s mine is located in Allegheny County and it is expected that other coal operators along the Union, the Monongahela Connecting and other industrial railroads will file a similar protest.

The industrial lines protested vigorously against being denied a share of the through tariffs with the trunk lines, but the commission has so far refused to modify its order.

The other initial lines are fearing under the operation of the Interstate Commerce Commission's order inhibiting monetary allowances in the guise of through rate divisions to certain terminal railroads, notably the Union, Monongahela Connecting and the St. Clair in the Pittsburgh district, the Wabash-Pittsburgh Terminal is suffering acutely, not having received any freight from any of the three industrial lines mentioned since the first instant, when the commission's order became effective. Practically, the only access to the tonnage producing concerns of this district for the Wabash-Pittsburgh Terminal is by way of the rails of one or the other of the terminal lines in question.

PENNSYLVANIA

Anthracite

Shamokin—Five hundred men and boys at the Hickory Swamp Colliery operated by the Susquehanna Coal Co., recently went on strike because some non-union men reported for duty.

Pottsville—Four men were killed at the Pine Hill Colliery recently, when the cage in which they were ascending upset and they were dashed to the bottom of the shaft 400 ft. below. The men were all foreigners. It is believed that the cage struck some obstruction.

Mahanoy City—Masked robbers invaded the workings of the Mahanoy City colliery on the night of Apr. 25, and at the point of pistols robbed a driver boy of his two weeks' pay amounting to $24. The robbers planned to rob the men on the night shift who received their pay on the above date, but the plan miscarried.

Girardville—McTurk Colliery suspended operations on Apr. 25, to remain idle for three months while a new slope is being sunk and old workings are being reopened, throwing 300 employees out of work.

Hazleton—Six hundred union miners recently struck and tied up the Hazle Colielry because 12 men did not pay their back dues for reinstatement into the United Mine Workers. The Lehigh Valley Coal Co., on Apr. 23, closed the operation indefinitely. A "button strike" is also threatened at Beaver Brook.

Harrisburg—Steps are to be taken early in May by the Auditor General's Department to prepare the way for collection of the state tax on anthracite coal in case the constitutionally of the statute of 1913 should be upheld. Practically all of the hard-coal operators in the state have filed reports of their output for 1913 and these will be used as a basis for calculation of the tax, the coal consumed in operation of mines and from washeries being excepted. The de-

partment is estimating the taxes on corporations which failed to file their reports for 1913.

Shenandoah—Fire on Apr. 25 destroyed the Indian Ridge colliery boiler house containing 10 boilers, and for a time threatened an oil house and a powder magazine close by, containing 500 kegs of powder and a large quantity of dynamite.

Bituminous

Pittsburgh—Six suits were entered in the United States District Court, Apr. 24, against the Monogahela River Consolidated Coal & Coke Co., by women whose husbands were killed in an explosion in the Cincinnati mine of the above company on Apr. 23, 1913. In each case damages are asked to the amount of $10,000.

Canonsburgh—The Hazel mine of the Pittsburgh-Buffalo Co. recently resumed operations after being idle since Apr. 1. The miners at first demanded being paid on the run-of-mine basis, but later voted to return to work even though this proposition was refused.

Du Bois—No result followed the joint conference of operators and miners of District No. 2 in Clearfield, on Apr. 25. The miners have, however, decided to submit the question of signing the 1912 scale to a referendum vote of the district. If the scale is accepted work will be resumed at once.

Summerville—It was recently announced that Mines Nos. 5 and 6 of the Pennsylvania Coal Corporation would reduce operations to three days per week until further notice. It is expected that this arrangement will cause a number of men to seek employment in other fields.

MARYLAND

Frostburg—While leaving the Ocean No. 1 mine of the Consolidation Coal Co. on the evening of Apr. 21, four miners were killed by a fall of slate. It is reported that a driver heard the roof breaking and called to the men to get out of the entry. This they were, however, unable to do.

WEST VIRGINIA

Bluefield—The annual meeting of the West Virginia Medical Society will be held in this city May 13-15 inclusive, and will be made the occasion of an exceptional program calculated to attract the population of the Pocahontas coal field and surrounding sections. Contests in first-aid work will be a special feature of the program, and many valuable prizes have already been donated.

Charleston—Because Superintendent Sandberg, of the Dorothy mine of the Four States Coal Co., refused to participate in the joint meeting of the miners and operators recently held in this city, 500 miners laid down their tools.

A deadlock resulting from the attempt to agree upon a wage scale for the coming year, the joint scale committee of miners and operators for District 17 adjourned on Apr. 24. All efforts are being made, however, to reach an amicable settlement shortly without a suspension of work.

TENNESSEE

Whiteside—The New Etna Coal Co. is making plans for improving its transportation facilities so as to shorten its six mile haul from the mines. The company has located Etna blacksmith coal in a tract of 400 acres and is prospecting extensively, at the same time making continued improvements in equipment and operation.

KENTUCKY

Hawesville—Test holes are being drilled by S. H. Allen and D. G. Duncan, who have leased the farm of J. B. Adams and adjoining properties, which are known to lie over veins of good coal. As soon as the operators agree on the best location for the sinking of a shaft work of developing the mine will be pushed forward. It is the plan of Mr. Allen and Mr. Duncan to have operations under way by early fall.

Louisville—Local coal operators and agents are participating in bidding advertised for by the Mississippi River Commission and the United States Engineer's office in St. Louis, the total requirements making some 50,000 tons, for river shipment.

Bridgeport—The power house of the Barton Coal Co. at this place was destroyed a few nights ago by a fire of mysterious origin. The damage was considerable.

OHIO

New Straitsville—Taylor, Williams & Jenkins closed a lease with Henry Watkins and Albert Groff whereby the latter secure a large tract of coal lands in the Whippoorwill Valley. It is the intention to develop the property during the summer.

Columbus—The conference of operators and miners which was in session in Columbus for four days adjourned sine die Friday, Apr. 24, without arranging a wage agreement. In fact the indications for an immediate settlement of the wage scale apparently were rather remote at the time of the adjournment of the conference.

The proposition of the miners, calling for a scale of 49.64c. per ton for machine-mined coal on the mine-run basis was rejected by the operators on the ground that it was entirely too high and they could not afford to pay that scale.

Just before adjourning a resolution was adopted giving the operators and miners in the various subdistricts of the state power to agree upon a scale for the subdistrict if possible. It was stated by several eastern Ohio operators that a settlement of the wage scale in certain subdistricts of that part of the state might be effected on the Pittsburgh basis of 64.64c. for pick mining and 44.76c. for machine mining, mine-run basis.

INDIANA

Indianapolis—According to reports made at the International headquarters, Apr. 25, the action of the Policy Committee of the United Mine Workers of America was upheld in the recent referendum. This means that the bituminous coal miners of the country will continue at work wherever possible pending the negotiations of the new wage contract.

Lafayette—The Public Service Commission of Indiana has lowered the freight rate from the Linton and Brazil coal fields to this city from 70c. to 65c. a ton. It issued an order about a year ago to this effect but the railroads petitioned for a rehearing and they were given a chance to arrange the controversy. They failed and the new tariff goes into effect May 10.

Sullivan—Among suits recently filed here against coal companies is one for $10,000 damages against the Vandalia Coal Co. by Hugh Houston because of injuries received from falling slate in the Superior mine and another against the same company for $5000 by John Dono for loss of a thumb while spragging a loaded car in the same mine. Robert Dixon sues the Gregory Coal & Mining Co. for $10,000 because of injuries received in a gas explosion in the old Shelburn mine.

Petersburg—The Hartwell mine property in Pike County near here has been sold by the receiver to D. J. Mackay & Co., Evansville, Ind., for $198,750. There are three shafts, four miles of railroad and 2438 acres of coal land on which is the town of Hartwell, with 300 inhabitants. The mines are electrically equipped. The new owners will spend $10,000 in getting them ready for operation and employment will be given to 300 miners

ILLINOIS

Johnston City—An extension is being built to the main line of the Illinois Central, south of here, connecting with the mine of the Johnston City Coal Co This will give this mine the Chicago & Eastern Illinois, Missouri Pacific, and Illinois Central R.R. for its outlet.

Springfield—Governor Dunne has appointed as members of the State Mining Investigating Committee: Wm. Hall, Springfield, vice W. E. Walker, Pawnee; R. J. Wilson, Marissa, vice Robert E. Locke, Johnston City, and John Tuttle, Harrisburg, vice Thos. R. Davis, Kewanee.

Royalton—The Franklin Coal & Coke Co. has plans for the erection by July 1 of a rescreening plant at its No. 1 mine.

Chicago—The creditors of the Standard Washed Coal Co. recently filed an involuntary petition in bankruptcy. The petitioners are the McComber-Whyte Co., the Hoplin-Benedict Co., and Logan A. Coleman.

ARKANSAS

Fort Smith—Competitive contests between teams from the various coal-mining camps in District No. 21, embracing Arkansas, Oklahoma and Texas, for proficiency in mine rescue, first aid and other phases of the Safety First movement, will be held during the early part of May, the date being not yet decided upon.

Clarksville—It is reported that the works of the Scranton Anthracite Coal Co., at Montana, will in the future, be operated with non-union labor. It is expected that the mine will be opened about June 1. This is one of the largest operations in this section of the state and employs several hundred men.

OKLAHOMA

Lehigh—During the month of March the mines of the Folsom-Morris Coal Mining Co. produced 53,000 tons of coal. This is the largest amount ever produced in these mines in one month. It is anticipated, however, that within a year these mines will be turning out coal at the rate of a million tons per annum.

PERSONALS

Job Freeman, one of the largest and best known operators in the Indiana bituminous field, has been nominated for treasurer of the state by the Republicans.

John I. Absalom, ex-state mine inspector of Montgomery, W. Va., has been made general superintendent of the Coalbell Coal Co., at Scotford, W. Va. He is a well known and popular mining man.

W. O. Garvin was made president of the Trenton (Mo.) Coal & Mining Co. at the annual election recently. Other officers are H. F. Hoffman, vice-president; G. M. Wolz, secretary, and W. E. Austin, treasurer.

C. H. Nesbitt, of Birmingham, Ala., and K. F. Webb, of Walker County, have just been reappointed chief mine inspector and associate mine inspector, respectively, by Governor O'Neal for a term of three years.

Harry Brown has been appointed mine foreman at the Hazel Mine of the Pittsburgh-Buffalo Co., at Canonsburg, Penn. He was formerly assistant mine foreman at the Francis mine at Burgettstown under the same company.

M. H. Boyer, division sales manager of the McAlester (Okla.) Fuel Co., with offices at Kansas City, has resigned after ten years' service with the company. He has been succeeded by C. H. Hightower, former general sales manager of the company.

John C. C. Mayo, the Kentucky millionaire coal operator who has been seriously ill at the Jewish Hospital in Cincinnati for some weeks, was removed to New York for special treatment recently, the private car of Senator Watson, of West Virginia, specially fitted up for the journey, being used.

C. D. Caldwell, of Cincinnati, Ohio, who recently received a promotion to the position of general manager of the Pittsburg & Buffalo Co., was presented a few days ago with a handsome silver-mounted cane by his associate members of the Coal Table of the Business Men's Club, in honor of his rise.

W. S. Newcomb, secretary of the Southwestern Intertsate Coal Operators' Association, underwent an operation at St. Marys Hospital, Kansas City, on Apr. 25 for hernia. Mr. Newcomb withstood the shock well and was reported resting easily. He has an excellent chance of recovery, though it will be at least six weeks before he is able to resume work.

Edward C. Mahan, of Knoxville, Tenn., vice-president and general manager of the Southern Coal & Coke Co., and president of the Southern Appalachian Coal Operators' Association, is quite ill with typhoid fever. The annual meeting of the association, to have been held Apr. 24, was postponed indefinitely on that account.

CONSTRUCTION NEWS

Clearing, Ill.—The Chicago & Western Indiana R.R. plans to build large coal docks at Clearing. The yards when completed are expected to be the best equipped in the country.

Jellico, Tenn.—Operations are expected to begin this summer on the erection of the new government building here, which, among other uses, is to house the mine-rescue work offices for east Tennessee.

Greensburg, Penn.—The Delmont Gas Coal Co. will shortly begin the development of a tract of land which it controls near here. E. M. Gross is president and James H. Gallagher is secretary and treasurer.

Penny, Ky.—In connection with the opening of new coal-mining operations in Pike County, Ky., John Smith and others have contracted for the building of some 600 houses for the use of miners and their families.

Hazard, Ky.—R. F. Peters and others who recently leased 800 acres of coal land near Mason, in Perry County, expect to begin construction of spur tracks, tipples, etc., immediately, with the hope of beginning operation by the middle of the summer.

McAlester, Okla.—The Rock Island Coal Co. has begun work on two new shafts near McAlester, Okla., and will spend about $1,000,000 during the summer. Steel tipples, the latest screening devices and electrical appliances will be features of the new mines.

Hartley, Ky.—It is expected that the Long Fork Coal Co. will begin a big coal development on Long Fork by June 1. It is the purpose of this firm to spend several million dollars in the work, and the building of a five-mile branch of the Baltimore & Ohio will be necessary.

Viper, Ky.—The Mason's Creek Coal Co. expects to start at once a good-sized coal plant to be reached by a short-line spur from the Lexington & Eastern R.R. The initial work will be started about May 1 and the company proposes having a daily capacity of from 15,000 to 20,000 tons.

Chattanooga, Tenn.—A coking plant to be located at the foot of Walden's Ridge is to be built by a syndicate represented by C. E. James, who is just back from New York, where he is understood to have made arrangements for financing the enterprise. Plans, it is declared ,are being prepared for the plant.

Martins Ferry, Ohio—The Rail & River Co. has been making improvements for the last year, and is now taking advantage of the shutdown in order to hurry these forward. Work has been started on a tipple at the No. 3 mine and steel for this structure has already begun to arrive. An extra force of men has been put on and still others will be set to work in the near future.

Sturgis, Ky.—The West Kentucky Coal Co. is building a large tipple, coal chute and watering station opposite, Granger, west of here, for the accommodation of the Illinois Central trains. The cost of the improvements will be about $15,000. In this connection the West Kentucky Coal Co. has just let contracts for improvements and additions to its office building here involving an expenditure of about $13,000.

Johnstown, Penn.—Contractors Sheesley & Janney, of Johnstown and Baltimore, have started work upon the opening of a big coal operation in East Wheatfield Township, Indian County, for the Conemaugh Smokeless Coal Co. The contract involves the sinking of a 200-ft. shaft and the excavation of a slope 950 ft. in length. It is anticipated that work will be sufficiently advanced by Jan. 1 next to allow the shipping of coal.

Nesquehoning, Penn.—Work has been commenced on a big washery and the huge culm bank between this place and Hauto will be removed by the Lehigh Coal & Navigation Co. This culm bank will be passed through the washery, after which the coal will be run through the breaker and the marketable fuel removed. It will require some years to remove the culm bank, and this operation will somewhat change the topography of the country.

Dunlap, Tenn.—A crew of civil engineers recently began to survey a route for the proposed railway from this point to the coal lands of the Chattanooga Iron & Coal Corporation in Brush Creek Gulch. The construction of this railway has long been contemplated by the Chatanooga firm, the purpose being to augment the company's coal resources by opening the Brush Creek Gulch tract. Construction of this railway will afford employment to a large number of laborers, and may last for more than a year.

Jackson, Ky.—The Wolf Valley Coal Co., of Roosevelt, has awarded a contract to T. J. Turner, manager of the Jackson Plumbing and Machine Supply Co., for all work in his line in the building of a new mining town in Breathitt County, Ky. First of all a sewerage system is being laid out in the city, yet to be christened. The town will contain 40 miners' homes, a clubhouse, a manager's residence and the usual other buildings. An electric plant will furnish power and light and all the coal from the mines to be developed will be handled in a huge modern tipple.

NEW INCORPORATIONS

Terre Haute, Ind—W. L. Bogle & Co., coal operators, have increased their capital stock $40,000.

Peru, Ind.—The Island Creek Coal Co. has filed notice of dissolution with the secretary of state.

Dover, Del.—The International Mines Development Co. has been incorporated with a capital stock of $3,000,000. Joseph W. Curtin, of New York, is one of the principal incorporators.

Fargo, N. D.—The Dakota Lignite Mines Co., of Dickens, has been incorporated with a capital stock of $200,000. The incorporators are W. L. Richards, Hanson E. Smith and Henry Truelsen.

Hamilton, Ala.—The South Brilliant Coal Co. has been organized with a capital stock of $10,000 by A. A. Griffith, George H. Parker and O. S. Goodwyn. Machinery has already been purchased to develop the mine.

Savannah, Ga.—The South Atlantic Coal Co. anticipates raising its capital stock to $100,000. Provision is also made that no stockholder shall dispose of his holdings to an outsider without first offering it for sale to stockholders.

Fairmont, W. Va.—The Miners' Appliances Co. has been organized to manufacture machinery of various kinds. The capital stock is $5000 and the incorporators are George G. Brobet, C. T. Shinn, John J. Wright, J. J. Mulvehill and C. W. Mulle, all of Fairmont.

Huntington, W. Va.—The Ellington Co. has been organized to operate coal mines and kindred business in Illinois. The capital stock is $25,000 and the incorporators are Frank Ellington, G. D. Miller, S. J. Hyman, J. K. Oney and W. H. Cunningham, all of Huntington.

Pittsburgh, Penn.—The Pittsburgh-Henderson-Standard Coal Co. has been organized to operate in western Kentucky. The capital stock is $20,000 and the incorporators are Thomas J. Lattimer, E. McClintock, H. Williams, W. T. Tharp, Jr., and W. C. Smith, all of Pittsburgh.

INDUSTRIAL NEWS

Dixon, Ky.—The Ruckman Coal Co. has recently installed an extensive line of improved haulage equipment, which will result in increasing the output of the mines, near here.

Toronto, Ont.—According to a recent estimate made by John J. Stirling, chief mining inspector for Alberta, the average payroll per day of the Alberta coal-mining industry during 1913 was $28,708, or $8,612,490 for the year.

Middlesboro, Ky.—F. D. Hart, Jr., has purchased of Oaks & Sharp the coal mine they operated near here under the name of the Home Mining Co. He will operate it in connection with the Mingo Coal Yards, which he also purchased from J. D. Yarborough.

Uniontown, Penn.—Following the word that the Carnegie Steel Co. has blown out two stacks in the Pittsburgh district the H. C. Frick Coke Co. put 1200 coke ovens out of blast. The Southern Connellsville Coke Co. is also considering blowing out all of its ovens.

Pittsburgh, Penn.—As a result of the opening of navigation on the Great Lakes there is a somewhat heavier shipment of lake coal over the Cleveland, Lorain & Wheeling Division of the Baltimore & Ohio. Practically all of this fuel is from West Virginia mines.

Salt Lake City, Utah—The 108th meeting of the American Institute of Mining Engineers will be held in Salt Lake City, Utah, Aug. 10-14 inclusive. Twenty-five papers are already in the hands of the secretary, and have been accepted for this meeting, and an interesting program is assured.

Charleston, W. Va.—In the Kanawha County Circuit Court, H. J. Smarr, of Charleston, was recently appointed receiver for the Mecca Colliery Co. holding mines on Morris Creek. No statement of the company's finances was made public but the receiver was appointed upon the petition of creditors.

Rockwood, Penn.—Hitchman Bros., who optioned a 600-acre tract of coal land in Milford Township, have been successful in securing an extension of 60 days on all the leases covering the field. They expect within this time to have made a thorough test and be in a position to commence work should they decide to purchase.

Johnstown, Penn.—The coal under the Singer tract in Conemaugh Township, about two miles east of Johnstown, consisting of 260 acres, was sold recently to a syndicate of local people headed by James Suppes, Jr., for $90,000. This price per acre is believed to be the record for bituminous coal outside the Connellsville field.

Boston, Mass.—Fire, on Apr. 22, destroyed a large empty coal pocket on the Mystic River in East Summerville. This pocket was owned by the Boston & Maine R.R. and leased to Dixon & Eddy, Boston merchants, who do a commission business in coal. Only the direction of the wind prevented drawbridge No. 8 from catching fire. The loss is estimated at $25,000.

Pittsburgh, Penn.—The annual meeting of the Mine Inspectors Institute of the United States of America will convene in Pittsburgh, June 9-12 inclusive, with headquarters at the Seventh Avenue Hotel. All members of the institute and all state mine inspectors of this country and the provincial inspectors of Canada are urgently requested to attend the meeting.

Kingston, Ontario—At the present session of the Canadian Parliament the government was asked why contracts were given last year for American coal for the Intercolonial R.R., which is a government institution, rather than to Canadian firms. The answer was made that the American coal could be procured at a more reasonable figure and with a quicker delivery.

New Orleans, La.—The quartermaster's department in this city, recently received instructions from Washington to secure estimates on the amount of coal in port and the facilities for coaling a fleet of transport ships in case of war. It was found that there was 160,000 tons of Pittsburgh coal on hand in addition to approximately 100,000 tons of Alabama coal at the several yards.

Pocahontas, Alta.—The Jasper Park Colliers, Ltd., of Alberta, which has for some time had a mine in operation at Pocahontas, on the south side of the Athabasca River is making another opening on the north side of the river, close to the main line of the Canadian Northern Ry., and shipments are expected shortly. The coal measure is 8 ft. in thickness of a high-grade bituminous.

Washington, D. C.—The Senate Naval Committee recently ordered a favorable report on Senator Tillman's resolution for an investigation of freight rates on coal shipped to Southern ports for the use of the navy. This action followed charges that the Southern Railway directorate was being used by the so called coal trust in discriminating against South Atlantic states in coal freight rates.

Springfield, Ill.—Sarah E. Finley, recently filed suit as administratrix in the circuit court to recover $10,000 from the Spring Creek Coal Co. for the death on Jan. 29, of Hugh Finley, who was killed by falling down a shaft. It is alleged that the company was careless in allowing a fireboss to run the cage to the bottom as Finley prepared to push a car upon it, supposing that it was where he left it, at the top.

Pittsburgh, Penn.—A statement by the Pennsylvania R.R. of the coal and coke carried over the line east of Pittsburgh and Erie for the month of March, shows an increase in bituminous coal over the corresponding month of last year. The total is 4,740,313 short tons, being an increase of 690,066 tons. The total from Jan. 1 to Mar. 31 is 12,414,492, or an increase of 296,745 tons as compared with the same period of last year. Both coke and anthracite coal show a decrease.

Pittsburgh, Penn.—The Federal Government has inaugurated a "flying squadron" for use in the coal fields for the relief of miners in case of accident. The initial equipment which has been delivered to the Bureau of Mines is a 1½-ton automobile truck, equipped complete with pulmotors, oxygen helmets, medicine, first-aid supplies, etc. It is anticipated that similar vehicles are to be stationed at various points throughout the country as the needs of the service demand.

Charleston, W. Va.—A peremptory writ of mandamus was recently awarded by the Supreme Court against the White Oak Fuel Co., at Scarbro, Fayette County, compelling it to furnish electricity for lighting purposes to all citizens in the town. This decision of the court places all coal companies whose plants furnish electric light to individuals under the definition of public-service corporations compelling the payment of a public-service corporation tax and other legal requirements for such concerns.

Chicago, Ill.—The Williams Patent Crusher & Pulverizer Co. has recently prepared Crusher Book No. 5, which covers every phase of coal crushing, a copy of which may be obtained upon application. This firm reports that many of the orders which it has received during the past few months are repeat orders, and that most of the machines sold are in use in connection with byproduct and beehive ovens preparing the coal to the general specifications of 90 per cent. through a ⅛-in. circular opening. The company reports that present prospects for business are bright, that inquiries are good, and sales exceptionally so.

Edmonton, Alta.—The United Collieries of Canada, Ltd., which controls large quantities of lignite within transmission distance of the city of Edmonton has made a proposition to the city to construct a modern power plant at the mine, transmit power to the city, and sell it to the municipality in bulk to be distributed by the civic distribution plant. As a basis of negotiation the company proposes an agreement to supply all power required at present at a rate not exceeding $12 per horsepower-year of maximum demand, plus a charge of six-tenths of a cent per kilowatt-hour subject to reduction provided enough industries will employ day or off-peak power. This offer is under consideration by the city.

Coal Trade Reviews

General Review

Heavy movement of anthracite but spring opening lacks the customary snap. Bituminous completely flat in all sections. Curtailment in industrial activity, large stocks and indications of an early resumption of mining have brought business to a standstill. Outlook poor.

Although the anthracite trade is experiencing a certain spring activity, it is becoming more apparent all the time that there is an absence of the customary snap and urgency. As usual, all companies will carry some of the April orders over into May, particularly for stove coal, and this paucity of supplies is being accentuated by a recurrence of the incipient "button" strikes, which has threatened to materially restrict production. The trade is most active in the line business; the situation at tidewater is showing a tendency to drag and lake shipping is slow in getting under way. The large output of domestic coal is also threatening to develop a surplus of the steam grades.

The demand for prompt bituminous has disappeared almost entirely. Prices are weakening, and coal of all kinds continues to pile up. The movement is confined entirely to contracts, requisitions on which are heavily curtailed as a result of the large stocks accumulated in anticipation of labor difficulties, and also in part to the general industrial curtailment. Much demurrage coal is being forced on the market, indicating considerable speculation on the labor agreement, and the situation will be further aggravated by the general resumption of operations in the central Pennsylvania district.

Contracting in the Pittsburgh district continues slowly on the same basis as last year with but little shading, although substantial concessions are offered on prompt and short-term business. A good water stage is permitting full operation at the river mines, while stocks generally are being liquidated, but the lake trade promises to be slow, and more men are returning to work than it will be possible to use. Shipments in Ohio are now reduced to a minimum, but consumers still have plentiful supplies as a result of the restricted operations in general industrial lines, and there is no anxiety felt over the possibility of a shortage. There is some slight demand for steam grades. The lake trade is open, but entirely devoid of any activity.

Business at Hampton Road is confined principally to shipments on contract, and there is rather an accumulation in local yards, although this will probably be moved shortly. The battleships of the American Navy, as well as those of other countries, manouvering in Mexican waters have thrown an unexpected demand upon the Southern ports at New Orleans, Pensacola, and Mobile, depleting stocks and causing a rush of urgent orders.

The Middle Western consumers are still using up stocks accumulated in anticipation of labor trouble, and there is no evidence of any improvement. What few mines have attempted to work, have been forced to close down in most instances as a result of the light demand. Some operators are accepting contracts at last year's figures, which would seem to indicate that an advance in the wage scale is not anticipated.

EASTERN MARKET

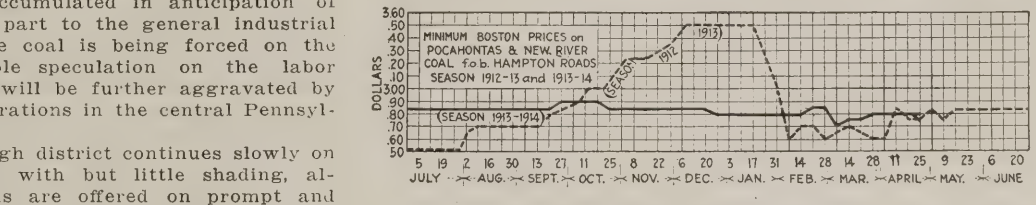
BOSTON

Emergency requisitions from Government have small effect. Heavy volume of Pocahontas and New River still at piers, and no relief to general dullness. Georges Creek and Pennsylvania situation unchanged. Stove coal getting into short supply.

Bituminous—The war flurry has had small effect on the market as a whole. A few spot cargoes here have been disposed of to put battleships in readiness for sailing but the demand from that quarter will soon be satisfied. The call for fuel at Hampton Roads is only slightly in excess of normal, the piers there furnishing the bulk of the fleet coal during normal times.

Meanwhile Pocahontas and New River fuels continue to pile up and the agencies have not relaxed any in their efforts to move it. The prospect is now for a long dull summer with a heavy market, the $2.85 price probably being reasonably well maintained for the reason that operators for the most part will not permit sales that net anything lower. Buyers have seen no reason to change their attitude and it is hard to see where any broad market can come from. That there should be so much hopeful talk over the Government's emergency requirements and on such small excuse is only another indication of how dull the coastwise market is.

Contracts are still being closed, but almost entirely on alongside or on car figures so that the base price is not disclosed. Judging from what is known of the minimum water rates, however, there is small reason for doubting that many of the contracts lately closed will net less than $2.85 f.o.b. Hampton Roads. The lowest bidder on a municipal order for about 10,000 tons was $3.47 alongside Boston for Pocahontas or New River for the season which allowing insurance of 2c. and $2.85 for the coal, would leave but 60c. for a season water freight for a relatively shoal place when current rates for the largest transportation are 65@70c. for spot loading.



The Pennsylvania coals show a better situation all-rail than at tidewater, although no stone is left unturned to place coal. The majority of the operations are still under suspension with no near prospect of work being resumed.

Anthracite—May is expected to be a lighter month than April for shipments of hard coal into this territory but the volume received will depend somewhat on the proportion of stove size available. The companies find it difficult to meet the demand for this size and we are almost certain to run into a scarcity of it next fall. Retail trade is sloping off with the approach of warm weather.

Bituminous prices at wholesale are about as follows:

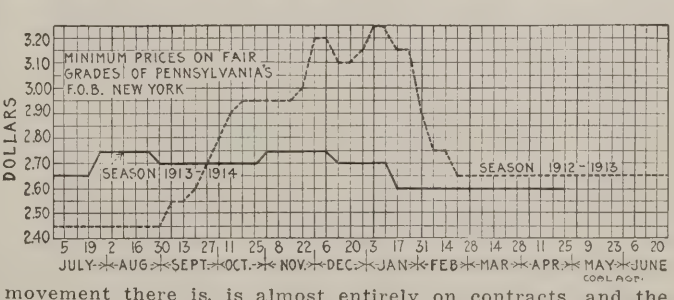
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.95@1.50	$1.20@1.65	$1.67@1.77	
Philadelphia*.....	2.50@3.05	2.75@3.20	3.22@3.32	
New York*.....	2.20@2.75	2.45@2.90	2.92@3.02	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	.....	$2.80@2.85
Boston†.....	.....	.....	.....	3.60@3.78
Providence†.....	.....	.....	.....	3.55@3.73

* F.o.b. †On cars.

NEW YORK

Prompt bituminous market at a complete standstill and considerable coal reported on demurrage. Movement entirely on contracts. Line business on domestic grades of anthracite about normal but slow at tidewater.

Bituminous—The New York soft-coal market has seldom ever been so completely flat as at present. What little



movement there is, is almost entirely on contracts, and the demand on these is heavily curtailed by reason of the stock accumulated in anticipation of a suspension in mining, and also as a result of the general curtailment in industrial activity. The prompt market is as completely dead as it is

possible to imagine. There is some demand in the line trade, but none whatever at tidewater, and the fact that large tonnages are being forced on the market to avoid demurrage indicates that there was considerable speculation on an adverse turn to the labor situation.

Western Maryland coal has been offered at down to $1.90@$2, f.o.b. It is probable that the situation will be further aggravated by the general resumption of mining in the Central Pennsylvania district, an agreement between the miners and operators having been reached, but subject to a referendum vote May 4. Operators hesitate to predict how much the mines will work, but it is doubtful if more than two or three days a week will be possible.

Unless there is a decided change in conditions, the outlook for the summer is highly unfavorable. The one encouraging feature in the situation is the determined efforts the agencies are making to obtain last year's prices, or better, on contracts, and also the excellent manner in which nominal quotations are being maintained on the better grades in the prompt market. Although substantial concessions are obtainable on odd tonnages of coal, particularly when on demurrage, the nominal circular continues as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—The large hard coalers report that they cannot supply current orders, and that much April business was carried over into May. In addition to this the situation is being further strained by a recurrence of "button strikes" which are delaying operations.

In the prepared grades, stove coal is generally the shortest in all departments, and chestnut the easiest, moderate concessions being offered by the individuals for prompt movement. The situation on egg coal is rather mixed, the free burning grades being notably short, while individuals are forced to make cuts in the regular circular in order to move prompt shipments of the off-qualities.

In the steam department the high grades of pea coal are moving off promptly, while the lower qualities are selling off as much as 20c. per ton. The lower grades of No. 1 buckwheat are offered down to $2.35, with premiums of 10c. prevailing on the better qualities. About the same condition applies on Nos. 2 and 3 buckwheat.

It is obvious that heavy operations at the mines, occasioned by the large demand for domestic coal, is developing a surplus of the steam grades. Line business on all the domestic coals is about normal for this period of the year, but there is a heavy falling off in the tidewater trade, particularly locally. We quote the New York anthracite market in which the new May circular has gone into effect, as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.70		$4.65	
Egg	4.95	$4.85@4.95	4.90	$4.80@4.90
Stove	4.95	4.95	4.90	4.90
Chestnut	5.20	5.20	5.15	5.05@5.15
Pea	3.55	3.55	3.45@3.50	3.25@3.50
Buckwheat	2.80	2.80@2.90	2.50@2.75	2.35@2.75
Rice	2.30	2.30@2.40	2.00@2.25	1.80@2.25
Barley	1.80	1.80@1.90	1.70@1.75	1.40@1.75

PHILADELPHIA

Anthracite trade still satisfactory. Domestic sizes in good demand, but steam grades flat. Bituminous market dull, with little improvement in sight, either in the way of prices or demand.

Anthracite—The second month of reduced prices finds the anthracite trade in a satisfactory condition. At this season of the year, however, the market for the small or steam sizes begins to contract, and as a result, individual operators are commencing to cut prices, and the large companies to stock their surplus. The past winter, it is understood, has been a distinct disappointment in the demand for pea, it was only at the end that there was any marked call for this size, and it is understood that quite a tonnage was carried over, when as a rule, the storage places are found bare.

Domestic sizes still continue in good demand. A large number of orders were carried over, and the prospect looks good for at least the month of May. Those conversant with the market, however, are loth to predict what the situation is likely to be after May. While there is a large tonnage moving, at the same time, the trade seems to lack the snap that should characterize it at this period. Egg and stove are the leaders, with the companies drawing on their storage supplies for the former. There are no stocks of the latter, and it is impossible to fill the requisitions made. Chestnut is not moving off as well as desired, although there is no indications of price cutting on this size. Prices at tidewater rule about as follows:

	Circular	Individual
Broken	$4.35	$4.35 @ 4.45
Egg	4.60	4.60
Stove	4.60	4.60 @ 4.70
Chestnut	4.85	4.85
Pea	3.25	

Bituminous—Marked dullness still characterizes the bituminous industry. This is due to the fact that the manufacturers, carry sufficient stocks, and also many industrial establishments are working either on short time, or not at all. The opening up of the Lake trade, is expected to improve conditions somewhat, but the operators are not depending on this to strengthen the market. Good coals can be bought at from $1.35 to $1.50 at the mines, grading down to $1 to 95c. for the cheaper varieties.

BALTIMORE

Remarkably dull situation in the coal business generally. Prices weakening under the light demand. Pennsylvania and Ohio suspensions have not aided the market in any way.

The soft-coal business has been remarkably dull and the past week proved the dullest yet. While there is, of course, a certain call for contract fuel, this is not at all what it should be, and the spot market has disappeared almost entirely. Prices are weakening under the light demand, and the past week witnessed sales of West Virginia gas and steam coals at figures off what had been obtained recently, and while the Pennsylvania situation held somewhat better, it was still wobbly to say the least. With gas coals there was recorded sales of slack on contract as low as 60c.; run-of-mine at times sold down to 70c. and three-quarter at 80c. Maryland and West Virginia steam coals of less desirable variety were quoted around 80c. or a little better. Low grade Pennsylvania fuels were hugging the dollar mark, and best grades holding steady at around $1.30.

The trade had rather expected that the suspension in Pennsylvania and Ohio might have the effect of tightening the market, but such has not been the case. There is more than enough fuel to meet the demand. In regard to the strictly local stiutaion, it about measures up to the general conditions. Cancellation of some shipments to Tampico the early part of the market threw some little coal free at tide, but arrangements were made to take it up.

The anthracite situation remains unchanged. It will be well into the present month before there is any special activity to take advantage of the low schedule of the year, which will last until May 31.

CENTRAL STATES

PITTSBURGH, PENN.

Annual contracts being closed at moderate rate with some concessions and considerable shading on prompt. Pittsburgh district operating at 35 per cent. of capacity. Ample labor supply and very light demand for coal. River mines operating almost full. Connellsville coke stagnant, with a further decline in production and shipments.

Bituminous—Coal contracts which expired Apr. 1 are being renewed at only a moderate rate. The leading interests are holding to the same prices as prevailed a year ago, with a basis of $1.30 for mine-run, but they are all quoting 1¼-in. at $1.50 whereas last year the regular price on domestic was $1.55 while some operators made a differential of five cents on the same coal for steam purposes, quoting it at $1.50. There is occasional shading on contracts, but not a great deal. Spot coal, on the other hand, is offered at various low prices and some short-term contracts are being made at 10@15c. under the regular market. Regular prices are as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

The referendum vote on the adoption of the Cleveland scale unchanged for another two years has been completed, and the official announcement will be made May 1. Immediately thereafter a conference will be arranged to settle various local points with respect to the Pittsburgh district. No trouble is expected on these matters, though there may be considerable discussion.

Lately more men have been willing to work than there is employment for. Mines in the Pittsburgh district are operating this week at an average of not over about 35% of capacity and are finding difficulty in maintaining even this rate. The trade is suffering from three things, the stocks recently accumulated, an industrial depression and failure of the lake trade to open. The stocks are being liquidated and will cut little figure within another fortnight. The lake trade promises to be slow until July, and shipments from mines will be

particularly late in starting in volume because there is much coal loaded in vessels last fall and which will have to move up the lakes first.

The river mines are working practically full, loading coal for shipment down the river as fast as the boats can take it. Nearly all the mines of the leading interest are now able to ship by rail, and it is the desire to take care of the river demand now and then divert the capacity to rail shipment for the lake trade. There has been a good river shipping stage for some time.

Connellsville Coke—The market is stagnant, with prices showing a slight softening tendency. The leading operators are still holding to $2 for contract furnace coke but there is no demand. Prompt coke is a shade easier. We quote: Prompt furnace, $1.85@1.95; contract furnace, $2; prompt foundry, $2.35@2.45; contract foundry, $2.35@2.45, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Apr. 18 at 334,655 tons, a decrease of 20,070 tons, and shipments at 325,545 tons, a decrease of 22,866 tons. Production exceeded shipments by 9110 tons.

BUFFALO

Bituminous waiting for stocks to be reduced. Too much nonunion coal coming in. Coke still not moving. Anthracite only fairly active. Market nowhere improving as yet.

Bituminous—There is still too much newly-mined coal in the market for any improvement. The Allegheny Valley, Pittsburgh and Central Pennsylvania field operators are holding together firmly, not operating unless they have customers that have no stocks ahead, but there is a lot of coal coming in from the Panhandle district beyond Pittsburgh, which takes a Pittsburgh rate and this is making trouble. It is mined by nonunion labor, but even then is selling at sacrifice prices as a rule. Jobbers report that they are buying this coal at prices below cost, while at the same time quite a large amount of it pays demurrage before it is finally disposed of. If the whole mining interest could be made to stand together and do little work till the surplus is gone there would then be a chance of re-establishing a paying market.

There is still no general quotation except the former: $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.25 for slack, no part of the trade having any life in it but slack, though most of the operators refuse to sell at a reduction. Pittsburgh has fixed the same Buffalo price as last year and will maintain it as far as possible. The continued strength of slack is on account of the poor lake trade.

Coke—The demand for coke has not improved and is not likely to till there is better movement of iron, which is not looked for right away. It would seem, rather, that the market grows more quiet from week to week. Connellsville prices remain fairly firm at $4.50 for best 72-hr. foundry.

Anthracite—The end of April finds the demand far less active than in recent years. There is a steady call and the rail movement is good, but the sales offices are not getting urgent orders from country consumers and jobbers. There is some scarcity of egg coal in this market, the leading companies not appearing to have taken care of that market very carefully as some ran entirely out of this size. Actual consumption is small now, but there is always some demand.

The lake trade is as dull as other branches. Instead of the winter-loaded cargoes rushing out, so that the vessels can bring down other waiting freight they now appear indifferent to getting away. So far the clearances have amounted to only 115,000 tons, most of it for Lake Superior ports. It is stated that some ports are still very badly blocked with last seasons coal.

TORONTO

Anthracite moving on the Lakes. Demand becoming less.

Trade is steady with diminishing demand as the season advances. The yards are well stocked and supplies of anthracite coming forward freely by water since the opening of navigation. The usual reduction in prices of anthracite will be made about May 1. The figure has not yet been fixed, but it is not likely that the price will be put below $7.50 per ton. There is no change in present quotations.

TOLEDO

Supplies still large and business at a standstill. Mines closed for an indeterminate period. Some movement in the Lake trade.

So far as the retail market in Toledo is concerned business is exceedingly dull and prices are demoralized. There is a light demand for both domestic and steam coal. The factories are well supplied in anticipation of the strike. The warm weather has, of course, made the domestic demand light. Ohio mines are all closed down and there is little prospect of an immediate return to activity but supplies seem to be sufficient to meet all demands.

The opening of navigation has witnessed some improvement and several boats have cleared from this port while others are now loading. There is an immense amount of coal on track in Toledo and the T. & O. C., yards are full of loaded cars. There has been no change in quotations. Coal men here are optimistic as to the future and it is generally believed that so far as lake business at least is concerned Toledo will have a profitable year.

COLUMBUS

Prices show no strength despite the month's suspension. Some West Virginia coal coming in, but stocks are still sufficient to last for 45 to 60 days. Conference of operators and miners adjourned without agreement.

The feature of the Ohio coal trade is the irregular prices which have prevailed despite the fact that all the local mines have been out of commission snce Apr. 1. Apparently there is not much demand and inquiries are not numerous. On the whole the trade is quiet and the prospects for the future are not bright.

Some West Virginia coal is finding its way to Ohio, but prices on the whole have been weak. Mine-run is sold as low as 70c., while ¾-in. is bringing less than $1 with domestic lump almost as cheap. These prices only prevail, however, where West Virginia coal has been shipped in on consignment. Retalers have sufficient stocks to carry them through until the usual stocking-up period. Outside of the demand for fancy grades such as Pocahontas and splints there is not much call for domestic sizes.

Since the conference of operators and miners adjourned without agreeing on a mining scale, the entire situation is unsettled. There is talk of the miners' officials calling a strike and that might complicate matters still further. Miners generally show an anxiety to return to work.

While navigation on the Great Lakes has been formally opened, there is not much stir in the lake trade. It is doubtful if there will be any appreciable tonnage of Ohio coal shipped before June or July, as reports from the Northwest show that there is still a large tonnage on the docks of that section.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.35
¾-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack	0.90@ 0.85		0.90@ 0.85	0.80@ 0.75
Coarse slack	0.80@ 0.75	1.00@ 0.95	0.80@ 0.75	0.70@ 0.65

CLEVELAND

Little coal coming in and the market is only just able to absorb it. Prices continue low. Lake business opening slowly; few requisitions received from upper lake docks. The first coal has been delivered at Lake Superior ports.

All week coal receipts in Cleveland have not exceeded fifty cars in any one day. The average amount of coal on track was hardly more than fifty cars and it was moved at the low prices that have prevailed for a month. Nonunion mines in western Pennsylvania, No. 8 mines in Richland, West Virginia and Fairmount gas operations continue to supply the market.

There has been some inquiry for coal for shipment and an Ohio No. 8 operator quoted seven cars of slack in reserve at the mines at 90c. This sort of inquiry is not extensive and hardly indicates that storage stocks are being exhausted. It comes more from companies that did not store much coal against a suspension. The limited market has tended to make the operators less eager to meet the demands of the miners for increased wages. This and the fact that the suit to test the legality of the screen-coal law will be decided early in the week, were big factors in bringing the joint conference at Columbus to an end.

Lake Trade—Saturday, vessels with coal arrived at Duluth-Superior and at Fort William-Port Arthur, the two largest coal receiving ports on Lake Superior. All of the lake ports were entered by vessels during the week. The coal shippers, however, are very busy getting boats to load before May 1 when car service goes into effect on lake coal on all railroads except the B. & O. and C. H. & D. which began charging car service Apr. 15. There is not a great deal of coal on track or en route, but shipments are so uncertain it would be dangerous to depend upon credits to balance car service charges on coal already on track. After next week shippers will find it comparatively easy to get vessel capacity as the boats will be largely in commission and will need coal.

Anthracite and Pocahontas are selling well. May circular is being asked for both coals shipped now. The advance amounts to about ten cents a ton. Spot coal is selling at $1.70@1.80 for slack of all kinds and lump at $2@2.05. For shipment the following prices are being asked:

	Pocahontas	Youghiogheny	Fairmont
Lump	$3.05	....	$2.05
Lump, 1¼-in.	....	$2.55	....
Lump, ¾-in.	....	2.40	....
Egg	3.05	....	....
Mine-run	2.60	2.30	....
Slack	2.60	1.90	1.80

CINCINNATI

Demand continues slack in all lines, largely on account of the delayed lake movement. Pocahontas the only strong grade on the list. Practically no market on other varieties.

Despite the growing seriousness of the labor situation the local market has shown no signs of strengthening. The usual heavy spring contract demand for Pocahontas is the only cheering feature of the situation; in other respects the market is abnormally quiet.

The steam grades, including nut and slack from the Eastern Kentucky field and some of the same grade from the several West Virginia districts, are in fair demand, as practically all industrial consumers in and around Cincinnati are operating on nearly full time. Buying seems to be very light, however, and only for current consumption. A plentiful car supply in all fields now operating, and the light demand in the Lake trade have contributed to the present slowness.

There is little consignment coal on track in Cincinnati, however, this being a peculiar feature of this market, growing out of the fact that there is no reconsignment privilege, and demurrage charges accumulate too rapidly, without an opportunity to market the coal at outside points. The railroads also refuse to accept coal for shipment on consignment, and this has served to keep Cincinnati free from surplus fuel such as frequently chokes other markets.

Owing to conditions indicated, prices are about what the purchaser cares to make them, although there has been no great concession made in this respect. Most of the selling agencies are holding out for 85c. on contracts for steam coal, for example, but at the moment that price will buy block, as one operator put it.

DETROIT

Consignment coal cleaned up and a more optimistic feeling prevails. Stocks still large, but opening of Lake navigation will stimulate business.

Bituminous—The local agencies have finally succeeded in cleaning up all of the track coal in this vicinity, and are now advising operators that they will accept no further fuel on consignment except at their own risk. Even yet there is a great deal of cheap coal offered, there being plenty of lump available recently at 70c. with no buyers. Manufacturing plants and railroads are reported as well stocked for several weeks to come yet. However, there are some members of the trade who freely predict better conditions shortly, particularly when the lake movement gets under way in full blast. Conditions seem to be improving in general business.

Coke—There has been a slight break in the coke market, as is only to be expected at this time of the year. The Semet-Solvay product has consistently held its own, but gashouse is off 50c. on quotations to the retailer, and 25c. to the consumer.

HAMPTON ROADS

Only fair movement for the week. Principal shipments to New England. Rather excessive accumulation in local railroad yards.

Dumpings at Hampton Roads have been fair. There has been no heavy demand and the greater part of the coal moving has been on contract business or on sales made during the previous week. The coastwise shipments have been principally to the New England ports although some small cargoes have gone South. In addition to Pocahontas and New River run-of-mine there has been several small cargoes of high volatile shipped to the New England market.

Foreign shipments have been made to Rio de Janeiro, Canal Zone, Dakar, Kingston, Leghorn and La Plata. Owing to the light demand for coal, vessel chartering has fallen off and for several days there was considerable tonnage here seeking charters.

The accumulation of cars on the railway terminals is somewhat above normal but vessels about due will considerably reduce this and indications are that some of the suppliers will be loading government colliers which will in all probability cut the accumulation to below the average.

LOUISVILLE

Market continues dull and heavy although there are indications of improvement. Concessions necessary to move coal on consignment.

Local operators and dealers report a slight improvement in the local trade marked by a somewhat increased demand in both the Eastern and Western Kentucky fields. Such stocking as there has been so far this spring is lighter than customary, a condition attributed to a disappointing winter. Operations in Western Kentucky continue practically at a standstill, with only the nonunion mines working, though in the eastern part of the state operations are said to be better than usual.

In spite of a slow domestic market, steam coals are in such poor demand that the dealers having nut and slack on consignment have found it necessary to cut prices sharply in order to dispose of it. One representative of a Western Kentucky operating company in Louisville complained that Eastern Kentucky slack had been offered there at below cost of production.

A feature of the Eastern Kentucky market is that several of the Jellico operators claim to be getting as high as $1.75 to $1.85 f.o.b. mine for block coal, but this is for fancy and highly advertised grades. Elsewhere in the eastern section prices range from $1.30 up for the block coals and on down to from 50 to 60c. for the pea and slack of Western Kentucky.

BIRMINGHAM

Market on both steam and domestic coal far below the average. Furnace and foundry coke quiet. Blacksmith falling off slightly in tonnage. Little doing in the pig-iron market.

The market on domestic lump is quiet. Operators having regular agents at various points are having less trouble to move their product than others. Regular agents are required to take a certain monthly tonnage during the summer, and they are keeping the coal moving fairly well.

The steam market is also quiet, though the bunker business at New Orleans, Mobile and Pensacola is taking quite a good tonnage. The operators state that the usual falling off in blacksmith coal has started, the tonnage during the fall and winter being more than in the summer; however, the prices are being maintained. Both furnace and foundry coke are weak, with few buyers, and quotations are off about 25c. Furnaces report only a small amount of pig iron sold during the past 10 days.

NEW ORLEANS

Coal requirements for American fleet deplete local stocks and increased orders are being sent out. Usual trade continues inactive.

Unexpected activity pervades the coal industry here due to the demand for coal for use by the American fleet in Mexican waters. Fuel is even being shipped by rail from here to Galveston to coal the army transports. One hundred and twenty-five cars have been forwarded this week and dealers instructed that further supplies probably would be needed. In addition to the American war vessels, which will secure a portion of their coal here, ships of other nations, on duty in gulf waters, are putting in for supplies. The "Conde" of the French navy filled every bunker here this week and two of the British vessels will coal here as soon as they can be spared from duty on the Mexican coast.

This has changed the whole outlook here. Stocks that were too heavy for this time of year have dwindled almost overnight. Orders to the mines in Pennsylvania, Kentucky, Indiana and Alabama have been increased. With high water in the rivers, deliveries can be made quickly from the up-river section. There are also plenty of cars available for the movement of coal from Birmingham and efforts are being made to increase the receipts from the Warrior River section of Alabama via the water route.

Other than the movement of coal for the use of the fleet demand is light. Few contracts are being made and retail dealers in this territory are placing no orders in the belief that lower prices will be obtainable. Despite the lowering cost of fuel oil many plants are showing reluctance to reconvert their boilers, fearing another increase in price which will make it necessary to use coal again.

INDIANAPOLIS

Few mines in operation and trade slow as a result of the large purchases in February and March. Contracts and sales in open market being made at old prices. Coal situation influenced more by industrial than mining conditions. Retail prices unchanged from winter schedule. Little or no domestic buying.

Owing to the fact that most large consumers of Indiana coal laid in a 30- to 60-day supply during the efforts of operators and miners to reach a new wage agreement, trade is now slow. Few of the mines are running. It has been difficult to make new contracts because coal buyers are waiting for industrial conditions to improve. It is the general im-

pression that there will be no strike, largely because the miners need money, both individually and for their organization, which has been severely taxed, supporting many strikes. It is said operators have been making new contracts based on the old scale, which is an indication of their opinion of the outcome of the present negotiations.

Indianapolis dealers are still selling at winter prices. They say they have not yet been able to make contracts with the mines for next season. It is known, too, that they would like to dispose of present stocks at old prices before making any reduction.

Present prices at Indiana mines run about as follows: No. 4 mine-run, $1.10@1.20; Nos. 5 and 6, five to ten cents lower than No. 4; steam lump and nut, $1.25@1.40; egg, 15c. additional; No. 4 4-in. domestic lump, $1.80@2; No. 5, about 30c. lower; screenings, 80c. to 90c.; Brazil block, $2.25@2.50.

ST. LOUIS

Market unchanged with little business being done. A few mines working, and even some of these are closing down because of poor business. Consumers showing no anxiety at all over the situation.

There is practically no change in the local market; little trading is being done, and there is no great tonnage of coal being offered. The steam market is somewhat irregular. Standard screenings bringing as low as 75c. or 80c. one day, and going to 90c. or higher the next day. Standard 2-in. lump is sold as low as 85c. and as high as $1.05. The nut coal is worth 90c. and egg the same. There is no Big Muddy coal offered and little from the Mount Olive field.

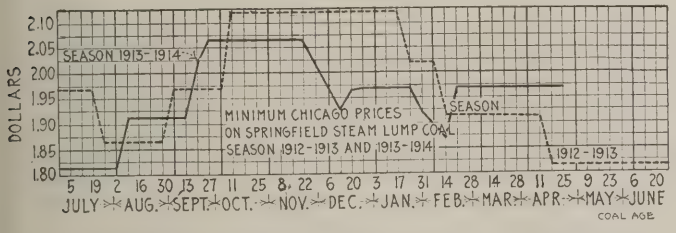
Carterville lump and egg is offered as low as $1.15, the better grades bringing $1.25@1.35; screenings the past week have been as low as 85c., and as high as $1. Nut coal is in good demand at from $1.25 to $1.50, while mine-run can be bought from $1.05 to $1.15.

The coöperative mines in the Standard field are working, and here and there a commercial mine, with a few railroad operations. During the past week, two or three mines found it more economical to suspend operations than to work. There is no dealer demand, and little anxiety during the past week on the part of the manufacturing plants. Anthracite is moving in good volume, coke and smokeless dragging.

CHICAGO

Dull and heavy despite the general suspension. Consumers are using up stocks and still have considerable on hand. Some coal on demurrage.

There has been no relief from the dullness in the Chicago market since the mines suspended and the demand is no better. The only active department is screenings on which prices are slightly higher. But there would not be a strong demand for a large production.



Dull conditions prevail in the anthracite market, although the buying has been a little stronger because retailers wish to get the April prices. The smokeless spot market has been comparatively good, although there is not a strong demand for prompt coal. A good deal of the spot coal is being shipped on new contracts and all that comes can be taken care of. Demurrage coal has been sold at an average of $1.10, although the larger companies are holding to circular prices. Splint coal has been only fairly active and there has been little demand for Illinois and Indiana fuels with the top figure of $1.25 for domestic lump as compared with the circular price of $1.35. Considerable activity is evident in the coke market, this being the contracting period for by-product coke. Some of the consumers are buying for storage and thereby aiding the present market.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.90@2.05	1.95@2.05	1.67@1.87	

Coke—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

KANSAS CITY

Improved business outlook has created a better feeling in the coal trade. Operations on about a half-time basis.

Though little change was in evidence during the past week, the volume of future bookings was materially increased, due largely to more favorable crop conditions. With wheat in splendid shape in the Southwest, there seems to be little cause for concern on the score of crops and general business has thrown off its conservatism somewhat. The coal trade is among these and a much more optimistic feeling prevails than for some time. Demand is quiet for immediate needs, and about half-time operations is the rule in most parts of the Southwest. A feeling of unrest is noticeable among the miners and no increase of working hours or output is likely in the immediate future.

PRODUCTION AND TRANSPORTATION STATISTICS

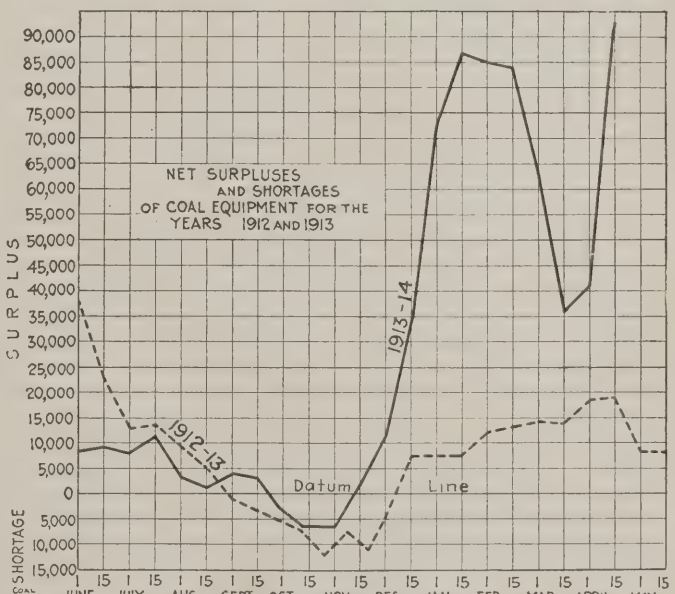
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Apr. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	738	0	**738**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	12,965	0	**12,965**
Ohio; Indiana; Michigan; Western Pennsylvania	37,170	0	**37,170**
West Virginia, Virginia, North & South Carolina	7,354	0	**7,354**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	14,147	0	**14,147**
Iowa, Illinois, Wis., Minn.; North & South Dakota	10,043	19	**10,024**
Montana, Wyoming, Nebraska	1,524	0	**1,524**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,972	0	**2,972**
Texas, Louisiana, New Mexico	549	5	**545**
Oregon, Idaho, California, Arizona	4,677	0	**4,677**
Canadian Lines	0	0	0
Total	92,139	24	**92,115**

	Dec. 15	Jan. 1	Jan. 15	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1
Surplus	36,435	72,535	87,149	85,489	84,775	64,822	39,133	41,055
Shortage	2,295	57	789	102	239	1,394	3,282	615
Net*	**34,140**	**72,478**	**86,360**	**85,387**	**84,536**	**63,428**	**35,851**	**40,440**

*Bold face type indicates a surplus.



SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for October and the first ten months of the years 1912 and 1913:

State	October 1912	October 1913	Nine Months 1912	Nine Months 1913
Missouri	315,419	317,466	2,438,163	2,367,435
Kansas	524,315	609,827	4,152,505	4,676,157
Arkansas	205,031	209,693	1,579,505	1,616,480
Oklahoma	319,717	340,915	2,384,278	2,864,050
Totals	1,364,482	1,477,901	10,554,451	11,518,12

This statement only covers the tonnage of members of the association, which is estimated to be at least 95% of the entire tonnage produced in the four states.

Financial Department

Lehigh Coal & Navigation Co.

President S. D. Warriner, of this company, reports for the year ended Dec. 31, 1913, as follows:

Income Account—For purposes of comparison the income account of the previous year has been restated to conform to the revised plan of accounting. Gross revenue for the year was $15,294,687, an increase of $1,486,037, due to (a) increases in coal revenue of $1,028,573, in canal revenue of $2,507, and in miscellaneous revenue of $464,114; and (b) decrease in railroad revenue of $9157. The net revenue of the several departments was $3,735,828, an increase of $100,101, and the net income was $2,372,511, an increase of $84,255.

The net miscellaneous revenues for the year was $833,646, an increase of $411,383, as compared with the net revenue for the year 1912, based upon the same method of accounting. This increase is mainly accounted for by an initial dividend of 4% on stock of the Lehigh & New England R.R. Co. and by profit from the sale of surface lands in the mining region.

Bonds and Notes—In order to provide for general corporate purposes, the company issued on July 1, 1913, $1,500,000 one-year 5% secured gold notes, secured by deposit of $1,250,000 general mortgage 4½% bonds, due May 1, 1912, and $1,000,000 funding and improvement 4% bonds, due July 1, 1948. Of these notes, $220,000 were subsequently retired by issue of treasury 4½% bonds.

To provide for the bonds and one-year notes maturing in 1914 [aggregating $10,054,519 in hands of public] and for general purposes, present and future, the board has authorized a consolidated sinking fund mortgage dated Jan. 1, 1914, securing an authorized issue of $40,000,000 gold bonds, maturing Jan. 1, 1954, and containing provisions for the retirement of prior liens. The initial issue of these new bonds, "Series A," will be for a total of $18,000,000, bearing 4½% interest. Of this series $14,000,000 has been sold.

Taxes—Our taxes continued to show an increase, the total amount of taxes in 1913 being $540,720, as compared with $450,567 in 1912, due principally to the imposition of a tax of 2½% on the value of anthracite coal as prepared for market, in accordance with an act of the Pennsylvania legislature, effective June 28, 1913. In 1908, our taxes were $288,483; in 1913, $540,720, an increase in five years of about 87%.

During 1913 state taxes in dispute accruing for 1910, 1911 and 1912 were settled adversely to this company, and payments amounting to $213,021 were made and charged against profit and loss.

Coal-Mining Department—Coal tonnage from lands owned and controlled:

	1913	1912
Mined by company	3,612,711	3,241,388
Mined by company lessees	209,018	183,892
Recovered from culm banks by company and its lessees	724,524	455,902
Less consumed as fuel by company and its lessees	551,486	424,093
Net commercial coal produced by company and its lessees	3,994,767	3,457,089
Net by Alliance Mining Co. and its lessees	147,144	159,843

Two new shafts, one at Rahm Colliery and one at Coaldale Colliery, are being sunk to develop the low levels.

During the year the company expended for permanent additions and betterments $816,450, charged to capital, and in addition $398,977 was charged against operation on account of underground developments and improvements, new stripping operations, and extraordinary repairs and renewals. There has been charged for depreciation and other reserves $476,777, and to cover obsolescence, $242,976.

On May 1 the claim of employees for additional wages under the sliding-scale percentage, in effect since 1902, was decided in favor of the men. Under this award your company paid during 1913, $25,771.

The sales of coal during the year 1913 amounted to 3,529,094 tons, a decrease of 117,337 tons, as compared with 1912. Market conditions late in 1913 were unsatisfactory. The shipments of anthracite coal by the producing companies have exceeded market requirements, this condition being caused by the mild weather of two successive winters, which unsettled the trade and decreased consumption. The net revenue received from coal for the year was $464,746, a decrease of $200,430 from 1912, based on the same method of accounting.

Note—For previous annual report of this company see "Coal Age," Vol. 3, page 552.

GENERAL BALANCE SHEET, DEC. 31, 1913

Assets ($62,513,921)—	
Coal lands, mining and marketing property, $17,456,799; canal property, $3,414,857; real estate, $1,018,753; total	$21,890,409
Railroads and other property owned or controlled: Physical property, $16,847,132; securities pledged, $7,988,311; securities unpledged, $6,286,786; total	31,122,229
Securities of uncontrolled companies pledged, $432,750; company's securities pledged, $3,399,000; total	3,831,750
Cash	984,444
Company's stock in treasury, $29,700; bonds, $393,813; securities of uncontrolled companies, $638,066; total	1,061,579
Customers' acounts, $1,231,307; sundry debtors, $512,958; total	1,744,265
Coal stock, $1,188,296; materials and supplies, $383,976; total	1,572,272
Accrued interest and dividends receivable, $16,719; sundry accrued rentals receivable, $9094; total	25,813
Suspended debit accounts	281,161
Liabilities ($62,513,921)—	
Capital stock, $26,587,650; funded debt, $26,515,333; total	$53,102,983
Loans and notes payable, $978.975; audited vouchers and payrolls, $909,550; total	1,888,525
Sundry creditors, $884,059; accrued taxes, $378,155; total	1,262,214
Matured interest on bonds, $177,301; accrued interest on bonds, $69,895; total	237,196
Matured and accrued rents, $2802; dividends unclaimed, $6991; total	9,793
Suspended credit acounts	63,466
Depreciation and other reserves, $4,055,359; profit and loss, surplus, *$1,884,384; total	6,003,209

*After adding sundry accounts adjusted, $194,064, and deducting adjustment of state taxes for years 1910, 1911 and 1912, $213,021.

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending Apr. 25:

Stocks	Week's Range High	Week's Range Low	Week's Range Last	Year's Range High	Year's Range Low
American Coal Products	83½	82	82	86¼	82
American Coal Products Pref	102¼	102½	102½	106	102½
Colorado Fuel & Iron	29	27½	28	34½	27½
Colorado Fuel & Iron Pref	140	140	140	140	140
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com	49	48	49	....	....
Island Creek Coal Pref	86	85½	85½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20⅛	19	19	23½	17⅞
Pittsburgh Coal Pref	88¼	84	84½	93½	84
Pond Creek	18	17	17½	....	....
Reading	162½	158⅞	159⅞	172¼	158¼
Reading 1st Pref	88⅜	88⅛	88⅜	89	87½
Reading 2nd Pref	88⅜	87½	87½	93	87½
Virginia Iron, Coal & Coke	45	45	45	52	40

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. g n. s.f.g. 5s	97	98½	97⅛	97⅛	91½	99
Colo. F. & I. gen. 6s	104	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	74½	Sale	74½	75¼	74½	82
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89½	92	89	Mar. '14	89	89
Gr. Riv. Coal & C. 1st g 6s	8?	..	99⅛	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	98½	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	89½	..	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	..	88½	88	Apr. '14	84	88¼
Tenn. Coal gen. 5s	77	81½	77	77	77	82
Birm. Div. 1st consol. 6s	101⅛	..	101½	101⅓	97⅛	103⅜
Tenn. Div. 1st g 6s	102	103	102	Apr. '14	101½	103
Cah. C. M. Co. 1st g 6s	101⅞	103	102	Mar. '14	101	102½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	101¼
Victor Fuel 1st s f 5s	..	75	80	May '13	..	..
Va. I. Coal & Coke 1st g 5s	92	93	92½	92⅛	92⅛	95

DIVIDENDS

Lehigh Coal & Navigation Co.—Regular quarterly dividend No. 142 of $1, payable May 29 to holders of record, Apr. 30.

G. B. Newton Co.—Dividend of 3½% on the first preferred, payable May 1 to holders of record Apr. 23.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 19
Issued Every Saturday
Hill Publishing Company

NEW YORK, MAY 9, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

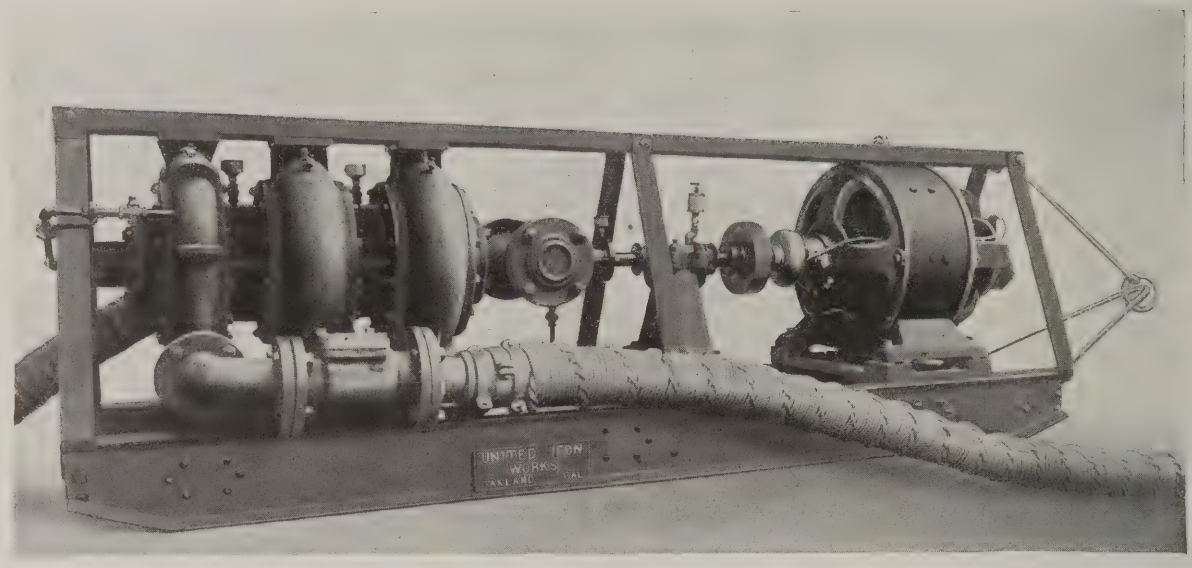
AS THE MULE SEES IT

BY BERTON BRALEY

I once was thin and bony as a mule could ever be,
You'd almost cut your fingers if you laid a hand on me;
I had an evil temper and a mighty evil eye
And I tried to kick the daylights out of everybody nigh,
My head was full of anger and my legs were full of scars
Where I tumbled in my struggles with the stiff old-fashioned cars,
But now I'm plump and cheerful as a pampered pussy cat,
For Hyatt Roller Bearings make a Mule
Grow
Fat!

But though I'm bright and happy with a temper that is cool
And though I'm roly-poly as you seldom see a mule,
And though my work is easy as it never was of yore,
I'm pulling twice the string of cars I ever did before!
So the mine is running smoother than it ever used to do
And the skinner is so pleasant that I can't believe it true,
While I'm so calm and placid that we never have a spat,
Since Hyatt Roller Bearings make a Mule
Grow
Fat!

There's nobility in labor, we should honor it a lot,
But unnecessary labor is a thing that makes me hot,
And a simple beast of burden like my modest little self,
Could observe that Hyatt Bearings save both energy and pelf,
For they double up the tonnage I can haul along the track,
Yet they almost last forever—and they never strain my back,
And the owner's purse and happiness won't lose a bit by that,
While Hyatt Roller Bearings make a Mule
Grow
Fat!



Westinghouse Electric Direct-Current Motor and Pump mounted on a skid for lowering down inclines.

Westinghouse Electric Self-Starting Direct-Current Motors for Mine Pumps

These motors form the most satisfactory drive for small pumps in coal mines equipped with direct current.

They are similar to standard motors except that they can be connected directly to the line and require no starting box.

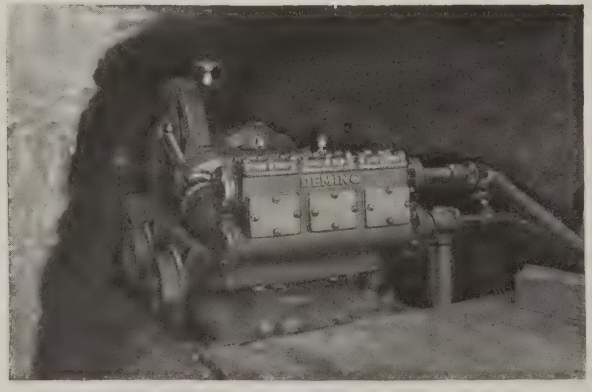
In starting these motors it is only necessary to close a circuit breaker in the power house or at some other convenient location; there is no need of visiting each pump and starting each by hand.

Another advantage lies in the fact that these motors start automatically on the return of power after a temporary failure of voltage, thus insuring operation at all times without individual attention.

Since there is no starting box and resistance, the connections are of the simplest possible character, a switch being all that is required.

These motors have been in successful operation in coal mines for several years and many re-orders from users prove their satisfactoriness in service. They are built in sizes up to 20 h.p. for all commercial direct-current voltages.

Full information sent on request.



Pump in a Coal Mine driven by a Westinghouse Electric D. C. Motor.

Westinghouse Electric & Mfg. Co.

East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W.Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, O.
Cleveland, O.
Columbus, O.
*Dallas, Tex.
Dayton, O.
Denver, Col.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Calif.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa
Pittsburgh, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
Syracuse, N. Y.
Tacoma, Wash.
Toledo, O.
Washington, D. C.

*W. E. & M. Co. of Texas.

WESTINGHOUSE ELECTRIC

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MAY 9, 1914 NUMBER 19

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 755

A suggestion that coöperation between the sales department and the operating department of any coal-mining corporation will bring about more satisfactory and permanent results.

IDEAS AND SUGGESTIONS: *Pages* 756-757

Weak Links in Coal Mining — The Other Fellow's Troubles.

*A TYPICAL WELSH COLLIERY: *Pages* 758-760

The operations described have been entirely overhauled and brought up to date, as is necessary if economy of operation is to be secured. The coal is carefully sized and cleaned both by hand and in a washery. The fine coal goes to byproduct ovens. COAL AGE, Vol. 5.

A NEW ERA: *Page* 760

*THE POCKET-COAL FIELD OF LEE COUNTY, VA.: *Pages* 761-763

The name refers not to the condition of the coal, but to the mountain-girt character of the district. The central-power station and central washery exhibit uptodate developments in the mining industry. W. R. Peck. COAL AGE, Vol. 5.

*INTERPOLE MOTORS FOR MINE LOCOMOTIVES: *Pages* 764-767

The demand for interpole motors on mining locomotives appears to have been built up by the manufacturers. Their use complicates the wiring and necessitates the carrying of an extra set of spare parts, while the results secured are not appreciably better than those afforded by a properly designed noninterpole machine. A. R. Anderson. COAL AGE, Vol. 5.

MINERS' ELECTRIC LAMPS: *Page* 767

SNAPSHOTS IN COAL MINING: *Pages* 768-769

Views of surface and underground equipment and of the Eccles explosion.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 785

COAL AND COKE NEWS: *Pages* 786-789

*THE COLORADO STRIKE: *Pages* 770-774

Peace and disarmament have followed the entrance of the U. S. troops into Colorado. The militia under arms now number 30 men.

*STATEMENT OF COLORADO OPERATORS: *Pages* 775-776

*A NEW PSYCHROMETER: *Page* 776

EDITORIALS: *Pages* 777-778

The Colorado Strike—The Panama Canal and the Coal Trade—Arbitration.

LEGAL DEPARTMENT: *Page* 779

Amount Recoverable for Personal Injury or Death: A recent verdict for $50,000 for personal injuries to a coal miner suggests a review of previous decisions bearing on the excessiveness of awards for personal injury or death, and a statement of general rules governing such allowances. A. L. H. Street. COAL AGE, Vol. 5.

INSTRUCTION WORK IN ILLINOIS: *Page* 780

THE MINING SCALE: *Page* 780

DISCUSSION BY READERS: *Pages* 781-783

Indications of Gas on the Carbide Lamp—Examining for Gas with an Open Light—The Mine Foreman. Letter No. 3—Starting Longwall in Room and Pillar Work. Letter No. 4.

STUDY COURSE IN COAL MINING: *Page* 783

INQUIRIES OF GENERAL INTEREST: *Page* 784

Extinction of Lamp on Falls—Engineer of Mines Degree.

COAL TRADE REVIEWS: *Pages* 790-794

ADVERTISING INDEX: *Page* 24

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

Competition Is The Life Of Trade

The Weekly Ad-Talk Page

And advertising is the life of competition.

There can be no real competition between manufacturers of competing machines, unless each knows fully what the other is doing—unless they compete squarely out in the open.

Advertising not only informs prospective buyers fully of detailed points of superiority of a machine, but also informs the makers of competing machines in the same way.

This brings about a sharper competition—a competition that results in better machines on both sides, in a better business for both manufacturers, and a better machine and greater satisfaction for the user.

Advertising, in short, has been the one big factor that has brought the manufacturer and his product squarely out into the light where both were prone, before the days of real technical journal advertising, to hide in the dark and, fearfully, avoid the benefits of real competition.

Advertising has paid and still pays—pays big—in the very broadest sense.

COAL AGE

Vol. 5 NEW YORK, MAY 9, 1914 No. 19

As a rule there is "no love lost" between the sales department and the operating department of any coal-mining corporation.

To the operating officials it always appears as if the sales department takes sides with the coal users, as against the company, and to the sales department officials, it seems that the only dependable thing about the operating officials is that they can get out a specified tonnage.

Operators like to believe that the right kind of a salesman ought to be able to sell anything that can be loaded aboard railroad cars, and salesmen seem to believe that operators ought to be able to produce lump, nut and slack in any desired proportion and quality, as the demands of a constantly fluctuating market require.

The superintendent keeps harping on the fact that if he were allowed to get out a larger output, he could make a better cost. The sales manager talks about the thousands of tons of coal he could sell, if they would only give him a particular grade.

Periods of dullness, such as the coal trade has experienced pretty generally during the past few months, often lead to a better understanding between the two departments. It is during such periods that mines which have continually produced dirty coal are almost eliminated from sales records, while the ones with good reputations seem to continue working in the same old way.

When the sales manager is approached, he calls attention to the fact that at the Big—— mine, the coal is all being disposed of by Jim Baldwin; "Yes, the same Jim Baldwin that we fired six years ago."

The manager quietly starts a little investigation of his own and learns that at the Big ——mine, the superintendent has succeeded in educating his miners up to a realization of the fact, that unless they load clean coal the mine will have to cut down to quarter time. When the manager gets his sales force and his superintendents together the following day, he does most of the talking and he does it in a way that convinces Mr. Sales Manager and Mr. Division Superintendent that "a house divided against itself can not stand."

Credit for many of the innovations leading to better preparation of coals must be credited to men in sales departments, not by right of invention, but because grim necessity drove them to outwit their competitors, and, working hand in hand with some progressive superintendent, they succeeded.

In some of these battles for market supremacy, you'll find evidence of co-operation leading all the way from miner to sales manager, and it occurs to us that such team work, once inspired, will be far reaching and permanent.

Ideas and Suggestions

Weak Links in Coal Mining

SYNOPSIS—A record-breaking run for one day. Reasons why the same record cannot be made every day. The need for careful and close investigation to discover the weak links in the operation of a mine. Many suggested weak links.

A weighmaster at a mine, stepped into the coal office one evening, and, all smiles, remarked: "Broke the record today." His smiles were reflected on the faces of all present, except one official of the company, who asked, "Why can't we break the record every day? Why can't we load as much coal tomorrow, and the next day, as we did today?" The mine foreman, who was present, explained that conditions were just right for a good run that day; all the men were in; all had plenty of coal; the machinemen had all places cut; the water was well pumped out; the equipment was all in good order; and, owing to having run out of flats the day before, there were plenty of loaded cars on the dump and on the bottom, which gave the boys a good start.

These were evident and sufficient reasons, and the superintendent was satisfied. If he had carried his inquiries further, however, he might have learned the one important reason why this record could not be equaled every day. A mine may not be expected to produce the maximum tonnage every day, but when the average daily production falls below the normal capacity, there is a reason for it. We were often told at school that "a chain is no stronger than its weakest link"; but, often, it is harder to find that weakest link than it is to repair the same when discovered.

A Weak Link in Haulage

In the mining of coal, the weak link may be found in the relation of the working places to each other. If two drivers can haul the coal mined by 40 men and ten of the men are widely separated from the other thirty, one of these drivers will generally be found hauling the coal from the ten men and loafing half the time, while the other driver is working the full day and only hauls two-thirds of the coal mined by the thirty men in his territory, which makes the total production of the forty men only 75 per cent. of capacity. If the conditions of the mine will not permit a more proportionate division of the men, it's time to figure on another mule or to let the other driver work half time in each section. Mules cost money but the price of a mule and its upkeep might easily be produced from the proceeds of the coal mined by ten men.

We often hear a miner say, "I didn't get much done today. I had one car to clean up, and then I had to wait for the machine till two o'clock." And another will say, "I didn't get started till the middle of the afternoon, and they kept me on the jump from that on till quitting time." It is easy for the boss to claim "They're always kickin'"; but he might better study the situation carefully and install a new machine, or put on a night shift to clean up and insure a good run the next day, by which a weak link would be strengthened.

The lack of a sufficient number of tracklayers or timbermen may be a weak link. Two or three places thrown idle every day on account of no track or need of timbering will seriously affect the tonnage. And if conditions are such that the production of these idle places could be handled if they are working, the necessary outlay for more track and timbermen would be justified, even though there will be days when they will have to be put on other work. There is almost always extra work to keep such men employed to advantage, such as cleaning up tracks, opening waterways, etc.

A weak link is sometimes discovered in the drainage of the mine. The pumping system should be adequate to meet all demands. A motor, trying to start a trip on a slippery rail, results in loss of time and equipment. Mud and water in entries and on roads where work must be done, is sure to cause a loss of efficiency in men, mules and equipment.

The timbering of a mine may prove a weak link. Aside from considerations of safety and the conservation of material, systematic and efficient timbering is good policy, from the standpoint of dollars and cents. Not only are falls of roof expensive, in the wages paid to day hands, for the labor necessary to clean the tracks, rehang trolley and signal wires, relay track and repair broken ties, but the delay and loss in time in haulage, occasioned by such falls, will be plainly apparent on the weigh sheet.

The Need of Good Track

Far too often we find poor track one of the weak links in mining. The need of good track is so obvious that it should not be necessary to call attention to it. But we often observe the results of poor track in spite of the fact that it is one of the most important items in the production of coal. It costs practically the same and more for the maintenance of poor track as it does to make good roads; and the delays occasioned by wrecked motor trips and cars off the track, perhaps in a part of the mine that will throw a half-dozen drivers idle, leave no valid excuse for poor roads in the mine.

Inefficient or insufficient equipment may cause a large reduction in tonnage, and must, therefore, be regarded as a weak link. It may be that an insufficient number of mine cars are in operation. During the short periods of temporary delay, the miners should have enough empty cars given them to keep on loading the coal mined. It is somewhat difficult to figure on the exact number of cars needed, in any case, for it is possible to have an oversupply as well as an undersupply. But if a larger supply of mine cars will result in an increased production of coal, it is probable that the expense of the new cars and the necessary storage room, both inside and outside of the mine, will be justified.

From the time the mine car is loaded and started on its journey to the tipple, it must be kept moving. The mine locomotives and loading machinery should never be

permitted to permanently curtail production; but should be kept to such a high standard that they will not be overloaded by the maximum capacity of the mine.

The installation of the power plant and the construction of the tipple and other permanent structures, being the most expensive items in the opening of a mine and having received careful consideration, will generally determine the limit of production. As the initial cost is so great, it is not often advisable to make many important changes in such equipment. But such minor changes may be made and equipment added as conditions warrant.

In the purchase and distribution of supplies, we may discover another weak link. All supplies that are ordinarily needed about a mine, should be kept constantly on hand. This includes lumber for track, timbering, car repairing, etc.; steel rails, nails and bolts, wires and insulators, iron and steel bars, oil, waste, pipe fittings and tools, small machinery parts, small tools; in fact, all mine supplies should be kept in sufficient quantities to meet every need. The purchase and distribution of supplies should be in charge of a competent man, who will see to it that all material is provided where needed, in quantities to meet the demand and, at the same time, prevent waste, which is as inexcusable as a lack of supply.

A system should be in force, checking all tools against the employee who takes them out, such tools to be charged to him if not returned. The prompt return of tools and an ever-ready supply of small repair materials, will insure prompt and permanent repairs, avoiding the delays caused by hunting material and tools, and preventing "patched-up" jobs.

A Possible Weak Link in Management

Even the management of the mine may be a weak link. So much depends on the mine superintendents and foremen that they are deserving of an article themselves. Much responsibility rests upon these often overworked and underpaid officials. But only brief mention will be made of some of the requirements and qualifications of the successful mine manager. To secure and maintain an increased production, he must use care in laying out the mine, and in the hiring and placing of men. He must be a man of forethought, looking to the future as well as the present requirements of the mine. His judgment must be sound in regard to the construction and improvement of the various departments, so that each department may bear its proper relation to the whole, resulting in greater safety, greater efficiency and a larger tonnage. On the superintendent devolves the duty of finding weak spots in daily operation of mine.

Then in his personal relation to the miners, by tact and good judgment, the mine foreman can do much to eliminate friction. Men will clean coal better for a foreman who treats them well, thus avoiding part of the delay in operation, which would be caused by having to clean the coal at the tipple. The foreman must treat his miners and their officers with fairness. Sometimes it is possible for the turn keeper or the mine committee to curtail the production of a mine to a greater or less degree. They will probably not do this if they receive the proper treatment from the management.

It is easy to run in a rut, and sometimes hard to convince those in authority of needed improvements on account of the extra cost entailed. It is true that improvements mean added expense and are sometimes not justified, on that account. But a considerable outlay is warranted by any improvement that will result in an increased tonnage, day after day, year after year. A chain is no stronger than its weakest link; and the capacity of a mine cannot go above the capacity of its weakest unit.

One hundred per cent. efficiency is hard to secure, perhaps impossible. But we certainly rise no higher than our ambition; and we will never reach 100 per cent. efficiency, unless that is our aim.

The Other Fellow's Troubles

By Southern Superintendent

If you think that you have more to contend with than any other class of men, possibly there's something wrong with your thinker. We had this brought home to us rather forcibly, only recently, while riding in a crowded Pullman smoking compartment. Here were a number of men, each one of whom was an entire stranger to all of the others, and, as it happened, each engaged in a different occupation. As is usually the case, under similar circumstances, the talk soon became rather personal and every fellow volunteered snatches of personal history and narrative that bordered almost on inside information, about his respective business. We recall that in the group was a chewing-gum manufacturer; a proprietor of a mineral-water bottling establishment; an adjuster for an automobile-insurance company; an owner of a powder mill; a manager of a large hotel company; and a former coal-mine superintendent.

The fun started when the ex-mine superintendent suggested that no one, unacquainted with the coal-mining business, could realize the full and terrible meaning of such words as strikes; explosions; inflamed public opinion; open winter; etc., etc. We won't attempt to repeat all of the conversation that followed, interesting though it was, but we feel called upon to affirm that we are now convinced that the man at the head of a powder mill can speak feelingly about explosions; he also knows a thing or two about liability insurance. An automobile-insurance adjuster knows a few things about unreasonable human beings. The chewing-gum manufacturer with a factory full of girls, knows just what a strike may mean, public sympathy, boycott and all, and the hotel man acquires a hide that can resist the word "robber," expressed in eighteen languages.

The words robber and baron are not necessarily always associated, popular opinion to the contrary notwithstanding; the average hotel man looks like a baron naturally, while the coal-mine owner is gifted only with such dignity in the eyes of the cartoonist.

We were about to slight the mineral water man: He's the fellow who studies weather conditions in earnest, if keeping a thermometer and a barometer in one's bedroom is any criterion. When the natural gases in his waters refuse to follow the accepted analyses, he has no stock-pile to fall back on and he can't even leave them in the ground.

There's a French saying that sounds something like this: "Company in distress makes trouble less." Perhaps that is the secret of the crowded condition so characteristic of smoking compartments on trains and steamers.

Try it out, the next time you think you're in trouble.

A Typical Welsh Colliery

SYNOPSIS—The operations described have been entirely overhauled and brought up to date as is necessary if economy of operation is to be secured. The coal is carefully sized and cleaned both by hand and in a washery. The fine coal goes to byproduct ovens.

D. Davis & Sons, Ltd., operating the Ferndale, Coedely and Griffin-Nantyglo collieries of South Wales, is one of the most famous firms in the Welsh coal-mining industry. The company now sells 3,500,000 tons of coal per year. The Ferndale mineral property embraces all the coal seams underlying an area of between 6 and 7 sq.mi., in the heart of the South Wales steam-coal district. This forms a continuous coal field reaching from the valley of the Rhondda Fach to that of the Rhondda Fawr and comprising no less than 6 workable coal beds. These are known as the 2-ft., 4-ft., 6-ft., 9-ft., the second 4-ft. or Bute seam and the 5-ft. seam.

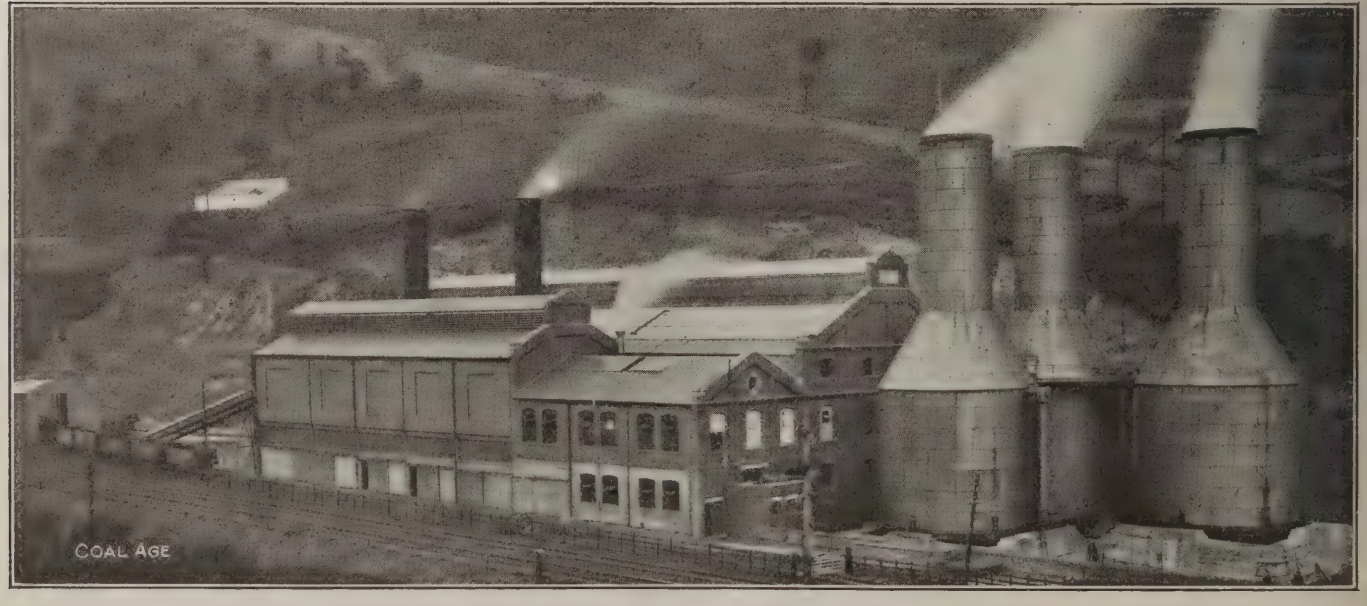


SURFACE WORKS, INCLUDING COKE-OVEN AND BYPRODUCT PLANT AT COEDELY COLLIERY

VENTILATING EQUIPMENT

These various coal measures are intersected by nine hoisting shafts and numerous ventilating pits ranging in depth from 720 to 1680 ft. The colliery is noted for its uptodate equipment and methods. Its electrically operated turbo-compressors and its fine ventilating plants are considered typical of the best in colliery engineering, while large sums have been spent in improvement.

It would be difficult to depict more graphically the size of the ventilating equipment than by stating that something over 17½ million tons of air are driven through



ELECTRIC POWER STATION AT FERNDALE

the workings per year. In other words, it may be roughly stated that for every ton of coal hoisted, ten tons of air have entered and left the underground galleries.

Sprinkling Lines

The workings are traversed by miles of iron pipe through which water is forced under pressure for sprinkling the floors, walls and roofs of the entries. At intervals there are valves, to which hose is attached by a special force of men retained for the sole purpose of keeping the coal dust wetted down in order to eliminate risk of explosions. Where electricity cannot be safely employed for operating machinery underground, another and larger system of piping 33 miles long is installed to carry the compressed air.



Picking Coal at Ferndale Colliery

The power house is of modern and economic type. It contains four boilers, each of 2000 hp., equipped with mechanical stokers; one stoker and one ash man are employed upon each shift, the fuel never being moved by manual labor from the time it leaves the hoisting shaft until the ashes are withdrawn from the ashpit.

In the central Power House there are installed three horizontal cross-compound engines of 2400 hp. each, with an equal number of Lahmeyer electric generators of the most modern type.

Plant Has Been Made Over

The whole power plant has been practically replaced during the last five years, the latest improved electrical equipment being installed. The electrically operated hoisting engines are each capable of raising 200 tons gross weight per hour, each wind being accomplished to a depth of over 1500 ft. in about 40 seconds.

The company's other large coal property at Coedely, now known as the Welsh Navigation Steam Coal Co.'s mine, was acquired in 1911. The seams now being developed contain the best quality of coking coal, steam and locomotive fuel. The output, which at present does not exceed 500,000 tons per year, is expected ultimately to reach 1,250,000 tons per annum.

Dumping and Coal Preparation

The cars, leaving the mine cage, run by gravity to revolving dumps which discharge the coal upon shaking screens. These separate the coal into sizes discharging the fine coal into bunkers beneath and depositing the larger grades upon picking belts in slow motion. Here the coal is picked and sorted, and the dirt removed. Washed coal from this plant is carefully lowered into railway cars by spirals to avoid breakage, and under the designation of pea, bean, or nut, according to its size, finds a ready market.

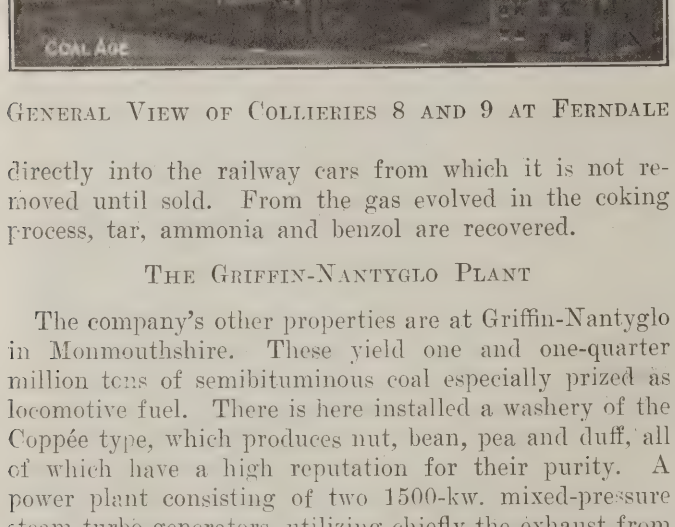
In the washery, the coal is classified into various trade sizes, nut, pea, bean and duff, each size being separately prepared and delivered into bunkers conveniently situated for loading into cars. Of the total washed coal delivered from the washery, some 75 per cent. amounting

to about 420 tons per day or 150,000 tons per annum will be duff or slack which will be delivered to a 1000-ton reinforced concrete bunker suitably arranged for feeding into the compressor boxes of the two oven-charging machines.

Coking Plant

In accordance with the general policy of this company some of the chief officials engaged at Coedely visited Belgium, Germany and other places to study and receive special training in the operation of byproduct coke ovens. A plant will soon be completed with the most modern devices for the reclaiming of byproducts.

The coking plant comprises two batteries each containing 30 ovens Coppée regenerative type; each oven will coke about seven tons of coal per day, producing about five tons of product. When the coking process is complete, the coke is pushed from the oven through a quenching machine at a rate of about 6 ft. per minute and is delivered



General View of Collieries 8 and 9 at Ferndale

directly into the railway cars from which it is not removed until sold. From the gas evolved in the coking process, tar, ammonia and benzol are recovered.

The Griffin-Nantyglo Plant

The company's other properties are at Griffin-Nantyglo in Monmouthshire. These yield one and one-quarter million tons of semibituminous coal especially prized as locomotive fuel. There is here installed a washery of the Coppée type, which produces nut, bean, pea and duff, all of which have a high reputation for their purity. A power plant consisting of two 1500-kw. mixed-pressure steam turbo-generators, utilizing chiefly the exhaust from the hoisting engines, fans and air compressor, is under process of construction. Electricity will be generated at 3000 volts and transmitted at 10,000 volts, being stepped down again for utilization at the first named potential. The motors at present aggregate upwards of 3000 hp. and include hoists, pumps, fans and the usual auxiliary motors for use on the surface in workshops, sawmills and coal washery.

Meeting of A. I. M. E.

A meeting of the American Institute of Mining Engineers, under the joint auspices of the Iron and Steel Committee, the Committee on Petroleum and Gas and the Committee on Coal and Coke, will be held at Pittsburgh, Penn., Oct. 8 to 10 inclusive.

A New Era

By Carson W. Smith*

There is much talk, at the present time, in regard to efficiency; we hear a great deal said about efficiency standards, efficiency engineering, scientific management and other words and phrases of like suggestion. Though the study of industrial efficiency, in the modern scientific manner, is of comparatively recent date, the underlying principles have been already discovered. The aim and purpose of this study are good; the tendency is good.

The elimination of waste, the utilization of products; the increase in capacity of units; these are all worth while. The growth of science and the knowledge of its principles and, especially, their application to industrial plants all over the country, are giving to this nation and to the world a foundation for the learning of a Greater Science, which is slowly but surely evolving from the heterogeneous chaos of the present inefficient industrialism. One hundred or two hundred years hence, the present period will be spoken of as the "Renaissance" or awakening of industrial development.

The tendency of the present time points emphatically to a new era in the entire industrial world. Business, efficiency and scientific management are important features of this development. The present labor unrest and socialistic tendencies point in the same direction. There is a leavening that is working profoundly in and through all classes; but the future will prove that these tendencies are for the development of a broad socialism that will give every man a "square deal." The time will come when the only man who is hungry will be the man who will not work.

We hail in the coming of this era a new conception of justice and equity. There will be no red-flag socialism; and friction between labor and employers of labor will ultimately be eliminated, as productive only of waste and inefficiency. That this is not altogether a dream, many incidents of daily occurrence are proving.

Coal and Coke Exhibits at Panama-Pacific Exposition

The United States Steel Corporation, and its subsidiary companies, propose to have a comprehensive exhibit of its operations at the Panama-Pacific Exposition, in San Francisco, 1915. In addition to the material exhibits, the Corporation expects to show, by moving pictures, its coal and coke operations throughout all departments, and all the ramifications of the processes used at its different plants. It will also set forth the work which it has done toward the social welfare of its employees and those depending on them, and will exhibit many forms of safety devices which have been conceived by its officials and employees. Aid and care for the injured, and the voice given to its employees through their committees, will also be demonstrated.

The cost of concrete overcasts can be greatly reduced by the use of reinforcement. Well screened tough coal can be economically used in place of crushed stone in massive stoppings, where the pressure or the danger from fire is not very great. If not well screened, too much coal dust is apt to be present, necessitating the use of a large amount of cement without corresponding improvement in the strength of the concrete.

*Superintendent, the Consolidated Coal & Coke Co., Dacono, Colo.

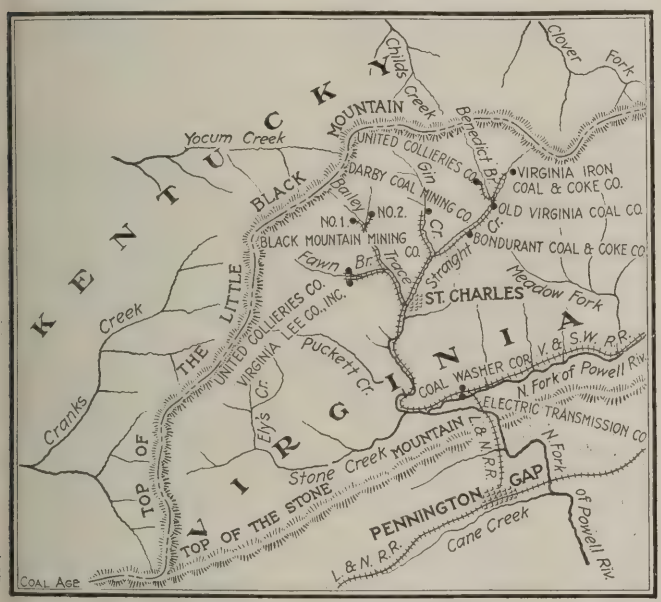
The Pocket Coal Field of Lee County, Va.

By W. R. Peck*

SYNOPSIS—The name refers not to the condition of the coal but to the mountain-girt character of the district. The central-power station and central washery exhibit uptodate developments in the mining industry.

In the extreme western part of Virginia, on the Kentucky state line, is a coal field of some 40 square miles in extent, which has come into prominence within the last ten years. Locally, this is the Pocket or Little Black Mountain coal field of Lee County.

Geographically, it is in southwestern Virginia, bordering Kentucky, in the heart of the Appalachian Mountains. Little Black Mountain, the summit of which forms the state line, bounds two sides of this coal field, while Stone



The Virginia Pocket

Mountain cuts it off from the world on the other sides, nature providing only one natural outlet, a water gap for the north fork of Powell River through Stone Mountain, known as Pennington Gap. Thus, this region, entirely surrounded by mountain ranges, became known to the earliest settlers of southwestern Virginia as "The Pocket."

"The Pocket"

Topographically, the field is one of many small streams, with narrow, winding valleys, each stream heading in the main mountain ridges and being divided from its tributaries by spurs having steep slopes and sharp summits. The main spurs, as they leave the mountain, are lofty, in many cases rising 200 to 300 ft. above the mountain, and maintaining this height until, with an abrupt break, they slope down to the stream at their foot. After the upturned strata of Stone Mountain have reached their natural horizon, as they do a short distance from the foot of the mountain, they become regular, and have a general northwestwardly dip with moderate grades.

Though this field, at the present time, produces only from 600,000 to 700,000 tons annually, it is, nevertheless, of great interest to the domestic coal trade, as the principal seam mined is one of the best domestic coals on the market. Eight mines, owned by six companies, are in operation; a large central power station has recently been completed, and a washer, large enough to handle the entire output of the smaller sizes of coal in the field, will be completed in the early spring of 1914.

History of Field

This field was not opened when the first rush was made into southwestern Virginia in the latter part of the eighties, due, perhaps, to the fact that there the famous Imboden seam of Wise County has deteriorated and is practically worthless. "The Pocket" was undeveloped and unprospected until the year 1903, when the Darby Coal & Coke Co. began prospecting and purchased about 1500 acres on Gin and Straight Creeks. About the same time, the principal land-owning company of this section, now known as the Black Mountain Corporation, entered the field, purchasing practically the entire region, with the exception of the 1500 acres mentioned above. The first company to open mines on the properties of the Black Mountain Corporation was the St. Charles Coal & Coke Co., which operated a mine on Seam No. 3, and later on Seam No. 5 also; this company, after passing through many and varied troubles, is known today as the Virginia-Lee Co., Inc., Norfolk, Va.

The Darby Coal & Coke Co., working Seam No. 5, or the Darby Seam, had an output of from 200 to 300 tons a day when the exceptional high prices of 1905 and 1906 prevailed in this field. Due to the superior qualities of the coal, and the small supply, it demanded and obtained an extremely high price, a price that would be fabulous there today. The profits made caused several new companies to enter the field, leases being obtained from the Black Mountain Corporation. The Virginia & Southwestern R.R. at once began to build several miles of additional tracks; and in the spring of 1907 there were seven mines in operation on the Darby Seam.

Would-Be Coal Men Forced Out by Competition

With the exception of the Darby Coal & Coke Co. and the Bondurant Coal & Coke Co., the history of the various corporations has been one of trouble, due to poor managers and limited capital, and all but the two mentioned above have changed hands in different ways: two through the bankruptcy courts, others by reorganization or the sale of stock. But the impression must not be drawn from the statement that investments in this field are not advisable, for they are. The first companies rushed into the field with limited capital, opening their mines and beginning to ship coal just when the prices, which were so high, began to drop, and the money they expected to make, to pay their debts, vanished. As this was a new

*Engineer with Fox & Peck, consulting engineers, Big Stone Gap, Va.

coal and a new field, it did not have an established market, and prices remained low for some time, thereby forcing many of the companies and their stockholders to get out as best they could. These conditions naturally brought into the field experienced mine managers and real coal men, and the field now has established markets in the south, north and west.

The Darby Coal & Coke Co. leased its plant and lands to the Darby Coal Mining Co. in 1909; and in 1911 the Virginia Iron, Coal & Coke Co., Imperial plant, began shipping coal from their mines on No. 6 Seam.

Description of Seams

Twelve workable seams of commercial value are found in this field, occurring in the upper part of the Pottsville group. Below Seam No. 1, according to report, are four or five coal seams in the lower part of the Pottsville group, and in the Lee Conglomerate, but they are thin, varying from a few inches to 2 or 3 ft. in thickness and are at the present time of no commercial value.

Following will be found the different seams, with their thickness and the interval between them, beginning with the highest and descending:

CROSS SECTION OF POCKET FIELD

Harlan sandstone, exposed in cliffs near the mountain tops, 40 ft. in thickness.
No. 12 seam, from 48 to 60 in. in thickness; interval, average, 60 ft.
No. 11 seam, average, 36 in. in thickness; interval, 300 ft.
No. 10 seam, average, 72 in. in thickness; interval, average, 40 ft.
No. 9 seam, average, 55 in. in thickness; interval, average, 100 ft.
No. 8 seam, average, 48 in. in thickness; interval, average, 205 ft.
No. 7 seam, average, 42 in. in thickness; interval, average, 325 ft.
No. 6 seam, average, 52 in. in thickness; interval, average, 275 ft.
No. 5 seam, from 36 to 48 in. in thickness; interval, average, 180 ft.
No. 4 seam, average, 30 in. in thickness; interval, average, 180 ft.
No. 3 seam, average, 40 in. in thickness; interval, average, 85 ft.
No. 2 seam, average, 36 in. in thickness; interval, average, 300 ft.
No. 1 seam, from 36 to 72 in. in thickness.

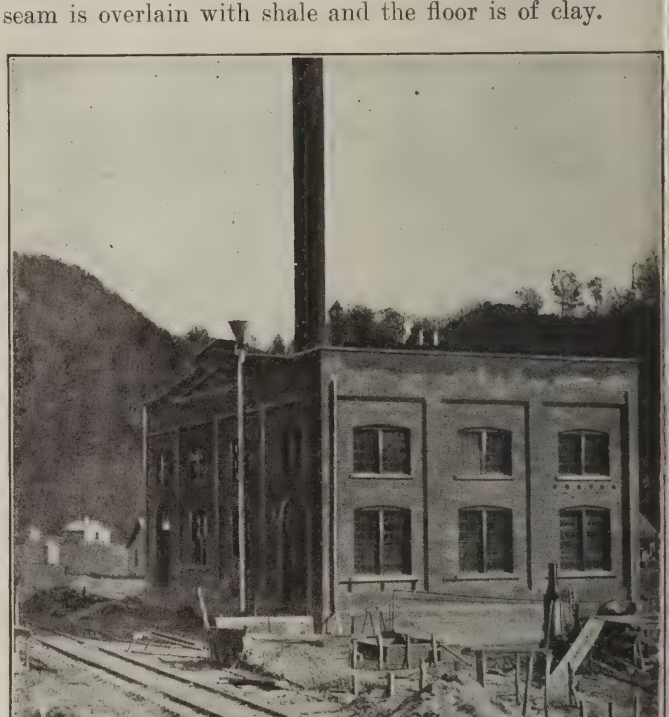
ANALYSES OF THE SEAMS

No. of Seam	Moisture	Vol. Mat.	Fixed Carbon	Ash	Sulphur	B.t.u.
12.....	5.49	41.20	52.75	6.05	1.36	13,109
10.....	2.48	36.08	54.56	6.88	1.04	13,504
9.....	4.44	35.99	53.59	5.98	0.76	13,363
7.....	2.00	40.67	51.09	6.24	0.74	.....
6.....	3.70	35.20	54.00	7.10	0.95	13,730
5.....	3.60	36.50	57.50	2.40	0.70	14,600
3.....	1.30	38.20	56.00	3.30	1.20	.....
1.....	1.92	38.78	56.26	3.04	0.65	.....

At present, only two seams are mined, Nos. 5 and 6; however, No. 10 seam on the head of Fawn Branch, was worked for two or three years by the former Dominion Coal Co., but, due to the improper construction of the incline and financial troubles, it was abandoned. The United Collieries Co., now operating the Dominion plant on No. 5 seam, and opening a new mine on seam No. 6, on Benedict Branch, will, in the near future, build a new incline and open up this No. 10 Seam.

The Darby, or No. 5, seam of coal is the most important in the field at the present time, and it is the same as the Roda or Taggart coal of Wise County, Va., and the Kellioka, of Harlan County, Ky. This seam in the area mentioned varies from 26 to 50 in. It is practically a clean coal, free from partings; it has a luster, is hard, and, when cut, breaks into splinters as well as blocks; it stands handling and the weather well, ignites quickly, burns splendidly in grate, stove or furnace, and leaves only a small quantity of a light reddish ash when complete combustion is obtained. This coal also makes a good coke, although, at the present time, it is not used for coking, as the price of nut and slack for steam purposes is usually good. The seam is overlain with a heavy sandstone top, but the sandstone is sometimes cut out by a heavy draw slate. The bottom is a clay.

Seam No. 6, lying about 275 ft. above No. 5, averages about 50 in. in thickness, and has a parting varying from ½ to 1 in. thick, usually occurring from 12 to 14 in. from the bottom. This coal, when cut, breaks into cubes, from the nut to block size; the blocks seldom exceed 12 in. in any dimension. The coal is hard, with a dull luster; it ignites with difficulty, burns slowly and leaves little ash. The top, in the mines of the Virginia Iron, Coal & Coke Co. on the head of Straight Creek, is exceptionally good, for after the drift mouth is passed, no cross-timbers and but few props are needed anywhere in the mine. This seam is overlain with shale and the floor is of clay.



Central Station of Electric Transmission Co., Pocket, Va.

Seam No. 10 has an average thickness of 6 ft. It contains a clay parting in the upper half and a thin shaly coal parting in the lower, and, usually, is overlain with sandstone and rests on shale. This coal blocks well, stands handling and weather, and is a good average domestic coal.

Operating Companies

The Black Mountain Mining Co., Big Stone Gap, Va., Dr. J. W. Kelly, president and general manager, leases from the Black Mountain Corporation. This company operates two mines on Seam No. 5, on Bailey Trace Branch, and has an output of 350 tons per day, shipping three grades of coal from Mine No. 1 and two grades from Mine No. 2. The power house consists of one 100-kw., belt-connected unit, 250 volts, direct current; additional power will be obtained from the central-power station. Mine No. 1 has four chain machines, two haulage motors, one electric pump and one electric rock drill. Mules are still used in parts of the mine for gathering. Mining is done by the room-and-pillar method; rooms 40 ft. wide and gob entries. Mine No. 2 has two chain machines, two haulage motors, one fan motor and one electric rock drill.

Mules are still used in parts of the mine. System of mining is the room-and-pillar method. The rooms are 40 ft. wide; and the entries are gobbed.

The Bondurant Coal & Coke Co., St. Charles, Va., C. W. Bondurant, president and general manager, leases from the Black Mountain Corporation. This company is mining No. 5 seam on Straight Creek. The output is 30 tons per day, and three grades of coal are shipped. Coal is shot off the solid. The coal is hauled by mules with a gravity incline to tipple. The system of mining is the room-and-pillar method. Rooms are from 20 to 30 ft. wide and gob entries are driven when necessary.

The Darby Coal Mining Co., Darbyville, Va., C. H. Thompson, president and general manager, leases from the Darby Coal & Coke Co. This company is mining Seam No. 5 on Gin Creek. The output is 360 tons per day, and three grades of coal are shipped. The two smaller grades are washed. The power house has one 150-kw. direct-connected generator developing direct current at 250 volts. There are four chain cutters, one Hess bar machine and three six-ton crab motors. The system of mining is the room-and-pillar method. The rooms are 40 ft. wide and are turned both ways from the cross-entries.

The Old Virginia Coal Co., Darbyville, Va., C. H. Thompson, president and general manager, leases from the Black Mountain Corporation. This company is mining Seam No. 5 on Straight Creek. The output is 450 tons per day, and three grades of coal are shipped. The power house has one 200-kw. belt-connected, 250-volt direct-current generator three-chain machines; one Hess bar machine and three 6-ton motors. Mules are used in some parts of the mine. The system of mining is the room-and-pillar method with rooms 40 ft. wide.

The United Collieries Co., Bristol, Tenn., C. W. Bondurant, general manager. The plant is known as the Dominion colliery and is leased from the Black Mountain corporation. This company is mining Seam No. 5 on Fawn Branch. The output is 250 tons per day, and three grades of coal are shipped. The power house contains one 150-kw. unit, belt-connected, delivering direct current at 250 volts. A substation is already installed to obtain power from the central-power station. Five chain machines and four motors are in use. Mules are still used in parts of the mines. The system of mining is the room-and-pillar method with rooms 30 to 40 ft. wide and the cross-entries are gobbed.

This company also operates the Benedict Plant, leasing from the Black Mountain Corporation. This operation will mine Seams Nos. 6 and 10 on Benedict Branch of Straight Creek. The output will be 1000 tons per day and power will be obtained from the central-power station of the Electric Transmission Co. Modern machinery will be installed throughout the mine.

The Virginia Iron, Coal & Coke Co.—Henry K. McHarg, Jr., vice-president and general manager, Roanoke, Va. The Imperial plant of this company, R. R. Williams, superintendent, leases from the Black Mountain Corporation. This operation is mining Seam No. 6 on the head of Straight Creek. The output is 500 tons per day, and three grades of coal are shipped. The power house has one 250-kw. direct-connected unit delivering direct current at 550 volts. There are three chain machines, five motors and a gravity incline to the tipple. Coal is mined by the room-and-pillar method with rooms from 25 to 30 ft. wide.

The Virginia-Lee Co., Inc., Norfolk, Va., W. A. Wagner, vice-president and general manager, leases from the Black Mountain Corporation. This company is mining Seam No. 5 on Fawn Branch. The output is 400 tons per day and three grades of coal are shipped. The power house is equipped with one 150-kw. belt-connected unit delivering current at 250 volts. There are seven machines and five electric locomotives. The coal is mined by a method giving a short-wall face of 120 ft. Where this method cannot be used on account of heavy draw slate, the room-and-pillar method replaces it with rooms 30 ft. wide.

Central-Power Plant

The general manager of the Electric Transmission Co. is Harry B. Reed, of Lexington, Ky. The central-power station of this company is located at the Pocket. The building measures 90x50 ft., and is constructed of brick and concrete. It has steel roof trusses and a concrete floor. A General Electric turbo-generator delivers 1000 kw., with power factor of 80 per cent. at 2300 volts, the current being three-phase, 60 cycles. There are two exciters each generating 25 kw.; one is motor-driven and the other actuated by a steam turbine. There is a five-panel black slate switchboard with lightning arrester and aluminum cell. The line voltage is 33,000 volts.

The transmission line is carried on wooden poles with Byllesby wishbone cross-arms, 35,000-volt insulators being provided. Steam is raised in a battery of two 350-hp. boilers, the pressure being 200 lb. per square inch. The draft is secured by a steel stack, 5 ft. in diameter by 140 ft. high. The vacuum of the turbine is provided by a Wheeler jet condenser. The piping is extra-heavy and was installed by B. F. Shaw & Co., Wilmington, Del. Water for the condenser and boilers is taken from the North Fork of the Powell River through 12-in. pipe, a concrete dam being built across the river.

The intake is constructed of concrete and the water is double-screened before it is admitted to the pipe line. After being used in the condenser the water is pumped to a hot well, where the makeup pumps deliver it to a 1000-hp. Blake-Knowles feed-water heater. Worthington outside-packed piston pumps are used for boiler feed. The rear of the building is of temporary construction, so that it can be extended for future installments.

Five houses for employees have been erected. An 8-in well 341 ft. deep to supply water for domestic use has been drilled, and the water will be pumped to a 20,000 gal. tank on the hillside. Another 2500-kw. unit, with the necessary boilers, will be installed later, and the transmission line will be extended to Harlan County, Ky., and to Wise County, Va. This plant was erected under the supervision of S. E. Puckette, with B. F. Shaw & Co. acting as consulting engineers.

A Community Coal Washery

The Coal Washer Corporation, N. D. Bachman, Jr., general manager, Bristol, Tenn. The present capacity of the washer constructed by this corporation is 750 tons every 10 hours. The constructors are the Montgomery Coal Washing & Manufacturing Co., Birmingham, Ala., who also are the manufacturers and designers of the jigs.

The present installation includes two jigs with foundations and a settling tank for these and for two more. The elevators will lift 1500 tons in 10 hours. There is one bin of 75 tons capacity for unwashed coal, and three bins of 100 tons capacity and one of 75 tons, for storing washed coal.

Coal is delivered in railroad cars from the various adjacent mines and dumped below the tracks and elevated to unwashed-coal bins. Then it passes through the jigs and settling tank and is elevated to the top of the washed-coal bins, where it is screened into ¾x2-in. nut, and ⅛- to ¾-in. pea and slack, being sprayed in the revolving screen. The slack goes to another settling tank and is elevated by a slow-speed elevator. The coal above 2 in. is sold unwashed. The washed coal can be mixed in any way desired. Water will be pumped from the hot well of the power house of the Electric Transmission Co. and delivered to a 30,000 gal. tank on the hillside.

This coal field is served by two railroads, the Virginia & Southwestern, a branch of the Southern R.R. and the Louisville & Nashville R.R. These two railroads use the same tracks in the field from their junction at the Pocket.

Acknowledgment is made to S. E. Puckette, engineer of the Black Mountain Corporation and to others in the field, for assistance in preparing this article.

Interpole Motors for Mine Locomotives

By A. R. Anderson, M. S.*

SYNOPSIS—The demand for interpole motors on mining locomotives appears to have been built up by the manufacturers. Their use complicates the wiring and necessitates the carrying of an extra set of spare parts, while the results secured are not appreciably better than those afforded by a properly designed noninterpole machine.

Most practices have their legitimate field of usefulness, and there are but few that cannot be overdone. So it is with interpole motors. The merit of interpole construction for certain classes of service is beyond dispute, but it seems that the recognition of its good features has so urged the extension of its application that the legitimate limit of its usefulness along certain lines has been overstepped. Particularly is this true in its adaptation to railway motors for electric mine locomotives.

The engineer, in common with all his fellow beings whose efforts are of any avail, is continually working in the spirit of compromise, and the advantages of a certain practice should not be permitted to become assertive to the point of barring the spirit of compromise from the engineer's considerations.

In recent years there has been a strong tendency to urge upon the mine operator the use of locomotives equipped with interpole motors, and many have taken up this agitation and established a demand for interpole motor equipment without, perhaps, definitely knowing whether the basis on which this demand is made is reasonable or not. It is hoped that the facts set forth in the following discussion from which conclusions of some value may be drawn, will assist the practical mine man in deciding upon the value of interpole equipment from the standpoint of satisfactory and economical operation.

Interpoles Are Not New

Interpole-motor construction is by no means a new idea; it dates back at least to 1884. On Oct. 23 of that year, an application for patent on this principle was filed in the U. S. Patent Office by R. H. Mather, and on Aug. 25 of the following year a patent (No. 324,862) was granted under the title of "Regulator for Dynamo Electric Machines and Motors."

The application of auxiliary poles midway between the main ones was exactly the same in principle as the present-day interpole practice, and the object as stated in the above mentioned patent was "to render dynamo electric machines of the specified classes self-regulating in such a sense that with constant speed of driving and with a constant position of the brushes, any such machine will maintain a constant potential regardless of variations of resistance in the working circuit—in other words, it is the object of my invention to prevent the occurrence of sparking at the commutator without any change in the position of the brushes, and at the same time to produce a constant electromotive force regardless of variations of resistance in the main circuit, a result which is particularly desirable in incandescent lighting and in the electric deposition of metals."

At that time the laws of commutation were perhaps not so well understood as they are today, and the above wording, therefore, sounds a little ambiguous, but the object of preventing the occurrence of sparking at the commutator without any change in the position of the brushes, is clearly enough put.

In 1885 and 1886 interpoles were used by F. L. Sprague in some experiments he was conducting on the Manhattan Elevated R.R. Commercial requirements, however, in regard to sparkless commutation, overload capacity and cost were not as exacting in those days as they are at present, and the principle was abandoned to be revived in more recent years.

The question naturally is asked, "Why were interpoles abandoned and then revived?" The answer has been hinted at above, but will be developed more fully later.

Sparkless Commutation Is Possible without Interpoles

As a starting point then, the statement is made that where no restrictions are placed on the dimensions of the machine, it is possible to design a motor that will have practically sparkless commutation from no load to full load in both directions of rotation. By "practically sparkless commutation" is meant that any sparking which may occur is so slight that it cannot in any way be considered injurious. As the load is increased above full load, however, the distorting effect of armature reactance upon field flux becomes more and more pronounced and objectionable and destructive sparking sets in.

In the early days when knowledge of these matters was more or less vague, everybody from the designer and manufacturer to the ultimate purchaser played safe. Commercial competition was less keen than it is today; designs were of liberal proportions, both in regard to dimensions and amount of material, and in the specification of apparatus for a given duty, a generous factor of safety was allowed. Electrical apparatus was passing rapidly through successive stages of development, and to err on the side of "too much" rather than "too little" was the watchful care of every engineer.

Eventually designs became more standardized; competing companies manufactured similar lines of apparatus, and business was obtained largely on price. The electrical industry took its place among well founded commercial enterprises of the day, and the inventive engineer with original ideas gave way to the cold, calculating scrutinizer of detail, whose sole business it was to reduce the cost of production of existing designs.

A similar revolution took place in the specification of machines, and the tendency toward investigating the average rather than the maximum duty in determining upon the capacity of the machine required became more marked.

Some significance then accrued to the term "overload capacity," and in the design of motors the long neglected

*Electrical Engineer, Jeffrey Mfg. Co., Columbus, Ohio.

interpole was soon revived. The association of interpoles with overload should be borne in mind. Thus may be explained the reason why the interpole with its added complications of mechanical construction and electrical connections lay for so long a time dormant, to be revived later in the strife for economic production and efficient operation under conditions in respect to heating, etc., where the variation in load is such as to permit of intermittent *overloads*.

With Limited Dimensions Use Interpoles

Another legitimate application of interpoles is found in motors where the dimensions for a given horsepower and speed are limited by the machine of which the motor is a part. By virtue of the increased number of ampere conductors on the armature, made possible by the use of interpoles, the torque developed by the armature is increased by this construction so that for a given speed a greater horsepower with good commutation may be obtained from a frame of given dimensions.

In general, interpoles are desirable and properly applied in cases where the motor is subjected to overloads, or where a large horsepower at a low speed is cramped into small dimensions.

But, thousands of interpole motors are designed for and put into service under conditions that do not fall under either one of these cases; conditions where the motor cannot be overloaded and where dimensions do not necessitate the use of interpoles to obtain the required horsepower. Then why are interpole motors built for these conditions, where dimensions are not limited and where the motor cannot be overloaded? The initiative in this matter is taken by the manufacturer; therefore, his side of the question will be considered first.

As pointed out above, the efforts of the manufacturer's engineers are directed toward decreasing the cost of production. Without going into detail, it is generally possible, because of the increased ampere conductors permissible on an armature of a given diameter when employing interpoles, to effect, in stationary motors of any considerable size, with continuous rating, a sufficient saving in material to more than offset the additional labor required by the interpole construction.

The size of motor in which the interpole design effects a saving in the cost of production, varies considerably with the design and methods of fabrication, but in general the interpole construction will not prove economical from a manufacturing standpoint on motors below 20 or 25 hp. And so although commutation is but little, if at all, improved under working conditions, the cost of production may be reduced.

The argument of good commutation under overload, however valueless in the particular application under question, still affords a talking point, and the interpole motor is urged on the trade by the manufacturer.

The customer, under the impression that "overload capacity" means an increased factor of safety, overlooks the fact that in accepting an interpole motor, he accepts just as much more apparatus on which he must take a chance of break-down and for the upkeep of which he must keep added stock on hand as the interpoles represent; and so, although the overload capacity may not be needed, the purchaser is easily won over to the attitude of the manufacturer in regard to interpole motors, and thus the demand is established.

In many cases where the motor is reasonably well looked after and cared for, and where the usage of the machine does not severely expose it to liability to damage, this point of upkeep on additional apparatus may not carry much weight, but there are places where this point is significant enough to demand deliberation, and of these, the electric locomotive for mine haulage is cited as perhaps the most conspicuous.

A Locomotive Can Only Exert a Certain Pull

Consider the conditions under which the electric motor is applied to a mine locomotive. A locomotive of given weight hauling a trailing load, is capable of exerting a maximum effort at a speed depending upon the speed of the motor, the gear reduction and the diameter of the wheels. This maximum tractive effort which the locomotive will exert depends upon the coefficient of adhesion between the locomotive wheels and the rail, and for general conditions may be taken as 20 per cent. for chilled cast-iron wheels or 25 per cent. for steel-tired wheels.

In other words, the maximum tractive effort of a locomotive with steel-tired wheels and driving on all wheels is 25 per cent. of the weight of the locomotive, which maximum tractive effort is developed at a certain definite speed depending upon the motor equipment, gear reduction and diameter of drivers and, therefore, represents a certain maximum horsepower.

Allowing for the mechanical efficiency of the locomotive, the maximum horsepower developed by the motor is, therefore, determined. Since there is nothing to prevent the motor from being operated continuously at this maximum horsepower while the locomotive is in operation, the motor equipment should be at least large enough to meet this condition, no matter what the purchaser may specify in regard to the average duty of the locomotive.

For example, the purchaser may outline a schedule of duty in which the locomotive is required to develop the maximum draw-bar pull only occasionally, and for very short intervals, as will be the case if his haulage route contains a short, steep grade. The rest of the haul is comparatively easy, and the average horsepower required of the motor may be less than one-half of the maximum.

Under this condition the locomotive might operate satisfactorily with a motor equipment having a normal rating of one-half the required maximum capacity, and an overload rating obtained by the application of interpoles equal to the maximum capacity for short intervals. It is repeated that a locomotive with such a motor equipment might operate satisfactorily *so long as the route remains unchanged,* but this is an item over which the manufacturer has no control.

The locomotive may be operated over the specified route for only a short time and be then placed on a haul that is practically level, as many cars as the weight of the locomotive will permit being hauled are coupled to it, and the maximum draw-bar pull developed almost continually; the motor operates at double its normal rating almost all the time, and trouble follows.

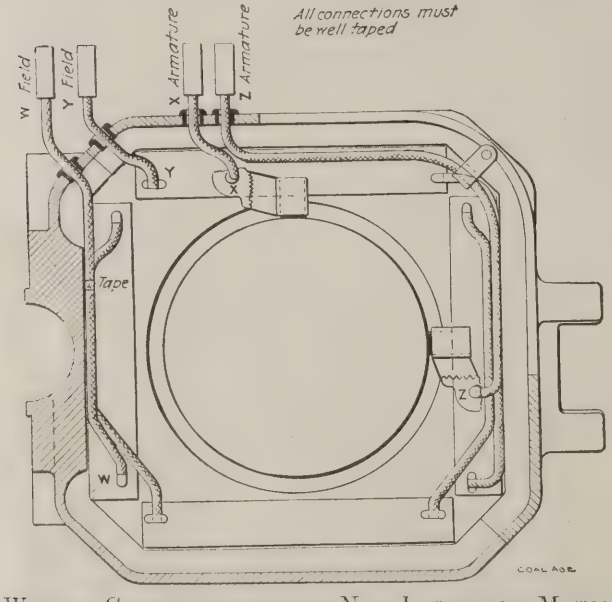
The correct motor equipment for industrial haulage and especially mine haulage must have a normal capacity at least equal to and preferably 10 to 15 per cent. greater than the maximum tractive effort which the locomotive can develop regardless of any outlined schedule of duty. Then the motor cannot be overloaded, and troubles arising from excessive overload are eliminated.

The above has been well enough known for several years, but seems to be lost sight of in urging the overload performance of interpole motors for mine locomotives. It is merely desired to emphasize this point; the overmotored locomotive is the only successful locomotive for mine service, as the motors in such a machine cannot be overloaded. This eliminates the necessity for interpoles so far as overload is concerned.

Sufficient Space Is Usually Available

The next point, then, concerns available space. Without going into the question of design, it is a fact that for practically all combinations of locomotive weight and track gage, the dimensions available for the motor will permit of the design of a good noninterpole machine, or one that gives sparkless commutation up to its full rated load, and whose speed is low enough for a single gear reduction.

Special cases arise occasionally, as, for example, where an exceptionally heavy locomotive or an unusually high-



Wiring Connections of a Non-Interpole Motor

speed machine is desired on narrow gage. These conditions, however, can generally be met by a special mounting of the motor. There are extremely few cases that can be met with an interpole motor that cannot be met equally well by a noninterpole motor.

Motors of the railway type are totally inclosed; they are rated on the one-hour basis, and since there is practically no difference in efficiency between interpole and noninterpole motors, the amount of heat to be radiated for a given horsepower is practically the same in both cases and the dissipation of this heat within a given temperature rise requires a machine of practically the same size in both cases. Therefore, entirely aside from the question of satisfactory commutation, the opportunity for reducing cost of production and over-all dimensions of motors for this class of service by the use of interpoles, is practically nil.

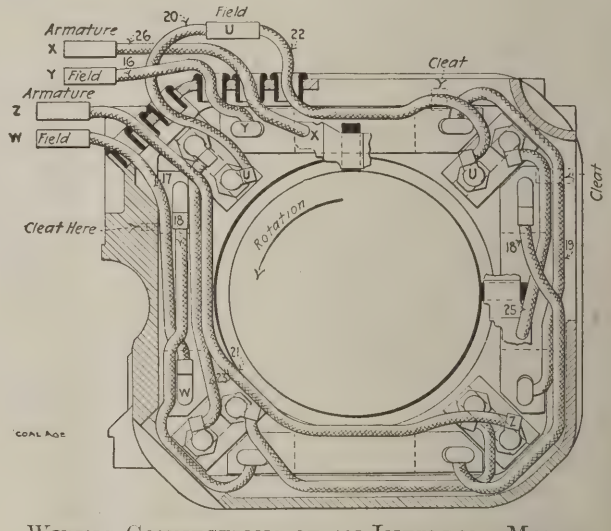
The limited space available for the application of interpoles to motors of this type oftentimes prohibits the design of an economically produced interpole machine capable of carrying overload with sparkless commutation.

A detailed discussion of design does not fall within the scope of this paper; suffice it to say that to take advantage of the interpole construction in the way of increased ampere conductors on the armature will generally necessitate excessive flux density in the interpole core, with consequent faulty commutation at overloads. Experience in the design of interpole motors of this type has pointed to the fact that the only correct way is to design a noninterpole motor as good as possible, and then if anything better is desired in the way of overload capacity, to add the interpoles.

Commutation Is Not Always to Blame

It has been said that the majority of locomotive troubles arise from faulty commutation, and that with the use of interpoles these troubles are eliminated. That the majority of locomotive motor troubles arise in this way is not strictly true with a properly designed equipment, in spite of the fact that the commutator, brushes and brush-holders often show the greatest signs of abuse when the machine is examined after the trouble has occurred.

The seat of trouble will more generally be found in worn armature bearings which permit of considerable



Wiring Connections of an Interpole Motor

jarring, pounding and vibration with consequent chattering of the brushes, small "make and break" arcs between commutator and brushes causing pitted and blackened commutator surface, high mica, excessive wear and disintegration of brushes and severe sparking which may eventually result in a flash-over or burn-out. All this is the result of badly worn armature bearings rather than faulty commutation, and is found in interpole as well as in noninterpole motors.

Furthermore, worn armature bearings permit grease, oil and dirt, a mixture whose electrical conductivity renders it a formidable promotor of trouble to enter the motor and accumulate on the commutator, brushes or brush-holders. The recognition of this has led the leading manufacturers of mine locomotives to embrace ball bearings as an effective remedy for these troubles, but the further step of adding interpoles is not necessary.

If nothing advantageous is gained, is there possibly anything disadvantageous about an interpole equipment on a mine locomotive? Only this, as stated above: That the installing on a mine locomotive of interpole motors, is equivalent to installing as much additional and un-

necessary apparatus from which there is liability of breakdown, and for which repairs must be carried in stock, as the auxiliary poles and their windings represent. The already small space inside of the motor is further filled by the auxiliary poles and coils, and more leads are packed into the motor, reducing accessibility and decreasing the ease of repair.

The acompanying illustration represents wiring diagrams drawn to scale of similar motors, one without, and one with interpoles, and illustrates what the addition of interpoles means in this respect. The connections shown might, of course, be somewhat simplified and leads shortened by making two kinds of field coils, one open end and the other closed, but there is the obvious objection of having to provide two different kinds of coils with the possibility of getting them wrongly placed.

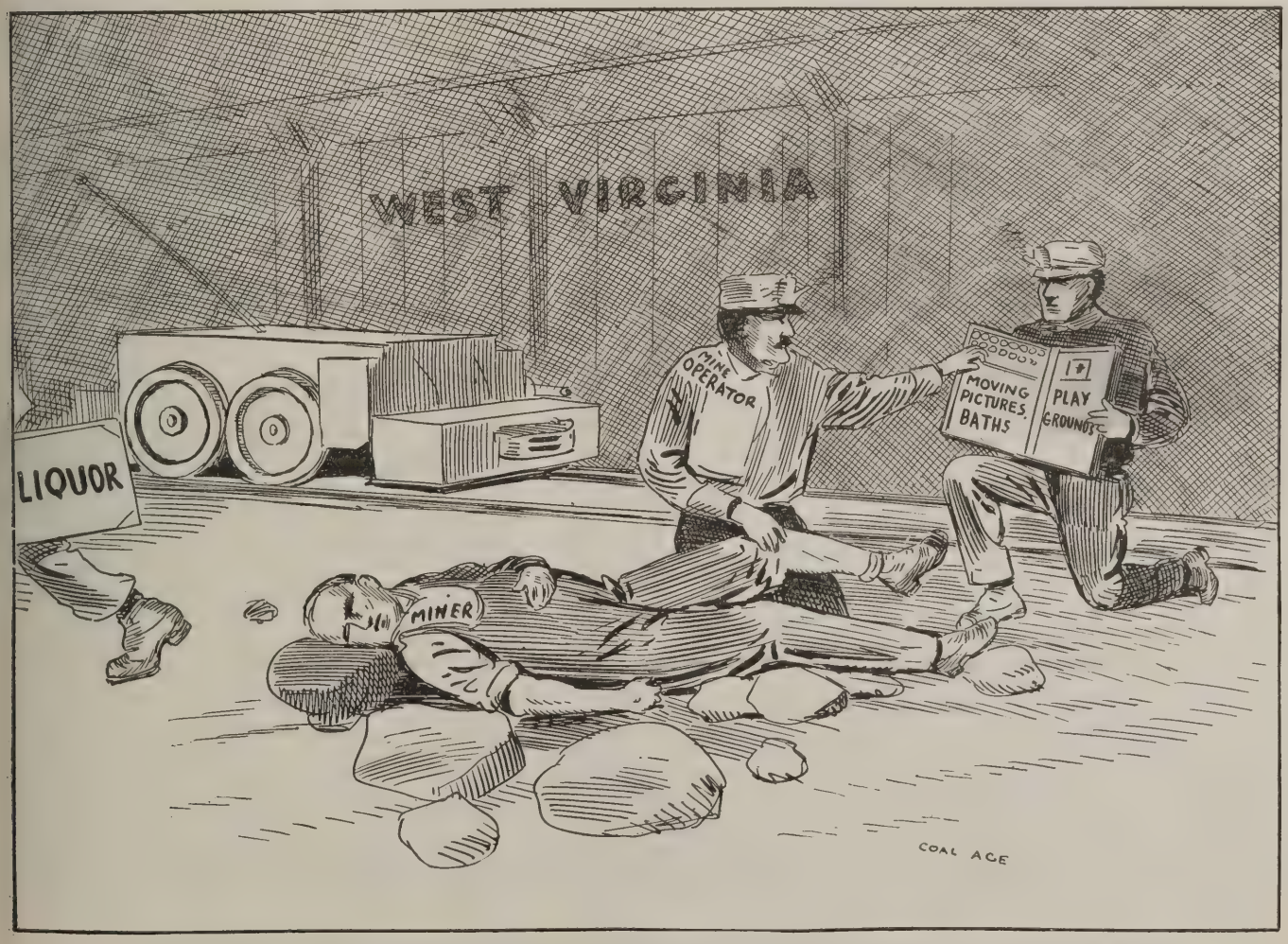
The complication of connections by the addition of the auxiliary windings is not altogether a trivial consideration from the standpoint of the mine electrician and the carrying of an unnecessary stock for repairs is not attractive.

There is no lengthy or involved moral to the above. The conclusion is simply this: Overload capacity is not needed on properly designed mine locomotives; no appreciable saving in the cost of production of motors of this type is effected by the use of interpoles, and where good noninterpole motors with satisfactory commutation can be obtained, the installation of unnecessary equipment is not to be recommended.

Miners' Electric Lamps

In a paper on the "Design and Maintenance of Miners' Electric Lamps," before the London branch of the Association of Mining Electrical Engineers, F. J. Turquand says the design of miners' electric lamps may be divided into three subsections: (1) The shell, or case, including the lantern or light-emitting portion; (2) the battery or source of electrical energy; (3) the methods of mechanically and electrically connecting the lamp case containing the electric bulb with the battery, including locking devices.

The main points in erecting a miner's electric lamp charging and repair installation are: (a) An electric supply at constant voltage supplied through a circuit, the installation resistance of which is high and without liability to leaks; (b) absolutely accurate circuit and testing voltmeters and ammeters, including a main-circuit recording-volt- and ampere-meter, which should be recalibrated periodically and have frequent sub-section fuses with the minimum of margin; (c) strong benches and charging racks completely covered with stout lead or glass sheet; (4) facility for washing down with a hose, and quick drainage.



The Safety-First Movement That Is Becoming Popular—Install It in Your Mine

Snap Shots In Coal Mining



TIPPLE OF SO. CAÑON COAL CO., SOUTH CAÑON, COLO.



MINE NO. 6, DOMINION COAL CO., GLACE BAY, N. S.

Views at Eccles Explosion



SURFACE PLANT AT ECCLES MINE, SHORTLY AFTER EXPLOSION OCCURRED, APR. 28, 1914



Bodies of Victims Were Placed in a Temporary Morgue and Were Shielded from View by a Canvas Wall



Friends and Relatives of Entombed Miners Awaiting News of Their Fate

The Colorado Strike

SYNOPSIS—Peace and disarmament have followed the entrance of the U. S. troops into Colorado. The militia under arms now numbers 30 men.

Last week we gave a history of the strike from the burning of the Ludlow camp to the dispatch of United States troops to the scene of action. The account this week is of a continuous pacification which bids fair to last at least as long as the troops remain. The President telegraphed to Governor E. M. Ammons that he should call the attention of the legislature to the need for immediate consideration of the whole situation as soon as that body would convene, namely, on May 4, and added:

"The manifest disadvantages of having two military forces under separate control operating within the same locality leads me to request you to withdraw your militia so soon as the troops of the United States have reached the scene and are ready to take over the necessary control.



COLORADO MINE WAR ARBITRATION COMMISSION

From left to right they are: William Fairley, of the U. M. W. of A.; Secretary of Labor Wilson, and Hywel Davies, president of Kentucky Coal Operators' Association.

SHOULD THE MILITIA WITHDRAW?

Governor Ammons very properly replied that he understood this part of the President's message to mean that the militia should not be kept in arms in parts of the state where United States troops were stationed. Cañon City and Trinidad, at which towns the two United States forces are stationed, are 137 miles apart by railroad. The former town is 192 miles from Boulder by the Atchison, Topeka & Santa Fé and the Colorado and Southern Rys. Near this latter town much of the violence of which we have been reading has been committed. It is not easy to see how the executive of the state of Colorado could be justified in removing the militia and leaving so large an area open to the armed forces of strikers, so long as the distribution of forces remained unaltered and the army of occupation was not augmented.

THE FIGHT AT FORBES

On Apr. 29 the fighting still continued. A conflict at Forbes, 10 miles north of Trinidad, which is near the New Mexico line, resulted in the death of nine men, there being six wounded. Forbes was attacked by some 150 or 200 strikers and was defended by Superintendent Nichols and 40 mine guards and strike breakers. The strikers had approached the camp at night and attacked the mine at 5 o'clock in the morning, the defense being aided by a machine gun mounted above the superintendent's office.

This gun became "leaded" in half an hour, but for three hours more the men in the camp withstood the fire until every building had been riddled. They then withdrew, leaving six of their number dead. Three strikers were killed, one of the bodies being pulled down from a tree, the man having ascended to pick off the defenders with a high-powered rifle. As a result of the fighting the Forbes camp of the Rocky Mountain Fuel Co. is burned to the ground.

The mine owners here threatened arrest of J. P. White, J. R. Lewson, J. McLennan, E. Doyle, F. Hayes and other union members on a charge of murder or conspiracy to murder in connection with the Forbes attack.

Major Patrick Hamrock stated to the Women's Peace Association that he heard the shots at Forbes and telephoned to Governor Ammons repeatedly for permission to move his 150 militiamen from Ludlow to the defense, but could not get his consent. The governor declares he did not receive any such request.

WALSENBURG AND LOUISVILLE

There was conflict in the Walsenburg region, about 30 miles further north, in which 200 militiamen, under Col. Edward Verderberg, participated. As a result five men were slain and three wounded, the former including Maj. P. C. Lester, of the hospital corps, who was attending a private, Miller, 150 yd. from the strikers' position. He was shot twice after he was dead, his Red Cross badges and revolver removed and his military overcoat was torn from his body.

On the preceding night in Louisville, 187 miles away by rail, a fierce fight had ensued. The militia succeeded in overpowering the opposition, and entered Hecla to find it deserted by the miners, their women and children having been sent to Boulder and Denver.

LUDLOW INQUEST

On Apr. 29 an inquest was held of the victims of the Ludlow battle. Dr. Asa Harvey, of Aguilar, physician of



STRIKERS' TENT COLONY AT LUDLOW, COLO.

the union at that place testified that after the fire in the tent colony had practically died down and while the women and children lay in the "safety pit" the militiamen applied torches to the inflammable canvas and that he with a ranch man had witnessed the deed. He also declared that the militia violated the white flag and fired on him while he was tending a patient.

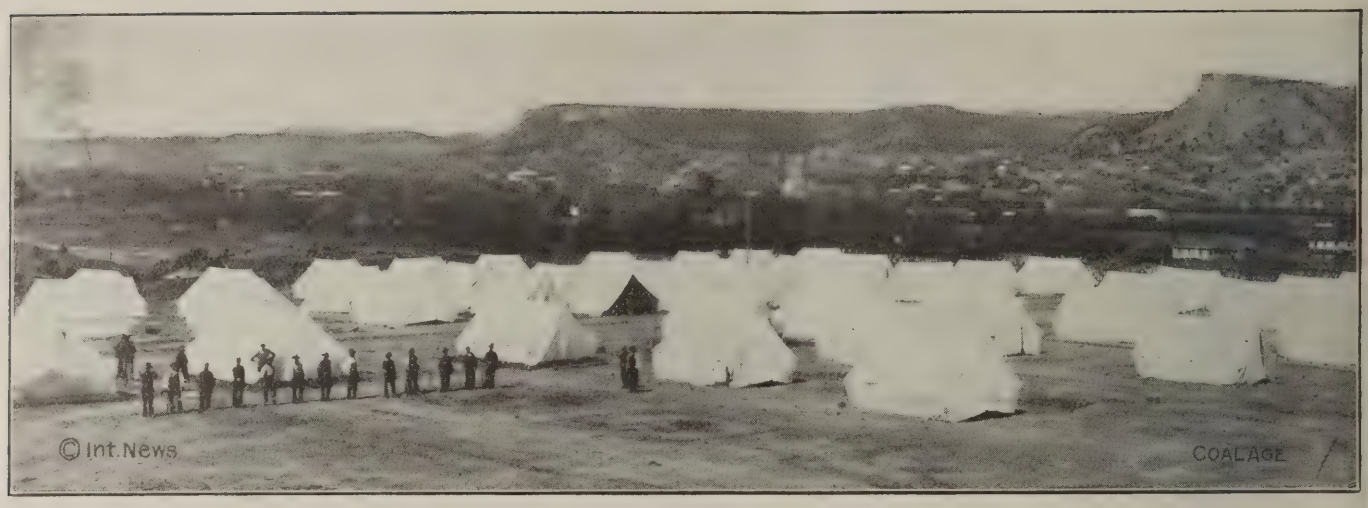
From evidence given on May 2, it seems increasingly difficult to exonerate the militia, even if we grant that the citizen force had every reason to attack and remove the tent colony as being an encampment of armed forces occupying a strategic position and constantly used as a vantage point in lawless attacks on the militia and strike breakers.

DEATH OF LOUIS TIKAS

Evidence as to the death of Louis Tikas seem to show that it took place in a most barbarous manner and even in violation of the rules of martial law which, however, was not in operation at that time. R. J. MacDonald, ex-stenographer of the Colorado Military Commission, declared that he heard Lieut. E. K. Linderfelt say, "I have ordered them not to hang him, but I have spoiled a good rifle."



RUINS OF LUDLOW TENT COLONY WHERE TWO WOMEN AND ELEVEN CHILDREN PERISHED



MILITARY HEADQUARTERS OF U. M. W. OF A., AT TRINIDAD, COLO.

Mr. MacDonald declared he had been told that Tikas was arrested and would be hanged. He met Linderfelt carrying his rifle over his shoulder with the stock to the rear. Previous testimony had declared that Tikas had been shot twice in the back and that his head had been crushed by a blunt instrument. The events recorded are a further indictment of the usefulness of the militia in times of civil strife. It is not trained and drilled like an army or a constabulary force and not being steadily under arms, the undesirable personel is not thoroughly weeded out as in the regular forces nor is the espirit de corps so strongly developed.

MILITIA HAS SUBJECTED ITSELF TO SUSPICION

It must be remembered that the militia has suffered a great deal of maltreatment from its oponents, many of its members had been killed and we can only condemn it because we expect a higher sense of duty from soldiers who are officers of the law and from citizens than we do from civilians and foreigners. As the Military Commission has declared the militia guilty of the murder of Tikas, the evidence seems strongly against them. Eighty-six members of Company B, Second Regiment, are to be courtmartialed, but probably only a few are guilty, perhaps only Lieutenant Linderfelt. This one evidence of savagery, however, makes it difficult for the public to give the military a blanket exoneration on all the other charges which have been brought against it.

THE IMPORTANCE OF LUDLOW

Henry A. Atkinson, secretary of the Social Service Commission of Congregational Churches, an advocate of the miners' cause, says of the Ludlow camps, the words being taken from a briefed account in the "New York Survey:"

This colony was a strategic position for the miners as it enabled them to keep watch on the station of the Colorado & Southern R.R. at Ludlow where strike breakers would detrain for several important mines. The land on which the colony was located was leased by the United Mine Workers of America, who furnished the tents and have supported the colony. There were 178 tents housing 900 people, of whom 271 were children, 25 babies having been born there since October.

Evidently, as the colonists were armed, there were only two courses to pursue: either to close the mines or to attack the camp. The militia was clearly checkmated by the strikers if the camp was to be kept inviolate.

THE INTERVIEW WITH ROCKEFELLER

Apparently the unrest has spread to New York City. Displeased with the somewhat general complaint that he had rebuffed Congressman Foster, J. D. Rockefeller, Jr., on Apr. 28 made a statement that Mr. Foster was unable to make any suggestion which did not involve the unionizing of the mines or the submission of this question to arbitration. He added that the Colorado Fuel & Iron Co. did not deny the right of any men to enter a union or to assert themselves freely in union for the furtherance of their common and legitimate interests, but it did assert the equal right of an individual to work independently of a union, if he so elected.

As a result of the interview with Mr. Foster, J. D. Rockefeller, Sr., who has always been regarded as an exemplary employer even by those who have denounced his other business methods, has been subjected to fierce criticism in the Federal House of Representatives. Men and women in mourning have picketed his offices at 26 Broadway and his house



A COMPANY OF ARMED STRIKERS AT THE TRINIDAD MILITARY CAMP



ARMED MINERS AT FIRING LINE IN ALL-NIGHT BATTLE, LOUISVILLE, COLO., APRIL 27



STRIKER FIRING FROM AMBUSH IN ONE OF THE BATTLES NEAR LUDLOW, COLO.

at West 54th St. and have been arrested for blocking the sidewalk. Some paid fines and were released; others refused and took part in a short and ineffectual "hunger strike."

ROCKEFELLER'S REPLY

Mr. Rockefeller, Jr., made a detailed reply, under the following heads, to those who declared that the Colorado Fuel & Iron Co. did not use its employees rightly:

1. **The Eight-Hour Day.** This was established by the fuel company for all its coal miners some time ago.

2. **Semi-Monthly Pay.** When this question was raised by one or two miners in one of the camps of the company, the officers at once studied the question and without delay decided to pay not only the miners in that particular camp twice a month but all the miners employed by the company.

3. **Checkweighmen.** For several years the fuel company has raised no objection to the employment by the miners of their own checkweighmen, as is done in Eastern mines where union labor is employed. In order that new men might understand their right in this matter, the officers of the company gave instructions that circulars should be posted in all the mines, stating that the company had always encouraged its miners to employ their own checkweighmen.

4. **Company Stores.** It has been charged that the employees of the fuel company are obliged to buy at the company's stores. The storekeepers are under strict instructions to say to all that they are at liberty to trade where they please, that the company is glad of their patronage but that their standing will not be affected one way or the other by their action in the matter. As a result of a study made in one of the mining camps of the company, it was found that only 22 per cent. of the wages of the men were spent in the company's stores.

5. **Wages.** In spite of the fact that no dividends have been paid on the common stock of the company since our connection with it, a matter of at least 10 or 12 years, and only $780,000 has been paid on the preferred stock, of which the greater part represented payment on account of an accrued dividend which had accumulated during many years, the company voluntarily increased the wages of its miners last year by a total amount of $300,000 a year and of its steel employees by a total of $350,000 a year. The wage scale compares favorably with that of any similar mines, whether union or nonunion, in any part of the country.

J R. LAWSON ANSWERS ROCKEFELLER'S STATEMENT

The reply of John R. Lawson, member of the International Executive Board of the United Mine Workers, recorded by Helen R. Robinson, is probably fair but puerile. He says that the eight-hour law was passed in 1905 and broadened in 1313 and could not be withstood, owing to the care in its framing. The semi-monthly pay law was established by law in 1901 and was not observed till March, 1912, when a strike was threatened. The law permitting the men to elect checkweighmen was passed in 1897. Lawson claims, 'With no union back of him, what would be the use of miners paying a checkweighman?", which is a check on the operators' statement that the union was weak at the time of the breaking out of the strike. There was a law passed in 1899 forbidding companies to compel their men to trade at the store. "May be," Lawson said, "the Colorado Fuel & Iron Co. people are observing that law just now, but they were not doing it when the strike was called."

But if these things are true, arbitration is still not necessary and a strike might well be declared off. A conference is not needed; the companies declare they have and will keep the law; the law is there to compel them. What need is there for controversy or arbitration? In a way everything Lawson is recorded to have said, leads one to the conclusion that the fight is for a closed shop.

ARBITRATION

The President still hopes to arrange for arbitration, however, and has sent for Hywel Davies, president of the Kentucky Coal Operators' Association, and William Fairley, a member of the Mine Workers Association in Alabama. He expects to ask them to appoint a third man.

On page 775 of this issue will be found the correspondence between Martin S. Foster, John D. Rockefeller, Jr., and the coal-company officials in Colorado relative to arbitration.



THESE FOUR STRIKE-BREAKERS WERE KILLED THE DAY AFTER PICTURE WAS TAKEN

The Italian and Austro-Hungarian governments are interesting themselves in their citizens who have been killed in the recent fights. The Italian consul at Denver has gone to Trinidad to obtain a complete account of the deaths of such men.

GENERAL STRIKE

The miners throughout the country have condemned the action of the Colorado authorities. At Pittsburg, Kan., the United Mine Workers threatened a general strike unless President Wilson took immediate steps to investigate the strike situation. The same district convention voted that the entire defense fund of the district, to wit, $200,000, be placed in the hands of John P. White to use in furtherance of the Colorado strike. The action of the 25 members of the executive board of the United Mine Workers now meeting at Indianapolis, Ind., is awaited with interest. It assembled May 4 and may possibly call a general strike, but is more likely, it is thought, to sustain the Federal Government in its action. At Peoria, Ill., and Du Bois, Penn., the United Mine Workers suggested such a strike as a protest.

SUCCESS OF U. S. TROOPS

The troops from Forts D. A. Russell and Leavenworth, Kan., arrived on Apr. 30 at Cañon City and Trinidad respectively. Mayor Holbrook is in charge. Guns were surrendered by 650 strikers at Walsenburg. Major-General Chase withdrew his militia from the district.

But the troops appeared to be insufficient for the pacification of so large an area and consequently on the request of Governor Ammons and Congressman Edward Keating, President Wilson sent the Eleventh Calvary from Fort Oglethrope, Ga., comprising 860 men, and two troops of the Twelfth Calvary from Fort Robinson, Neb., comprising 140 men. The first mentioned force will go to the southern part of the southern field, which includes Trinidad, Walsenburg, Forbes, Aguilar and Delagua. The other force will be the first sent to the northern field—Boulder and Louisville. Col. James Lockett, of the Eleventh Calvary, will be in supreme command. On May 2 the last militiamen left the southern district, one troop of U. S. soldiers being sent to Ludlow, relieving 200 men of the militia from duty.

DISARMAMENT

Also, on May 2 the Secretary of War, L. M. Garrison, issued a proclamation calling upon individuals, firms, associations and corporations in the Colorado strike districts to give up their arms. The secretary stated privately that the intention was to disarm first the rioters, then the sellers of arms and lastly the citizens. Receipts are being given those who surrender their arms, but no promise has been made to return them. Whether the United States troops have the right to disarm the militia and the mine guards who have been duly sworn to maintain the peace of the state is a question, and Major Holbrook showed no disposition to attempt such a disarmament. Even after the proclamation it seemed likely that only those volunteering such surrender or opposing the military forces of the United States would be disarmed by force.

Orders have been issued forbidding railroads and express companies from shipping weapons into Colorado except for the use of Federal troops.

THE COLORADO LEGISLATURE

On May 4 the legislature of the State of Colorado met in special session at the call of Governor Ammons. The immediate outcome was less eventful than was expected, the chief executive being greeted with applause. It has been stated that Governor Ammons will introduce an arbitration bill which will, however, not have compulsatory features.

It is also likely that a bill creating a constabulary will be introduced. The legislature has to provide $1,000,000 to meet the state military indebtedness. Impeachment of the governor appears to be unlikely, as the vote for the speaker showed that 23 were in his favor and only 17 opposed. Furthermore, five of his supporters were not present at the vote.

The latest report shows that the militia is completely disbanded, except in Routt County at the Oak Creek mine. This detachment of 30 men is located 224 miles distant from the nearest United States force which is detailed for service in maintaining peace.

Recent experiments in byproduct ovens in Great Britain showed that out of every ton of coal charged, there was obtained from twelve to fifteen c.w.t. of excellent coke, which sold in the market for $7.50 per ton. This same ton of coal also gave 30 lb. of ammonia, which sells for $63 per ton; 100 lb. of tar, at $8.50 per ton; 2½ gal. of benzol worth 60c.; and 5000 cu.ft. of gas.

University of Tennessee Offers a Course in Coal Mining

The Mining Department of the University of Tennessee, at Knoxville, will offer a two-weeks' course in practical coal-mining subjects to candidates who are qualifying themselves for the State Mine Foremen's Examination, and to others who are interested in the work. The course will begin on May 18, and continue until May 30. It will be under the direction of Dr. Jarvis, of the mining department, assisted by Geo. E. Sylvester, Chief Mine Inspector of Tennessee and his deputies, together with other practical mining men of the state.

The work has been arranged on the basis of particular topics and days, so that those who find themselves unable to attend the entire session may select the subjects that are of chief interest to them and be present on those days only.

The schedule of subjects and time devoted to them is as follows:

Mine gases, their chemical and physical properties; testing mine gases; effect on the human system; handling mine gases and the management of gaseous mines. May 18.

The theory and practice of mine ventilation; distribution of air currents. May 19 and 20.

Methods of mining; mine timbering and support; mine development; tunneling and shaft sinking. May 21, 22 and 23.

The use of electricity in mines; haulage; lighting; signaling; dangers. May 25.

Explosives used in mines; the handling, use, storage and the theory of explosives; testing. May 26.

Mine drainage and haulage; haulage systems; laying out tracks; transportation of men, coal and explosives. May 27 and 28.

Inspection, discipline and sanitation in and around mines; mining law; duties of mine foremen and miners. May 29.

Mine accidents; first-aid and rescue work. May 30.

The Certificate Law

In a recent decision of the examining board of the Province of Alberta, Canada, refusing the application of a former certified resident of Scotland, for a certificate of competency making him eligible to hold the position of mine manager in the province, the reason given for not issuing such certificate under the new law was that, in the opinion of the board, the standard of examination in Great Britain in 1909 (the date of the candidate's British certificate) was not equivalent to the present standard of examination in Alberta Province. The board further stated that the percentage of marks necessary to obtain a first-class certificate in Great Britain is not so high as the percentage required in Alberta.

CERTIFICATES FROM OTHER COUNTRIES ARE HONORED BY THE CANADIAN AUTHORITIES

The new law authorizes an examining board to grant certificates, without examination, to the holders of certificates from any other country, providing that the board considers that the standard of training and examination required in the other country was equivalent to that required in the province. In making their decision in this case, we believe the examining board acted conscientiously, only desiring to maintain the standard of efficiency required of all certified mine managers, for whose ability to assume such duties they are responsible. The law is the safeguard of all mine workers, and its representatives only perform their duty in striving to maintain the standard required.

Statement of Colorado Operators

SYNOPSIS—The following is the statement of Martin D. Foster, chairman of the House Mines and Mining Committee, relative to arbitration and the reply of the operators to his proposal:

FOSTER'S STATEMENT

In my conference with Mr. Rockefeller at his office in New York I urged on him the importance of submitting the differences existing between the striking miners and the operators, to a fair and neutral board of arbitration, believing that troubles existing in the state of Colorado could be peacefully settled.

I spent the month of February in Colorado at the direction of the House of Representatives, investigating conditions. Mr. Rockefeller has not been there in ten years. I have been over the property and have conferred with and examined men on both sides of the controversy. I understand the issues on both sides.

There is nothing in the differences which cannot be settled by arbitration. The demand that the union be recognized union and all the other differences can be amicably settled. In my judgment, it is your duty to do so.

ROCKEFELLER TO FOSTER

Your telegram last night received. I am forwarding it to the officers of the Colorado Fuel & Iron Co. in Denver, who, with officials of other mining companies in Colorado, are the only ones competent to deal with the question therein referred to.

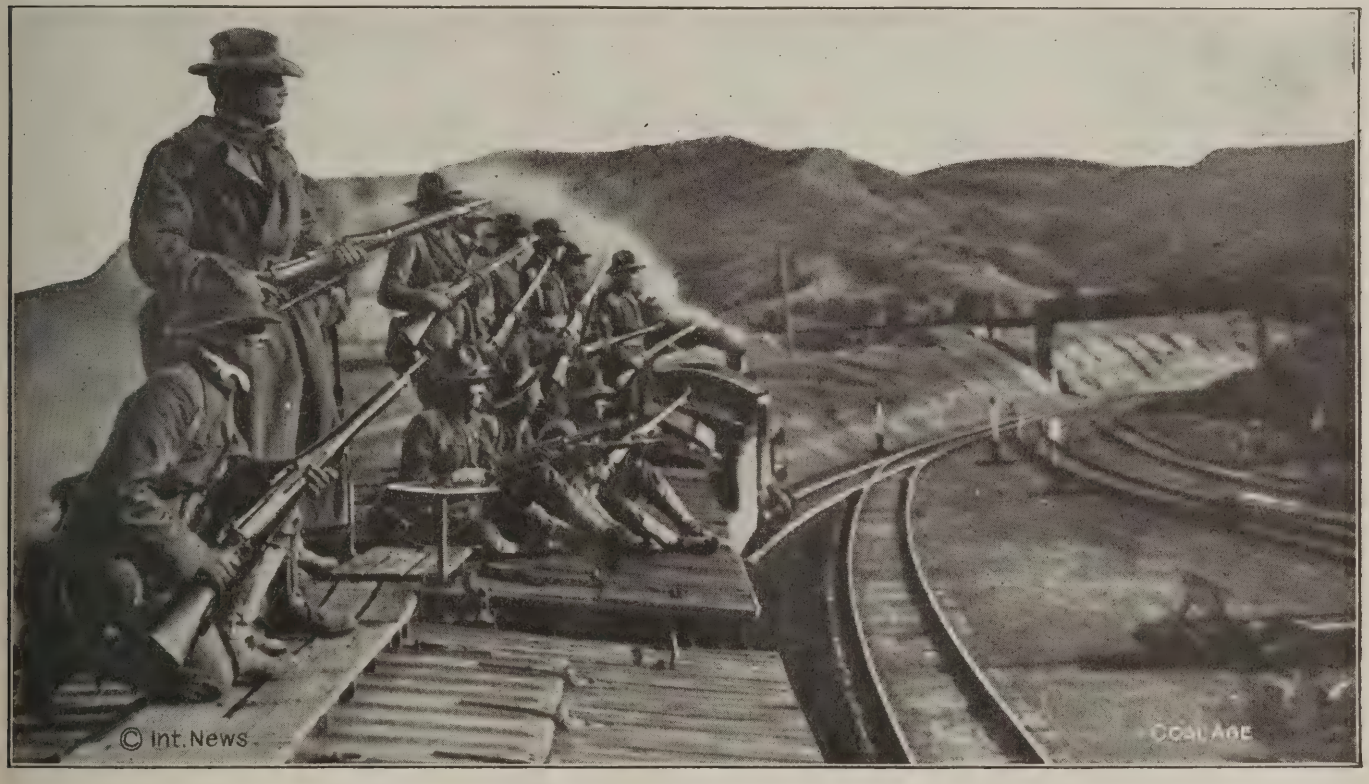
REPLY OF FOSTER

Your telegram somewhat a disappointment. We were in hopes that you would deem the situation so grave and serious that you would give your personal effort to prevent the further killing of men, women and children, and we renew the hope that you will reconsider and resolve to use your personal influence and authority to this humane end.

REPLY OF EIGHTEEN COAL COMPANIES

Reply of the Colorado Fuel & Iron Co. and other coal-operating companies to Dr. Foster.

Answering your telegram of last night addressed to John D. Rockefeller, Jr., and referred to Colorado coal-mine own-



MILITIA ATOP BOX CARS APPROACHING LUDLOW, COLO.

has now been withdrawn. The great question now confronting the strikers and owners is, "Will you agree to submit the matter to adjustment by arbitration?"

Mr. Rockefeller cannot evade his responsibility; he cannot set forth the excuse that he will not arbitrate the recognition of the union. He can prevent loss of life and property by yielding to arbitration.

The great Pennsylvania strike and also the recent West Virginia strike were settled by men on both sides agreeing to abide by the decision of umpires.

National sentiment and every instinct of humanity demand the prompt settlement of the Colorado strike. Nothing should prevent both strikers and Mr. Rockefeller from placing the case before a neutral board.

TELEGRAM OF FOSTER TO ROCKEFELLER

William Green, secretary-treasurer of the International Mine Workers' Union, makes public statement that mine workers will waive any recognition of union or unionizing camps. Are you willing to enter into negotiations for settlement of strike on that basis and stop the killing of men, women and children? I strongly urge you to do so, and believe the strike can be ended without recognition of the

ers for reply: When, on Apr. 16, the governor withdrew all except a small detachment of militia from the field, order and quiet prevailed in this state. There were employed by operators of Colorado coal mines more than 10,000 apparently contented men. On the morning of Apr. 20 the strikers in the Ludlow tent colony, two miles from the nearest coal mine, placed their women and children in what they considered places of safety, and made an armed attack upon the militia, encamped nearby.

LUDLOW

The fight continued throughout the day and several men were killed. During the battle the tent colony was destroyed by fire. The next day the bodies of two women and eleven children were discovered in a hole under a tent where the strikers had placed them when the attack upon the soldiers was begun. They had all been suffocated. None of these children and no woman was killed by rifle fire nor did the soldiers know of, or have reason to suspect, the presence of non-combatants where the strikers had concealed them.

On Apr. 23, Lawson, international board member United Mine Workers of America, and the leader of the strikers, in an interview published throughout the state, asserted that a

war of extermination would thenceforth be conducted by the strikers, and Doyle, secretary of the United Mine Workers of America, by wire instructed the officials of local unions to watch for the approach of the militia, which had been ordered back into the field. The meaning and purpose of such language was obvious.

MURDER AND INCENDIARISM

Since that time the strikers, in armed bodies varying in number from 50 to 400, have attacked the town of Delagua from the hills and killed three men. They have dynamited and burned the buildings and equipment of the Empire, Southwestern and Green Cañon mines at Aguilar. They have driven men, women and children into the Empire mine and sealed the entrance with explosives. After the declaration of truce agreed to between the Governor and Hawkins, attorney for the mine workers, they drove the postmaster and others away from the Sunnyside mine and took possession of it, as well as the Pictou mine.

They dynamited the tipple at the McLaughlin mine and fired many shots into the buildings at Maitland. They forcibly entered the store building at Rockvale and carried away guns and ammunition. They attacked the building and dwelling houses at the Chandler mine and kept up a merciless fire from the hills for nearly 40 hours, killing one man, and finally took possession of the camp by slipping in a number of men under a white flag.

They have burned, dynamited and completely destroyed the McNally mine in Huerfano County, kept up an almost continuous fire from entrenchments for fifty hours upon the Walsen mine, wounded one woman, killed and wounded four men and killed a surgeon wearing the Red Cross insignia while attending a wounded soldier on the field.

They viciously attacked the Hecla mine in Boulder County, killed one and wounded three men, and drove all employees and their families to cover for many hours. They attacked the Forbes mine in Las Animas County with a force of 400 armed men, killed seven miners, including four Japanese, and burned everything in sight, including a stable and thirty-three mules.

THE UNION, A PARTY TO VIOLENCE

In the prosecution of the campaign of extermination, the foregoing are some of the things those men have done during the past few days, with the tacit consent, active coöperation, and under the personal direction and control of officers and paid agents of the United Mine Workers of America.

As stated before, the coal mine operators of this state now have in their employ about 10,000 men, who are satisfied with the conditions of their employment. We promised these men protection from personal violence when the strike was called, and they have stood loyally by their employers under most trying circumstances, disregarding the dangers and privations incident to the recent armed attacks of strikers upon them and their homes. With these men we will always treat concerning matters of their welfare.

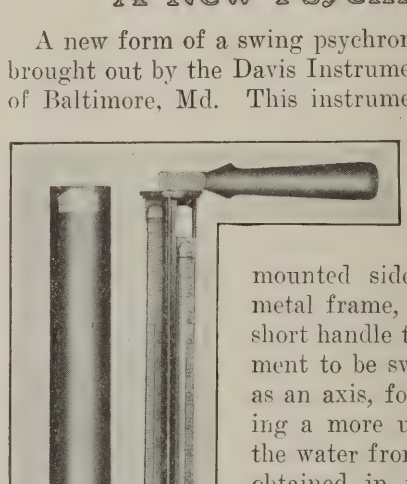
But we cannot enter into negotiations of any character with the officers and agents of the United Mine Workers of America, who alone are responsible for the terrible reign of disorder and bloodshed which has disgraced the state. Instead of it being our duty to do so, we conceive it rather the duty of the officials of the United Mine Workers of America, who called the strike, now to call it off. They can do so if they see fit, and by so doing they will within an hour in a great measure restore industrial peace and prosperity to this state.

In no event will the American people, when fully advised, permit 1200 or 1500 armed strikers to continue their unlawful efforts to prevent 10,000 law-abiding and industrious men from working for whom, when, and upon such terms as they see fit.

COLORADO FUEL & IRON CO.,
By J. F. Welborn, President.
ROCKY MOUNTAIN FUEL CO.,
By David W. Brown, Vice-President.
VICTOR-AMERICAN FUEL CO.,
By G. F. Bartlett, Jr., Vice-President.
OAKDALE COAL CO.,
By William B. Lewis, President.
SOUTH CANON COAL CO.,
By H. F. Nash, General Manager.
PRIMROSE COAL CO.,
By H. B. King, President.
THE RUGBY FUEL CO.,
By George D. Kimball, General Manager.
THE HUERFANO COAL CO.,
By S. S. Murphy, President.
CONSOLIDATED COAL & COKE CO.,
By C. L. Baum.
ROUTT COUNTY FUEL CO.,
By F. L. Prentiss, President.
YAMPA VALLEY COAL CO.,
By P. M. Peltier, President.
HAYDEN BROS. (Juniper Mine),
By Lewis A. Hayden.
EMPIRE COAL MINING CO.,
By Marthene and Siple.
SOUTHWESTERN FUEL CO.,
By S. W. Siple, President.
THE NATIONAL FUEL CO.,
By H. Van Mater, President.
THE ROYAL FUEL CO.,
By H. Van Mater, President.
THE UNION COAL & COKE CO.,
By J. V. Bowen, President.
MOFFATT COAL CO.,
By S. M. Perry, President.
LEYDEN COAL CO.,
By S. M. Perry President.

A New Psychrometer

A new form of a swing psychrometer has recently been brought out by the Davis Instrument Manufacturing Co., of Baltimore, Md. This instrument, which is shown in the accompanying illustration, is 8 in. in length. The two graduated, standard thermometers are mounted side by side on a light metal frame, to which is attached a short handle that permits the instrument to be swung about this handle as an axis, for the purpose of securing a more uniform evaporation of the water from the wet bulb, than is obtained in the other type of instrument, which is stationary.



A CONVENIENT PSYCHROMETER

Two of the features in which this instrument is superior to other forms of swing psychrometers are the lightness of its mounting and its compactness. As shown in the illustration, the frame of the instrument consists of a central light rod that terminates in a screw point, which secures the instrument in its case by screwing into a hole in the bottom of the tube or case shown on the left. The case is 1 in. in diameter and provides a convenient and safe means of protecting the instrument from harm, in transportation or when being carried from place to place. The wet tube, shown on the right, is mounted at a slightly lower level than the dry tube on the left. The bulb of the former is covered with a small silken sack, which can be readily immersed in a vial of water, without wetting the dry tube, when the instrument is to be used. Accurate and rapid readings are obtained with this instrument, which is the most convenient form of psychrometer that we have seen.

It requires great skill and a lot of experience to enable a fireboss to judge by means of the ordinary safety lamp when he has a gas cap. He is often troubled in estimating small percentages. Indeed it is possible that the number of firebosses who can accurately test a percentage of 2½, on examination would be found to be in a minority. The eye is given to playing tricks, often regulated by the health of the individual—good today but indifferent tomorrow.

Editorials

The Colorado Strike

In the conflict of testimony regarding the conditions in Colorado, we are chary of accepting any statements but those we know are unbiased—to wit, those made by one party in favor of the other in an unguarded moment.

The socialists at Colorado Springs give testimony of that kind to the excellence of the management of the coal corporations in that vicinity by a statement drawn up and adopted by them at a meeting held Apr. 19, 1914. They state first of all that socialism does not mean national ownership and that the nationalization of mines is not a socialistic measure. We differ with them, of course. Socialism is a somewhat indeterminate creed, but this particular faith is a tenet of binding force. They have always demanded either that or nothing. They then go on to state in discussing federalized coal mines:

> What difference can it make to the workers what group of capitalists own the industries, whether they are owned by one individual, by a "soulless corporation" or by a "soulless state," so long as the laws are made, interpreted and enforced by the capitalists through their "soulless" government?

This doctrine is not new. It is the creed of the Industrial Workers of the World. In that it states that government employees are not likely to be more fairly treated than the workmen engaged by private corporations, it expresses our own sentiments exactly. We do not observe that the federal services are marked by consideration for the rights to combine, by the provision of pensions, by advanced notions as to safety in operation or by any interest in the welfare of the employee. We are in accord in this view with the "socialists" of Colorado Springs. Pensions and some welfare work in the army and navy should, however, be specifically excepted.

Moreover, we are quite ready to *believe* the testimony of those socialists that conditions of labor would not be improved if the operation of the Colorado mines were to be handed over to the state or federal authorities. We readily grant that the socialists of Colorado have every reason to know whether labor is abused as has been declared, or on their shoulders would all such tyrannies fall, and being not operators but operatives, they are not likely to be protagonists for the coal-mine owners. They are therefore good enough witnesses when they declare that the individual Colorado operators are no more to be suspected than their fellow countrymen would be if, as a body, they took control of the mines.

But Edward Keating, who represents Colorado in the Federal House, also replies unexpectedly to those who argue against the coal operators. In a speech denouncing John D. Rockefeller, made Apr. 29, 1914, in the House of Representatives, he stated, "The Colorado laws were enforced throughout the state, except in the counties of Huerfano and Las Animas, the counties where Mr. Rockefeller and his associates dominate the situation."

Mr. Keating would have us believe that the strike is for the purpose of securing the enforcement of state laws. Why, therefore, is it to be found active in other counties than those mentioned by him? Why has Fremont County been the seat of so much trouble that it has been chosen as headquarters for one detachment of the Federal army? Why has there been a continuous rattle of musketry in Boulder County? For this reason only that the point at issue is not one relating to the enforcement of state law, as Mr. Keating declares, but is for the purpose of introducing the closed shop. A law which, apparently, is being obeyed in central and northern Colorado, is one which requires that no discrimination shall be shown against Union men. In these sections the miners cannot be seeking merely the right to combine. What they really desire to secure is the exclusion of the nonunion workman.

But there are more friends of the strikers to hear. William Diamond, an organizer of United Mine Workers of America, in charge of the Trinidad district, is said to have stated, Apr. 30:

"The strikers will comply with every command of the Federal authorities, provided we are assured that the mines are to be closed and that Federal troops are to remain in the field until this difficulty is settled."

All of which means that the United States govenment is asked to close down the mines till the men have every demand satisfied. The nation is not to permit any man to work unless the men who have engaged in lawless rebellion are willing. We can easily see why the militia, though directed by a pliant governor, failed to satisfy the strikers.

The Panama Canal and the Coal Trade

There has been much written about the advantage of the Panama Canal to the coal trade, and there is little question but that it will profoundly modify conditions and in some ways redound to the benefit of the nation as a whole. It should cheapen coal on our western coasts and provide a better fuel than that which they are now using and it should help us to gain some of the coal trade of South America.

But when it interferes with transcontinental travel it reduces the aggregate amount of coal used and it tends to isolate sections of the country which are now on important interoceanic routes. The United States is now divided into two parts; one is a peninsula, embracing the West, including Mexico, the South American Republics and Panama; the other an island, including all the Eastern states. It has been our constant endeavor to build up means of communication around and outside this island and around this peninsula, regardless of the inevitable effect on the interior regions and the disturbing action on the vested rights of those people, who do not and cannot have water frontage.

As to the deterrent effect of water transport on internal development, we might instance Newfoundland. It has always been a difficult matter to maintain a railroad in

that island. Subsidies had to be provided prior to its construction, and they say that some few years ago one passenger train only was run every other day. Even today there are but six trains a week in any one direction, which cover the full length of the line. The water freighters are such powerful competitors that the railroad can not be made a profitable business without a mail subsidy. Somewhat similarly, the Panama Canal will serve to remove much of the transportation activities from the heart of the country to the big rivers, the ocean front and tide water, and consequently certain parts of the coal trade may be expected to suffer acutely.

However, the loss to the country will not be so much by reason of this changed market as by the fact that deprived of profitable transportation business between certain points, the railroads will be obliged as always to make up their profits by increased charges on noncompetitive business. This will raise coal freights everywhere except where there is competition with water service. The public in the small towns who have helped pay for the canal will not only have to continue to pay the interest on its construction, but pay again and dearly for the business it displaces.

We do not much sympathize with inland towns in their predicament if the traffic on the canal, on the rivers and the lakes is economic and can be, and is, made to stand the charges of the services rendered to it. The welfare of the country must be considered paramount, even if the interior does suffer decline. But we have sought to build up water transportation by wholly artificial means, making our canals, our harbors and our lockage almost free to coastwise travel. Perhaps most of this traffic is economic; we have no way of telling. The most natural way to find out would be to load it with all the charges incident to creating, maintaining and lighting the waterways.

We have no conceivable right to subsidize any form of business as against any other in order to lower the rates another business is charging. To do so is tantamount to acknowledging that the business against which the discrimination is set in force is not charging too high a rate or why should the public have to aid the new competing party by presenting it with the facilities with which the original carrier was not similarly provided.

The influence of Big Cities is more powerful than that of Big Business, and is just as much the proper subject of suspicion. Equally liberal are the appropriations of both to the congressional lobbies. These cities are mostly along the coast and rivers, and they seek to aid their transportation problems at the expense of the whole country.

Had there been a Panama Canal when gold was discovered in California, many a goodly city in the Rockies and many a coal mine might never have been opened. Without transcontinental roads, the West would have remained an undeveloped wilderness. As it was, railroads had to be constructed for military as well as for economical reasons. Subsidies were given to a few of these so as to induce them to take risks such as the nation itself faces in the construction of the Panama Canal, the inevitable loss of money in the lean years before commerce is established.

Competition by the Tehuantepec R.R. has reduced the inter-oceanic rates and by reducing earnings has increased the charges on purely internal travel. Such charges as these, the Canal, especially if freed, will tend to increase and the part of the coal business which cannot easily ship by the coast is sure to suffer not only in increased freight charges, but in the decreased prosperity of the towns it supplies.

Surely it is not a proper duty of Congress to redistribute the energies of the nation partly at the expense of those sections of a common country, which lose and not gain by the distribution. Is it too much to hope that Uncle Sam may in a few years assimilate a part of the lesson he has repeatedly taught the railroads—that a common carrier must not make discriminations, least of all an organization whose patrons are all stockholders in the carrying company.

Arbitration

The proposal made by Martin D. Foster, Chairman of the House Committee on Mines and Mining, strikes a responsive chord in every one's heart. It seems, at first sight, that the coal companies are all wrong in refusing arbitration. The inquiry is heard everywhere, "What is Rockfeller going to do about it?"

But it must be remembered that we might also ask with reason: What are the armed bands of foreign gunmen, who have slaughtered dozens of our citizens, who have burned villages and mines, going to do to end such a state of insurrection?

The operators are not any too favorably disposed toward arbitration, for somehow our arbitral bodies are unlike our law courts. They are animated rather by sympathy than by justice. So strong is this sentiment of surrender to clamor that we could hardly rely on John D. Rockefeller, Jr., J. F. Welborn and D. W. Brown themselves to arbitrate this matter without making a concession in wages.

The outcome is wholly different in international affairs. Arbitration between nations means a decision in favor of one or the other on certain counts, but arbitration between workingmen and operators always means concession to the party of the first part. If it does not, then the arbitral award is not worth the paper on which it is written and the war it is intended to quench, flames up with renewed ardor.

When men have attempted to subvert order, have armed themselves and attempted to dictate who shall, and who shall not, work, surely we should call on them to quiet the tempest they themselves have raised. Failing obedience, the forces of the law should make continued disturbance impossible.

We trust that a wholesale deportation will follow of all those foreigners who having taken advantage of a friendly power have dared to take up arms against its authority. Where the militia has wreaked vengeance on those who opposed its action, let the state take the proper measures.

Let us, however, not condemn the militia for the deaths it may not have intended to cause. The murder of Louis Tikas, a prisoner in the hands of the militia, if substantiated as appears probable, is to our mind a far greater crime than the burning of a camp which had been armed and hostile and which the militia might well have considered empty. Most of the women and children appear to have left the camp. Possibly the militia did not know that 14 still remained or could not escape.

Legal Department

Amount Recoverable for Personal Injury or Death

By A. L. H. Street*

SYNOPSIS—A recent verdict for $50,000 for personal injuries to a coal miner suggests a review of previous decisions bearing on the excessiveness of awards for personal injury or death, and a statement of general rules governing such allowances.

Fifty thousand dollars was allowed by a jury in the United States District Court, sitting in Brooklyn the other day, for injuries sustained by Matt Yarkanis, a miner, while working in a mine owned by the Delaware, Lackawanna & Western R.R. Co., at Luzerne, Penn.

If this verdict is finally sustained by the courts, it will probably be the largest recovery that was ever upheld in this kind of a case, and one of the largest awards that was ever made in a personal injury case. The largest previous recovery awarded in a coal-mine case seems to have been for $37,000, the judgment having been awarded by the same court against the Lehigh Valley R.R. Co.

The Yarkanis suit was based on claimed negligence of the company in failing to provide sufficient ventilation in the mine. Gases issuing from fissures resulted in a primary explosion, which accident caused the explosion of dynamite which Yarkanis was handling. His injury consisted in loss of eyesight, fracture of skull and leg, and internal injuries.

Theoretically, the measure of damages recoverable at law for a personal injury is the amount which will afford fair compensation therefor, including allowance for physical and mental suffering endured and to be endured, loss of time, expense reasonably incurred on account of the accident, impairment of earning capacity, disfigurement of the person, etc.

Test of Reasonableness

Since no arbitrary money value can be placed upon physical or mental suffering, the courts allow juries much latitude in assessing damages therefor, if the award is within the proof. Ordinarily, a verdict will not be disturbed as being excessive unless it is so large as to indicate that the jurors were governed by passion, prejudice or a misconception of the law or evidence of the particular case. If the amount of interest which the amount of the verdict could earn, at a reasonable rate, grossly exceeds the amount of wages which plaintiff would probably have earned annually, and the balance of the recovery is excessively disproportionate to the suffering he has endured and will endure in the future, the award will be deemed improper. (Idaho Supreme Court, 125 Pacific Reporter 341.)

Probably the largest recovery ever sustained by the courts of this country for a personal injury was the judgment for $70,000, awarded by the California Supreme Court in 1911 against the Southern Pacific Co., in favor of Willard R. Zibbell. (116 Pacific Reporter 513.) He had earned about $2500 a year, had a life expectancy of 38 years, and his injuries consisted in loss of both arms and a leg. The jury returned a verdict for $100,000, but the trial judge ordered reduction on this amount to $70,000. In upholding this judgment, the Supreme Court said:

What Courts Have Held

"While the damages awarded in this case are very great, the shocking character of the injuries, the loss of both arms and one leg, the permanent loss of earning capacity, the inevitable disabilities and the suffering endured, and necessarily to be endured for more than 38 years, present a case where the injuries are as grave as the damages are great, or, at least, a case where there is no such marked disproportion between the character of the injuries and the award made for them as to suggest at once that the award was influenced by prejudice, passion or corruption."

But $50,000 was held by the Arkansas Supreme Court to have been excessive recovery for injury to an employee, although he was hopelessly incapacitated for work, was paralyzed below the point where his back was broken, had previously earned $100 and incurred $1000 expense for medical treatment, etc. (140 Southwestern Reporter 279.) The court ordered the recovery reduced to $25,000. On the other hand, the same court sustained a recovery of $35,000 for permanent disability accompanied by curvature of the spine. (137 Southwestern Reporter 1103.)

The following awards have, also, been upheld: $20,000 for death of an employee who left a dependent family (California, 136 Pacific Reporter 303); a similar verdict in Mississippi (63 Southern Reporter 336); $25,000 for loss of arm, leg and teeth (Minnesota, 145 Northwestern Reporter 40); $20,700 for loss of an arm, the other arm having been previously amputated (Ohio, 103 Northeastern Reporter 761); $18,000 by a miner who was severely crushed (Washington, 137 Pacific Reporter 1019); $17,000 for impairment of employee's health, with probable loss of leg (Virginia, 80 Southeastern Reporter 568); $27,000 for loss of leg and most of other foot (Alabama, 62 Southern Reporter 679); $25,000 for loss of leg, broken shoulder and permanent incapacity for chosen vocation (Arkansas, 151 Southwestern Reporter 699); $20,000 for loss of sight (Washington, 132 Pacific Reporter 241.)

The following awards have been held to be excessive: $35,000 for permanent injury (Idaho, 125 Pacific Reporter 331); $30,000 for mother's loss of son (Florida, 62 Southern Reporter 210); $30,000 for permanent injury (Washington, 132 Pacific Reporter 39); $20,000 for death (Louisiana, 63 Southern Reporter 888); $18,300 for partial disability (Wisconsin, 143 Northwestern Reporter 1027); and $17,500 where there was no total disability (Missouri, 161 Southwestern Reporter 726).

*Attorney at Law, Commercial Bldg., St. Paul, Minn.

Instruction Work in Illinois

It will be generally conceded that the most effective work that is being done, at the present time, in connection with the Safety-First campaign, is the instruction of industrial workers. Particularly is this true in regard to coal mining. The work of giving practical instruction to miners has received special impetus in Illinois. During the last few months, the work has been organized in different centers.

The Illinois Miners' and Mechanics' Institutes

This organization was established by act of the state legislature, Senate Bill No. 259, approved May 25, 1911, but only made effective by the appropriation of $15,000 per annum by the last legislature. The work of the institutes is under the general direction of R. Y. Williams, formerly of the Federal Bureau of Mines; and schools have since been organized in two mining districts, in the southern part of the state. The administration of these institutes is, by act of the legislature, placed in the hands of the trustees of the University of Illinois at Urbana. The Department of Mining Engineering of the University, in this connection, has planned a two years' course covering the practical subjects of coal mining.

The Peoria District Organization

With the same general objects in view, and for the purpose of bringing th practical instruction of miners nearer home, the coal-mine operators of the Peoria district united in an organization known as the Safety-First Inspection Bureau. This organization was formed during the month of January, 1914, and has for its purpose the prevention of accidents in coal mines and the education of employees of the mines in that district. The plan of instruction covers both the science of mining and first aid to the injured, together with the personal inspection of the mines of the district, for the purpose of reaching the entire community of miners and all classes of mine workers and giving them such helpful suggestions and instruction as may be practicable.

The following companies are included in the organization: The Clark Coal & Coke Co., Logan Coal Co., Crescent Coal Co., Groveland Coal Co., Brewster & Evans Coal Co., Warsaw Coal Co., Newsam Bros. Coal Co. and Tazewell Coal Co. The organization has made a wise choice in the selection of John Dunlop, former state mine inspector, Peoria, who is in direct charge of the instruction work.

Coal Age has no hesitancy in saying that Mr. Dunlop is thoroughly competent and fully qualified, by education and experience, to assume the important duties that devolve upon him by reason of this work. He is an indefatigable worker and an experienced mine inspector. Under the direction of Mr. Dunlop, classes have been organized at different points in the district, and the superintendents and other mine officials, by their liberal support and presence at the classes, show that they are deeply interested in the success of the undertaking and the welfare of their employees.

In Peoria, the Proctor Recreation Center have tendered to the organization the free use of their rooms, for class purposes. The Peoria Institution occupies a building recently erected and devoted entirely to the recreation of the citizens of that place. In this building are provided rooms for bowling alleys, basket ball, pool tables, social parties and club rooms, besides shower baths for male and female, and a large swimming pool. The building is a handsome edifice provided and maintained by the Proctor Endowment Fund.

The classes held for the instruction of miners are the only educational meetings conducted in the building. The attendance on these classes predicts with certainty the success of the undertaking. Many of the students, at present, are preparing to take the coming state examinations for mine manager, mine examiner and hoisting engineer, to be held this month. Mr. Dunlop's long experience in the mine inspection work in Illinois and the preparation of candidates for examination makes him eminently fitted for the work in hand. Mr. Dunlop is vice-president of the National Association of Mine Inspectors, known as the Mine Inspectors' Institute of the United States of America, which will hold its seventh annual meeting at Pittsburgh, Penn., in June.

The Mining Scale

Latest advices seem to show that there is a deadlock in the scale situation. The abundance of coal and the indifference of many of the men as to whether they work or not, are factors in the situation. The latter condition cannot long continue and it is probable that, in a short time, the miners will accept the old scale or the mines will work without an agreement.

At a well attended open-air meeting, near DuBois, in central Pennsylvania, on Apr. 28, the speakers, all but J. E. Brown, advised that the men work till after a referendum has been taken to decide whether the old scale unmodified should be accepted in that district. The men almost unanimously decided to violate the orders of the national officers. They voted to remove their tools and stop the boiler and repair men from working. The Nanty Glo miners have declared for a closed shop.

The miners in the Kanawha coal field quit work on May 1. Thomas Cairnes, president of District No. 17, urged them to remain at work, but without avail. The miners during the negotiations had made 24 demands. These were later reduced to three. Though the agreement in the Cabin and Paint Creek district does not expire till next March, many of the men quit work on May 1.

Miners' Examinations in Illinois

Announcement is made that the Miners' Examining Board of the State of Illinois will hold meetings, during the month of May, according to the following schedule:

Peoria, May 5; Spring Valley, May 6; Braceville, May 7; Danville, May 12; Pana, May 13; Springfield, May 14-15; Willisville, May 19; Belleville, May 20; Staunton, May 22; Eldorado, May 26; Benton, May 27; Herrin, May 28-29.

The members of the examining board are Edward Maher, president; John Knies and Nicholas Cowell, secretary.

Shot-firing accidents due to the shot going off after the battery has been disconnected from the cable are fortunately very rare indeed. They may easily be counted on the fingers of one hand, and a good explanation of the cause has perhaps never been given. The idea generally favored seems to be that the detonating substance becomes slightly damp and then needs a certain amount of energy to make it detonate.

Discussion By Readers

Indications of Gas on the Carbide Lamp

Referring to the interesting letter of William Kellum, COAL AGE, Mar. 28, p. 536, the following may be of interest to those using the carbide lamp.

As has been previously explained, COAL AGE, Vol. 1, p. 1136, calcium carbide in contact with water produces acetylene gas and calcium hydroxide is thrown down, according to the equation

$$CaC_2 + 2\ H_2O = Ca(OH)_2 + C_2H_2$$

The reaction that takes place when this gas burns in air, disregarding the inert nitrogen of the air, is

$$2\ C_2H_2 + 5\ O_2 = 4\ CO_2 + 2\ H_2O$$

It is important to remember that the flame of a carbide lamp is a gas-fed flame, the gas being generated in the lamp chamber and burned at the nozzle, in contact with air. As is well known, all wick-fed flames require first, a distillation of the gas from the oil drawn up through the wick, which distillation absorbs a certain portion of the heat of the flame. This absorption of heat in wick-fed flames, together with the high calorific power of the gas generated in a carbide lamp, are sufficient to account for the greater tenacity of the carbide flame. The extinction of all flame is due to one or both of two causes; namely, the lack of sufficient oxygen to support combustion; and the absorption of heat from the flame, causing its temperature to fall below the temperature of ignition of the gas or vapor.

I was much interested in Mr. Kellum's narration of the effect observed by him of carbon dioxide or blackdamp on the flame of a carbide lamp. My experience differs from that of Mr. Kellum's in one respect; namely, I have been able to observe no vertical tendency in the tip of the carbide flame, in the presence of carbon dioxide, as he has described. In my opinion, the failure of the carbide flame to maintain a horizontal position throughout, was due to the fact that the lamp had not been freshly charged; or, possibly, the nozzle was partly choked by water that prevented the free flow of the gas feeding the flame.

Once, when examining an entry that had caved, my carbide lamp, which was freshly charged, did not show any change to warn me of the presence of blackdamp; but, after going about 400 ft. in this entry, I felt, first, a choking sensation and experienced some difficulty in breathing. Taking the lamp from my cap, I set it on the bottom to observe more closely its action. My casual observation, at first, did not detect anything peculiar. Soon, however, I noted that the flame of the lamp became more extended and had a reddish tint. The flame, however, remained horizontal throughout.

I now endeavored to light a "sunshine" lamp that I always carried with me, to use in case of emergency. The matches simply flashed and went out. Then I tried to light the wick by the flame of the carbide lamp, which, by this time had elongated to about 1½ or, perhaps, 2½ in. and had a distinct reddish tint, while the top of the flame became smoky; but the flame itself remained horizontal, as I said before. I spent about five minutes trying to light the "sunshine" lamp with the carbide flame; but it would only burn a moment after taking it from the carbide flame. On removing it therefrom, the oil-fed flame diminished and went out gradually, with little smoke, unlike its extinction in fresh air owing to lack of oil or a heavy draft.

By this time, the carbide flame was more extended and redder than ever, and, becoming dizzy, I thought it wise to retreat at once. The carbide lamp was not extinguished and its flame remained horizontal, as at first. In my opinion, the horizontality of the flame depends on the pressure of the gas within the lamp, in the same manner as the horizontal throw of water from a nozzle depends on the pressure in the pipe. I cannot understand how any outside cause affecting the combustion of the gas, would act to turn the tip of the flame upward or, in other words, give it a vertical direction.

In regard to the enlargement of the carbide flame and its extension, I believe this is simply due to the effort of the flame to reach a sufficient supply of oxygen for its combustion. The reddish tint I consider is due to a partial or incomplete combustion in the flame. It is a well known fact that, while from 13 to 16 per cent. of carbon dioxide, in an atmosphere of otherwise pure air, is sufficient for the extinction of a wick-fed flame, gas-fed flames require all the way from 10 to 58 per cent. of that gas for their extinction. I believe that this fact is due to the higher calorific power of the gas fed to the flame, by which a higher temperature of the flame is maintained. As previously stated, the extinction of a wick-fed flame is hastened also by the absorption of the heat, in the distillation of the oil in the wick.

The cap formed above a lamp flame, in presence of inflammable gas, as is well known, is caused by the burning of the gas in the air surrounding and in contact with the flame. The sensitiveness of a flame to produce such a gas cap depends, primarily, on two factors: 1. The free access of the air to the flame. 2. The temperature of the flame, which directly affects the combustion of the gas and enlarges the cap formed thereby. Owing to this fact, a flame fed by a gas, such as hydrogen, is much more sensitive to the formation of a cap than a wick-fed flame, even when the latter is consuming a volatile oil as alcohol, naphtha or benzine, which are, in turn, more sensitive than the flames of sperm or cotton-seed oil. It must be remembered that the calorific power of hydrogen gas is from five to ten times higher than that of other gases and vapors, which fact makes it the most sensitive to the formation of a gas cap. For similar reasons, the flame of the carbide lamp is peculiarly sensitive to gas.

In reference to the suggestion of introducing a carbide burner into the combustion chamber of a safety lamp for the purpose of testing for gas, I want to say

that I consider such an attempt unsafe, for the reason that the carbide flame cannot be easily reduced and regulated; but, in the presence of gas, sufficient heat would be generated within the chimney to destroy the cooling effect of the gauze.

In closing, I want to draw attention to the fact that a carbide flame indicates the presence of dust more clearly than any other open lamp in use. The intense heat of the flame causes the particles of dust to burn more brightly, often producing minute sparks about the flame, besides elongating and changing its size and color.

JAMES T. WARD.

Scalp Level, Penn.

Examining for Gas with an Open Light

In reading the article entitled "An Extraordinary Experience," COAL AGE, Apr. 25, p. 682, what surprised me most was the fact that a man having charge of a mine and with six years' experience as fireboss, should look for gas with a naked light. He and the other men present can congratulate each other that they escaped without harm or injury. The only time a person should experiment with gas in a mine is when obliged to remove it; and only safety lamps should then be used.

The incident narrated would not be so bad had the man making the examination quit after the first manifestation of the curious phenomenon. Instead of this, he seems to have tried the experiment several times, inviting others to witness the spectacle.

In my experience, I have only known of one man who thought he could examine a place for gas successfully with an open light and he would have discharged any man for attempting the same trick. Many who have tried to do this have been burned severely and have caused injury to others, while some have lost their lives in the attempt. In my opinion, the mining law should empower the mine inspector to lay off anyone who would be so thoughtless of danger to himself and others as to make such a foolhardy attempt. It reminds one of the man who toyed with a loaded gun and afterward said "I did not know it was loaded."

A MINER.

Scranton, Penn.

The Mine Foreman

Letter No. 3—I want to endorse the statements of Mr. Srodes, COAL AGE, Mar. 14, p. 458; as well as those in the letter of Mine Foreman, Apr. 18, p. 658.

As mine foreman, myself, I have long felt that men holding this position in West Virginia have too much for which they are responsible. There are few plants where the mine foreman has not more than he can do to look after the inside of the mine. In most cases, it is no small matter to maintain the circulation required by law and ventilate the working face in such a manner as to make the mine safe and healthful. This work alone requires constant and watchful care; but, in addition, the foreman must give most of his attention to the output of coal and to keeping the roads in good condition.

Besides the inside duties, the foreman must look after work on the surface, in the blacksmith shop and on the tipple, in the boiler house and engine room, fan house and elsewhere. These buildings, and the equipment requiring his daily attention, are often widely separated. When a breakdown occurs, he may have to spend half a day at a single point, endeavoring to overcome the trouble and maintain his output. On going to the office in the evening, after such a day, he must account to the superintendent for the short tonnage.

In nine cases out of ten, the superintendent of the mine does not fully appreciate the difficulties against which the mine foreman must strive. While holding his foreman responsible for maintaining the daily output and keeping the mine in safe condition, he too often refuses to give him the needed support and necessary equipment to perform his duties successfully. Under these conditions, it is difficult for a mine foreman to comply with many requirements of the state law.

I have in mind one instance, in this state, where the company is operating four mines, and where the superintendent changes the mine foreman at each mine about three times a year. A close observer can see readily that the real reason for this condition of affairs is a lack of coöperation between the superintendent in charge and his foremen, many of whom are practical and competent men. In such cases, the foreman suffers from the incompetency of the superintendent.

The suggestion has been made that, owing to these conditions, it would only be just and right that the state law should require certificates of competency of mine superintendents; because, as cannot be denied, he is the one in power to say what shall or shall not be done. It is true in many cases that if a mine foreman suggests that the mine is not complying with the mining law of the state, he is in danger of losing his place. I am glad to see this question discussed and hope to hear from others.

ANOTHER FOREMAN.

———, W. Va.

Starting Longwall in Room-and-Pillar Work

Letter No. 4—Referring to the inquiry, COAL AGE Apr. 4, p. 587, asking if the common longwall system can be successfully applied in a coal mine already fully developed on the room-and-pillar system. The data given in this inquiry—the thickness of the coal, nature of the underlying and overlying strata and the fact that the coal lies in a basin, are all strong points in favor of the adoption of the longwall system and warrant an affirmative answer to the above question.

However, before one decides to change the system already in use in a mine, he must carefully study the question of obtaining efficient labor under the new system. Longwall work is a different class of work from room-and-pillar operations. It may be difficult to get a class of miners sufficiently acquainted with the system. The adoption of the new system will require changes in respect to yardage, tonnage, undercutting the coal, timbering and other details, all of which must be carefully considered beforehand.

The advantages derived by the proposed change will be an increased output of coal, increased percentage of lump coal, increased safety, better ventilation, less coal dust, less shotfiring, less expense for brattice boards and

cloth, rails and timber. There is less timber lost in longwall work than in room-and-pillar operations. The posts are used over and over again, and when broken can be sent out of the mine and worked up into cap-pieces. In some instances, steel props have been used to advantage in longwall work. In adopting the longwall system, I would endeavor to drive the main haulage roads "on face" and the main gateways and stallgates "on end" or "on the butts." This will insure the maximum amount of lump coal. In the present case, I would use longwall mining machines and undercut in the nine inches of soft slate. The waste of the seam should be used for building packs. The nine inches of bottom coal could probably be taken up with the pick as the face advances and loaded out with the coal mined.

In starting the longwall work, I would begin at the face of the main haulage road and undercut the coal, gradually working the face into a half circle. Wooden cribs should be built at the entrance of the main gateways, which, of course, are at right angles to the main haulage roads. In the case under consideration, the main gates should be set off 1800 ft. apart, to allow for four stalls on each side of each main gate, each stall having a 200-ft. face, equally divided on each side of the gateway.

When the main gateway has advanced a distance of from 200 to 250 ft., a crossgate should be set off, by building substantial packwalls at that point. This crossgate should run at such an angle as to cut the intermediate stallgates successively as they advance 250 ft. As these stallgates are cut off by the crossgate, new stallgates are started from the cross-gate, in the usual manner of longwall. The blue slate rock should be taken down over the main haulage roads, main gateways and main returns, up to the sandrock. It will probably prove of advantage to use the large pieces of rock for building packwalls, while the smaller pieces are used to make a good floor over which the track is laid, which will prevent, to some extent, the heaving of the soft bottom. This work is usually done in steps and kept at a distance of 200 or 300 ft. back from the working face.

At the coal face, two rows of props are kept, the posts being set at regular distances apart. Roadpacks are usually built 6 ft. apart, as the face advances; and 9-ft. packs are built every 24 ft. along the face. Where there is not sufficient waste for building these packs, timber cogs are used. These are withdrawn and carried forward, as the face advances. The longwall system is fast gaining favor and undoubtedly will predominate in all coal fields when the shallower seams have been worked out.

EDWIN HUSBAND, Supt.,
Wadsworth Red Ash Coal Co.
Helena, Ala.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Summation of Potentials—The circulation of air in two or more splits or currents, in a mine, differs from a tandem circulation in the fact that the same unit pressure circulates the air in each and all the splits, which are thus separate currents moved by one pressure; while in a tandem circulation one continuous current passes in succession through different airways or sections of the mine.

While in a tandem circulation the mine pressure is equal to the sum of the pressures for the several sections through which the current passes; and, likewise, the total power for the mine is equal to the sum of the powers absorbed in the sections; in a split circulation, the total power for the mine is equal to the sum of the powers absorbed in the splits, but there is but one pressure, which is the same for all the splits starting from the same point in the mine.

As before, indicate the several split pressure potentials by X_{p_1}, X_{p_2}, X_{p_3}, etc.; the corresponding powers on the air by u_1, u_2, u_3, etc.; and the total power on the air by u_o, remembering that it is necessary, in all splitting calculations, to use the pressure potential, which has the value

$$X_p = a\sqrt{\frac{a}{k\,l\,o}}$$

The work is simplified by using the part potential value, as previously stated, omitting k when finding the potential values and multiplying the final result by that coefficient.

The following shows the development of the formulas for the summation of the potentials in split circulations where the splits all start from one point in the mine:

$$u_o = u_1 + u_2 + etc. \qquad (1)$$

But,
$$u_1 = \frac{q_1^3}{X_{p_1}^2};\quad u_2 = \frac{q_2^3}{X_{p_2}^2};\ etc. \qquad (2)$$

By the principle of splitting air currents,

$$q_1 = \frac{X_{p_1}}{\Sigma\, X_p}Q;\quad q_2 = \frac{X_{p_2}}{\Sigma\, X_p}Q;\ etc. \qquad (3)$$

Combining equations 2 and 3 and simplifying,

$$u_1 = \left(\frac{Q}{\Sigma\, X_p}\right)^3 X_{p_1};\quad u_2 = \left(\frac{Q}{\Sigma\, X_p}\right)^3 X_{p_2};\ etc. \qquad (4)$$

Finally, substituting these values (4) in equation 1, and factoring,

$$u_o = \left(\frac{Q}{\Sigma\, X_p}\right)^3 (X_{p_1} + X_{p_2} + etc.) \qquad (5)$$

Simplifying equation 5, gives the formulas for calculating the horsepower on the air at the point of split, by the summation of the part pressure split potentials:

Horsepower on the air,
$$H = \frac{k\,Q^3}{33{,}000\ (\Sigma\, X_p)^2} \qquad (6)$$

The formula for calculating the water gage, in like manner, is

Water gage,
$$w.g. = \frac{k\,Q^2}{5.2\ (\Sigma\, X_p)^2} \qquad (7)$$

The Coal Age Pocket Book

As an illustration of the usefulness of the summation of potential values, we give below the calculation of the horsepower on the air, unit pressure and water gage developed in the circulation of 100,000 cu.ft. of air per minute, in four splits, calculated by the usual method on a preceding page, where it was necessary, first, to find the natural division of the air.

Example—An air current of 100,000 cu.ft. per min. is divided, at the foot of the downcast shaft, between the following four splits:

Split A, 8x12 ft., 6,000 ft. long; a = 96 sq.ft.; s = 240,000 sq.ft.
Split B, 6x20 ft., 12,000 ft. long; a = 120 sq.ft.; s = 624,000 sq.ft.
Split C, 6x12 ft., 8,000 ft. long; a = 72 sq.ft.; s = 288,000 sq.ft.
Split D, 4x 6 ft., 1,000 ft. long; a = 24 sq.ft.; s = 20,000 sq.ft.

Calculate the horsepower on the air, unit pressure and water gage concerned in producing this circulation, using the part potential values and employing the method by summation of potentials; no regulators being used in the mine, but the division of air being natural.

Solution—The part potential values for the several splits are as follows:

Split A, $X_{p_1} = a\sqrt{\frac{a}{s}} = 96\sqrt{\frac{96}{240{,}000}} = 1.920$

Split B, $X_{p_2} = 120\sqrt{\frac{120}{624{,}000}} = 1.664$

Split C, $X_{p_3} = 72\sqrt{\frac{72}{288{,}000}} = 1.138$

Split D, $X_{p_4} = 24\sqrt{\frac{24}{20{,}000}} = 0.831$

Sum of part pressure potentials ($\Sigma\, X_p$) 5.553

Substituting this value for $\Sigma\, X_p$ in the formulas for finding the horsepower on the air and water gage, in natural splitting,

Horsepower on air. $H = \frac{0.00000002 \times 100{,}000^3}{33{,}000 \times 5.553^2} = 19.6\ hp.$

Unit pressure. $p = \frac{0.00000002 \times 100{,}000^2}{5.553^2} = 6.48\ lb.\ per\ sq.ft.$

Water gage, $w.g. = \frac{0.00000002 \times 100.000^2}{5.2 \times 5.553^2} = 1.24\ in.$

In natural splitting or when no regulators are employed, the general mine potential is always equal to the sum of the several split potentials, which is true for either power or pressure.

In a tandem circulation, however, the general mine potentials for power (X_{uo}) and for pressure (X_{po}) are given by the formulas

$$X_{uo} = \frac{1}{\sqrt[3]{\Sigma\,(1/X^3_u)}};\quad \text{and}\quad X_{po} = \frac{1}{\sqrt{\Sigma\,(1/X^2_p)}}$$

Inquiries of General Interest

Extinction of Lamp on Falls

I was much interested in the answer given to an examination question, COAL AGE, Mar. 28, p. 540, which reads as follows:

If, while examining a fall in one of the entries in a mine, your safety lamp became suddenly extinguished, what gas or mixture of gases would you say was present?

I would like to ask, would it be possible, in a portion of a mine that is not ventilated, to find the air depleted in oxygen to such an extent that a light would be extinguished, assuming there was no marsh gas or carbon dioxide present? Or, would it not be possible to find a sufficient quantity of nitrogen given off, in such an unventilated portion of a mine, as to render the atmosphere incapable of supporting combustion? Or, again, is it not possible for the coal to absorb the oxygen from the air to such an extent that the air in that portion of the mine will not support combustion?

Also, would a lamp be extinguished in an atmosphere containing 19 per cent. of oxygen, no foreign gases being present?

I would like to hear from someone who has made analyses of mine air, under different conditions, when the lamp was extinguished. I have seen safety lamps extinguished at different times on falls when no explosive gas was present.

I remember an instance where a fall had occurred in one of the room pillars, during the night, and the fireboss when making his examination the following morning found a mixture of gas, on the fall, that extinguished the flame of his lamp. Gas had never been seen in that section of the mine before. When the gas, in this case, had been removed, the place showed no indication of the presence of explosive gas coming from the cave.

READER.

Punxsutawney, Penn.

In the absence of any analysis of the mine air taken at the point where the lamp was extinguished, we can give no better explanation of the cause of the extinction of the flame than that given in answer to the examination question to which correspondent has referred. As there stated, it is possible for the extinction of a lamp to be caused by "sharp" marsh gas—gas undiluted with air; or a mixture of marsh gas and carbon dioxide.

Under certain conditions, where these gases diffuse into each other in the absence of air, they form a mixture lighter than air. It is also possible for carbon dioxide to issue from the roof strata, in such quantities as to extinguish a lamp on top of a fall. It is possible, also, that temperature may play an important part in holding an extinctive mixture of gas at the roof, while a cooler undercurrent keeps the air clear at or near the floor. These conditions are so numerous that it is impossible to more than suggest certain possibilities that may exist, any of which may or may not be true in this case.

In regard to the strata giving off a sufficient quantity of nitrogen to render the air extinctive, we do not think such a condition is within the range of ordinary possibilities, in coal mining. Even assuming that the place is not ventilated, there would have to be an addition of 27.4 volumes of nitrogen to each 100 volumes of free air, to produce an extinctive atmosphere containing 16.4 per cent. oxygen and 83.6 per cent. nitrogen.

Neither do we consider it probable, although we admit it may be possible, that the coal might absorb sufficient oxygen from the air in an unventilated place to render the atmosphere extinctive. This condition could only exist, however, in a very close place, hardly in mine workings, even though unventilated.

Referring to the incident of the extinction of the fireboss' lamp on a fall of the night before, in pillar workings, it is possible for a close atmosphere to have formed in a space above the roof slate before it fell; and we may suppose that the oxygen in that atmosphere would, in time, be depleted by absorption to such an extent as to render it extinctive. Such a condition may have existed in the incident cited by correspondent, and would explain the fact that when the gas had been removed, there was no further indication of trouble.

In the absence of foreign gases, a wick-fed flame will not ordinarily be extinguished until the oxygen has been depleted to, say 16.4 per cent., although an alcohol flame is extinguished at 17.2 per cent. Gas-fed flames are more tenacious, the hydrogen flame not being extinguished until the oxygen has been depleted to 6.3 per cent., in the absence of other gases.

Engineer of Mines Degree

My profession is geology and, for many years, I have been engaged in making investigations of coal properties and rendering reports upon coal and mineral lands, in 13 different states. I have been in the habit of affixing the letters M. E. to my name when signing these reports. I have observed that some engineers write the letters E. M. after their name when signing such reports. I shall much appreciate having COAL AGE express an opinion as to which of these, if either, is the proper form to use.

MINING ENGINEER.

————, Penn.

The letters E. M. written after a name indicate that the person is a graduate engineer, holding the degree "Engineer of Mines." The letters M. E., written after a name, indicate that the person is a graduate mechanical engineer, holding that degree.

While there are many mining engineers of unquestioned ability who have gained their knowledge by an extended experience and practice, only the graduate engineer can properly write the letters referred to above after his name. The practical engineer who holds no degree, but has gained his knowledge and experience in practice, is entitled to write "Mining Engineer," or "Mechanical Engineer," following his name; but he should not use the letters mentioned above, which refer to a degree conferred by a college or school, authorized to give such degrees.

Examination Questions

Springfield, Illinois, April 20, 1914

(*Selected Questions*)

Ques.—Explain how you would determine the safe working load for a seasoned hemlock, mine prop, 10 in. square and 7 ft. long, assuming the crushing load is 5300 lb. per sq.in., for hemlock timber.

Ans.—The length of the post in feet, being less than its diameter in inches, there is no danger of the post failing by bending. The safe working load, in this case, can, therefore, be calculated from the crushing strength, which is given as 5300 lb. per sq.in. The post being 10 in. square, its sectional area is 10x10 = 100 sq.in., and the total crushing load is, therefore, $100 \times 5300 \div 2000 = 265$ tons. It is customary, in mine timbering, to allow a factor of safety of 3, which makes the safe working load, in this case, $265 \div 3 = 88+$ tons.

Ques.—A current of 9000 cu.ft. of air is passing per minute through a regulator. If the difference in pressure on the two sides of the regulator is equal to 0.7 in. of water gage, calculate how far the regulator shutter is open, assuming the height of the opening is one foot.

Ans.—For the given quantity of air and water gage, the area of the opening is calculated by the formula

$$A = \frac{0.0004\,q}{\sqrt{w.g.}} = \frac{0.0004 \times 9000}{\sqrt{0.7}} = 4.3\ sq.ft.$$

The height of the opening being 1 ft., its width is 4.3 ft.

Ques.—In a mine ventilated by a fan, which is circulating 120,000 cu.ft. of air per minute, at a speed of 70 r.p.m. and a water gage of 2.5 in.; at what speed would this fan have to run to circulate 150,000 cu.ft. per min.; and what water gage would be produced by such circulation?

Ans.—Commonly, the speed of the fan is assumed to be proportional to the quantity of air circulated; or, in other words, the speed ratio is equal to the quantity ratio. By this rule, calling the required speed of the fan x,

$$\frac{x}{70} = \frac{150{,}000}{120{,}000} = \frac{5}{4} = 1.25$$

and $$x = 70 \times 1.25 = 87.5\ r.p.m.$$

More accurately, however, the fourth power of the speed ratio is equal to the fifth power of the quantity ratio, which gives

$$\left(\frac{x}{70}\right)^4 = 1.25^5 = 3.05$$

and

$$x = 70 \times \sqrt[4]{3.05} = 70 \times 1.32 = 92.4\ r.p.m.$$

Since the water gage varies as the square of the quantity of air in circulation, the water-gage ratio is equal to the square of the quantity ratio, which gives

$$\frac{w.g.}{2.5} = 1.25^2 = 1.56+$$

$$w.g. = 2.5 \times 1.56 = 3.9\ in.$$

Ques.—If the ventilating machine was permanently disabled by an explosion of firedamp, what temporary means would you employ to restore ventilation in the mine?

Ans.—Assuming that the ventilating machinery is permanently disabled so that it cannot be repaired in a reasonable time, steps should at once be taken to secure and set up, temporarily, another fan. Such a fan may often be obtained from an adjoining colliery or sent on a rush order from the nearest machine shop.

In a gaseous mine, as in this case, no attempt should be made to start circulation by a fire basket lowered in the shaft, or other similar means. Following an explosion, there will often be a manifest tendency in the mine that will make one of the shaft openings the upcast. Advantage should be taken of this tendency to increase the natural circulation by any means possible; such as lowering a steam jet into the upcast or the diversion of surface winds into the downcast opening.

There should always be kept on hand, especially at mines subject to explosion, emergency equipment that will be available for use on such occasions. This equipment should include a duplicate fan, a small disk fan or blower that can be quickly set up when and where needed. There should also be an abundance of brattice material at hand ready for use if conditions permit.

Ques.—What percentage of firedamp (marsh gas mixed with air) is necessary (a) to show a faint cap; (b) to readily explode; (c) to be at its most explosive point?

Ans.—(a) Assuming the firedamp in question is pure marsh gas diluted with air, no dust or foreign gases being present, it is possible for an experienced observer to detect the first appearance of a flame cap in an unbonneted Davy lamp burning sperm or cotton-seed oil, when the marsh gas forms from 2 to 2½ per cent. of the mixture. Much depends on the style of lamp used, the oil burned, the velocity of the air current and the experience of the observer. Under these varying conditions, a flame cap will often not be detected when fully 3 per cent. of gas is present; and, at other times, the effect of the gas on the lamp flame will be first observed when somewhat less than 2 per cent of gas is present.

(b) A firedamp mixture, consisting of pure marsh gas and air only, first begins to explode when the proportion of gas to air is 1:13; or the mixture contains, say 7.14 per cent. of gas. It should be remembered, however, that firedamp is inflammable and dangerous, before this point is reached; namely, when the proportion of gas to air is 1:17; or, say 5.5 per cent. of gas is present in the mixture.

(c) A mixture of pure marsh gas and air reaches its maximum explosive point when 9.46 per cent. of gas is present in the mixture; this point being determined by the quantity of oxygen necessary for the complete combustion of the marsh gas, the volume of oxygen required for this purpose being twice that of the marsh gas consumed.

Coal and Coke News

Pennsylvania

HARRISBURG

The belief held here that the personal power long wielded by the late George F. Baer, as head of the Reading system and of its many subsidiary and associated companies will be largely divided, received confirmation in a considerable degree, when the directors of the Central R.R. of New Jersey, on May 1, elected William G. Besler as president of that company.

While Mr. Besler is recognized as an able railroad man, it is not thought that there is any likelihood that he may be chosen to head the Reading company, the holding corporation of the system, where legal and financial training are requisite, or of the Philadelphia & Reading Coal & Iron Co., where familiarity with the commercial side of the anthracite coal business is needed. For these reasons the opinion is expressed that the election of Besler made it nearly a certainty that some other man would be chosen as the president of the Philadelphia & Reading Coal & Iron Co.

The Possible Successors of the Late George F. Baer

The most generally accepted view is that the next president of the Philadelphia & Reading Ry. Co. will be either Theodore Voorhees, the veteran vice-president in charge of operation, or A. T. Dice, vice-president and general manager. W. J. Richards, vice-president of the Philadelphia & Reading Coal & Iron Co. stands next in line of promotion for the presidency of that corporation.

Incidentally it was recalled that the directors of the Philadelphia & Reading Ry. Co. have always recognized the principle that under its charter, the president must be a legal resident of the state of Pennsylvania. The principle does not necessarily apply to the Reading Co., the holding corporation, or to the Philadelphia & Reading Coal & Iron Co., which owns and operates the Reading coal mining and marketing industry.

A new president was also selected on May 1, for the Lehigh & Wilkes-Barre Coal Co., another of the many subsidiaries of the Reading system. The new president chosen by the directors, is Charles F. Huber, hitherto vice-president and general manager. His former position is abolished.

The developments of the meetings held on the above date, accentuated the opinion held in many quarters that not only will there be a great subdivision of the late Mr. Baer's authority, but that separate presidents will be selected for every one of the nine different corporations embraced in the Reading system.

Temple Iron Co.

The Temple Iron Co. directors, on May 1, elected E. T. Stotesbury, of Philadelphia as president pro tempore, to succeed Mr. Baer, and Robert W. De Forts was selected to take Mr. Baer's place as a director.

The directors of the Temple Iron Co. on the above date, also announced that the company's assets had been sold to the highest of six bidders. This concern was the storm center of the suit several years ago by the Government against the leading anthracite coal-carrying roads, which resulted in a decision by the U. S. Supreme Court that the company must be dissolved. The Temple Iron Co. held the stock of eight important coal-mining concerns in the Wyoming region, and its shares were held by the railroads until the court ordered that this control should cease.

The buyer was the firm of Thorne, Neale & Co. The chief assets comprise eight collieries and a cash payment will be made for them. The new owners of the Temple Iron Co. operate other large properties in the Schuylkill and Wyoming regions.

The Lehigh Valley R.R. and the Coal Sales Co.

The Lehigh Valley R.R. Co. and other defendants on Apr. 30, filed their answer to the government's suit for the dissolution of the existing relations between the railroad company and various coal-producing companies. The answer is a general denial to the allegations of a combination in restraint of trade or any infringement of the provisions of the Sherman anti-trust law.

The Lehigh Valley Coal Sales Co. specifically denies that it receives favors of any kind from the railroad company that might be called discriminatory against other shippers. The company further says it has nothing to do with interstate trade.

The Lehigh Valley Coal Sales Co., in its answer stated that the sole purpose of the organization of the company was to separate and disassociate absolutely the Lehigh Valley Coal Co. from any interest or participation in the anthracite coal business other than the mining and production of anthracite coal and its sale at the mines.

The answer adds that not a single share of the Lehigh Valley Coal Sales Co. stock was subscribed for at the time of its organization or at any subsequent time by either the Lehigh Valley R.R. or the Lehigh Valley Coal Co., but admits "that the large majority of the Lehigh Valley R.R. stockholders as of February, 1912, availed themselves of the privilege offered to subscribe to its stock at organization," and that "its first officers were chosen largely from the officers of the Lehigh Valley Coal Co.'s sales agency force." It denies however, "that any of its incorporators or any other board of directors were the nominees, representatives or instruments or under the control of the defendant Lehigh Valley R.R.," or "that its shares were intended for distribution among stockholders of the railroad company pro rata or otherwise."

As to coal it purchased from the Lehigh Valley Coal Co., the Lehigh Valley Coal Sales Co. asserts that the fixing of price was a matter of bargaining, involving several legitimate business considerations, and the answer declares that the Lehigh Valley R.R. Co. has never used or attempted to use, and never has had and does not now have the power to use it as an instrument for any purpose.

Additional Rescue Stations

In the effort to have the government add 10 additional rescue stations and 15 additional rescue cars to the government service throughout the country, President Van Bittner, of District No. 5, of Pittsburgh, and Andrew Matti vice-president of District No. 9, of Hazleton, United Mine Workers of America appeared before the Mines and Mining Committee, Apr. 29, and urged the passage of such a law.

Vice-President Matti delved extensively into the affairs of the anthracite coal district of the state, and when asked the reasons for the many accidents occurring in the hard-coal fields he declared that some of them could be avoided if the number of mine inspectors were increased. He stated that the number now employed is entirely inadequate to meet the wants at the various mines.

He added that the miners seldom see the inspectors. He did not believe these officers were remiss in their duties, but the amount of labor needed for complete inspection is now excessive, due to the increased number of mines, to the depth of the shafts, and the distance from the chambers to the surface. "It would take" he said, "the inspector nowadays about a month, to examine the average mine, and when he completed his labors it would be necessary, in order to keep the workings of the mine under the closest observation, to start back and do the mine over again." In other words, Mr. Matti believes that there should be an inspector for almost every colliery.

He also favored the establishment of additional rescue stations, and cars. It was his belief that at least three more of these cars should be located in the anthracite fields, one at Hazleton, the other at Scranton, and the third at Shamokin or in that vicinity. It was contended by the miners' representatives that more cars are needed in the anthracite region, because of the greater danger in anthracite mines than in the bituminous regions where there is little gas where the roof is low, and where there is little danger of caving.

Anthracite

Jeddo—The Casino, the new Jeddo club house, erected by G. B. Markle Coal Co., is now completed and was thrown open on May 2; General Manager A. B. Jessup delivered the address of welcome. The building is one of the most modern club houses in the anthracite region and is a valuable addition to that little mining town.

Drifton, Penn.—Ground was broken on Apr. 29 for an addition to the Mining & Mechanical Institute. The new ad-

dition will be of the same style of architecture as the present building and it is the intention of the contractor to have rooms ready for occupancy in September. A manual-training and chemical department will be maintained in the new structure.

Wilkes-Barre—Locals of the United Mine Workers at the several collieries of the Lehigh Valley Coal Co. for the past week have been discussing what is called the "prop question" and the grievance committee of the Dorrance colliery called on the officials and made a request that the men be paid for the placing of props. The request was refused and it was explained to the committee that according to the scale now in effect, the miners agree to place props in the workings without extra charge. It is thought that other locals beside the Dorrance have discussed the question and requests from other committees are expected to be made to the officials.

Centralia—The strike of mine workers at Packer Collieries Nos. 1, 2, 3, 4 and 5, operated by the Lehigh Valley Coal Co., which went into effect Apr. 27, throwing 4000 men and boys out of employment, was amicably settled on May 2, and the collieries will resume full operation at once, causing much rejoicing.

Pittston—One miner was instantly killed and another perhaps fatally injured in the Hoyt shaft of the Pennsylvania Coal Co., on May 2, when these men were run down by runaway cars. The men had started up the slope behind some loaded cars, when the rope broke and the cars started down. Before they could reach a place of safety they were caught under the wagons, which left the track and buried them in the débris.

Taylor—Attorney William Brewster, of Wilkes-Barre, on Apr. 30, bid in the property of the defunct Marion Coal Co. for $531 at a trustees' sale, conducted by Attorney William A. Titsworth, who was appointed referee in bankruptcy. It is said that Brewster represented W. P. Boland, president and organizer of the company. The sale closes a long legal battle.

Bituminous

Lilly—The independent miners' union at this place is finding the cost of maintaining its large membership now out of work a heavy burden. The union pays to every member out of work $2 a week; $1.50 to his wife and 50c. to each child under age. Since the slackening of work at the mines, the special reserve fund of $17,000 has been dwindling at a rapid rate.

Connellsville—Several hundred miners and coke workers at the Herbert plant of the Connellsville Central Coke Co. struck on May 2, when notices were posted announcing a reduction of 25c. a day for drivers and coke workers and 10 per cent. for miners.

Washington—The number of violent deaths in Washington County in April due to alcoholic drink was just twice the deaths in the coal mines. According to the monthly report of the coroner, James Heffran, four persons died as a result of using liquor, while the mines only took two lives.

WEST VIRGINIA

Charleston—Against the instructions of their leaders, 10,000 miners in the Kanawha Valley have laid down their tools and refused to work, having voted almost unanimously to remain idle pending an adjustment of the wage controversy, which has been the subject of a prolonged conference between the operators and union officials. Failure to arrive at an agreement on various disputed points caused this action on the part of the miners, who became impatient at the delay. President Thomas Cairns, of District No. 17, which is involved in the controversy, is endeavoring to persuade the men to return to work until the negotiations are concluded, but without much prospect of success.

It is feared by many that scenes rivaling those of the strike in Paint and Cabin Creek districts will take place during the present strike of the miners in the Kanawha coal district. There are 10,000 miners out, and the situation is ominous.

Unlike conditions following previous mine explosions in the state of West Virginia, the widows, children and other dependents will be taken care of by a fund created by the employers and employees, made possible under the Workmen's Compensation Act, which went into effect last October.

Wellsburg—The Rex Carbon Coal Mine, about five miles east of here, on the Wabash R.R., is being put in condition for operating, and it is expected to have the mines in working order within a few weeks.

KENTUCKY

Middlesboro—The Hazard Coal Land Co., which holds 3200 acres, has just leased about half of these holdings to the Ashless Coal Corp., of Roanoke, Va. The Ashless Company will install an electrically equipped plant with 1000 tons daily capacity and the operation will be under way as soon as possible. The Hazard company is now negotiating for the lease of the remainder of its land.

Pineville—Mine operators and miners are much elated over what Congressman Caleb Powers reports that there is an excellent prospect that either Pineville or Harlan, in the Eastern Kentucky coal field, will get one of the mine rescue stations to be established by the Federal government. Mr. Powers some time ago introduced a bill in the house calling for the appropriation for two stations of $26,500 each, one to be located here and the other at Harlan. Local interests are not disappointed especially in the recommendations from the Department of the Interior that Kentucky be allowed but one station.

OHIO

Massillon—Fire starting in the boiler room of mine No. 21 of the Massillon Coal Mining Co., located at Dalton, nine miles north of Massillon, destroyed the outside equipment of the company, entailing a loss of approximately $50,000. It is announced that the plant will not be rebuilt.

Columbus—It is announced that the newly created United States Commission on Industrial Relations will likely take a hand in the Ohio wage controversy. It is understood that a representative of the commission, Alexander M. Dailey, has been in the Buckeye State investigating conditions relative to the coal-mining industry and that his report will soon be filed with the commission. It is believed that public hearings may be fixed at which both operators and miners will be called to testify.

Fort Smith—Negotiations to arbitrate the strike between the miners and the Bache-Denman Coal Co. terminated when the company refused to be a party to the proposal of State Labor Commissioner J. C. Clary, which was to have the Governor appoint a committee to settle the matter.

INDIANA

Sullivan—The drilling outfit now sinking test holes at Caledonia for the Monon Coal Co. will be removed to Shelburn, to drill test holes to the No. 5 vein at the Steel Tipple and Mammouth mines. These have been shut down because of exhaustion of the vein they were working.

Jasonville—The Latta's Creek mine, closed for a month, has been reopened. The Island Valley mine has been closed.

Terre Haute—The settlement of the wage and working conditions in Indiana for the next two years is put in the hands of a subscale committee of the operators' and miners' associations. This committee has begun its meetings, using as headquarters the office of Phil H. Penna, secretary of the operators' association.

ILLINOIS

Springfield—The Illinois Mining Investigation Commission recently appointed by Gov. Dunne, has been recently organized, electing Thomas Jeremiah, a coal operator of Williamsville, as president and R. J. Wilson, of Marissa, a miner, as secretary. The commission will investigate mining conditions in the state and will draw up such amendments to Illinois Mining Laws as they think desirable, and report them to the General Assembly when it meets next winter.

Edwardsville—Mine No. 3, which has been operated for 35 years, it is said, will be soon abandoned. The City Coal Co. has given up its lease to the Edwardsville Coal Co., the owners, and it is reported that the property will be converted into a large coal yard.

ARKANSAS

Fort Smith—The first investigation ever undertaken under the auspices of this state in a labor dispute has been recently started, when J. J. Clary, state commissioner of labor, began inquiry into the difficulties between the United Mine Workers of America and the Bache-Denman Coal Company. The trouble between the mine workers and the company resulted in the company's breaking its contract with the union and substituting the "open shop" policy.

CANADA

Victoria, B. C.—The Canadian Collieries, Ltd., operating mines on Vancouver Island, B. C., has asked holders of the company's bonds to consider a proposal that the company be allowed to postpone sinking fund payments for five years. Labor troubles during the past 18 months have caused serious loss of profit, necessitating the fixed charges for the past year being met to a considerable extent out of working capital. They have also delayed the carrying out of the scheme of new construction and development entered upon soon after the company was organized, so that the sum of approximately $3,000,000 provided to pay for the extension and im-

provement plan and for additional working capital, has proved to be inadequate. About $1,500,000 more will probably be required to complete the necessary work. This sum certain holders of the stock are willing to find when required, provided that the holders of the first mortgage bonds agree to the postponement until Mar. 21, 1919, of the sinking fund payments, the first of which fell due on Mar. 31, last. Power will be reserved by the company, however, should circumstances make it desirable to commence payment of the sinking fund at an earlier date than that specified. The resolution for the postponement of sinking fund payment also provides that no dividend shall be paid on any share of capital stock until after commencement is made on the payment of the sinking fund.

PERSONALS

John E. Finney has been appointed receiver for the Poteau Coal & Mercantile Co., Poteau, Okla.

The Hazard Mfg. Co., formerly of 50 Dey St., has removed its office and warehouse to 533-541 Canal St., New York.

R. C. Cole has joined the staff of the Pneumatic Tool Department of the Ingersoll-Rand Co., and has been stationed at the Chicago Office.

C. L. Purcell has been made assistant to sales manager J. A. Rundio, of the New Pittsburg Coal Co. at Columbus, Ohio, to take the place of Ray Davis, who resigned.

George H. Garrey has recently severed his connection with the American Smelting & Refining Co. and allied companies, as their chief geologist, and has opened an office as consulting mining geologist and engineer at 115 Broadway, New York.

RECENT COAL AND COKE PATENTS

Stoker. N. E. Gee, Altoona, Penn., 1,082,419, Dec. 23, 1913. Filed July 31, 1908. Serial No. 446,291.

Miner's Lamp. C. Dushek, Beloit, Wis., 1,080,050, Dec. 2, 1913. Filed May 1, 1913. Serial No. 764,907.

Boiler. H. W. Jacobs, Topeka, Kan. 1,093,430, Apr. 14, 1914. Filed Apr. 21, 1913. Serial No. 762,634.

Miner's Lamp. F. E. Baldwin, New York, N. Y. 1,094,358, Apr. 21, 1914. Filed May 16, 1913. Serial No. 767,971.

Furnace Stoker. E. F. Krell, Detroit, Mich., 1,082,126, Dec. 23, 1913. Filed March 11, 1911. Serial No. 613,679.

Shovel for Stokers. C. A. Fell, Dronfield, Eng., 1,080,903, Dec. 9, 1913. Filed Nov. 16, 1912. Serial No. 731,853.

Dumping Grate. W. W. Lewis, Garnet, W. Va., 1,082,127, Dec. 23, 1913. Filed Feb. 16, 1912. Serial No. 677,942.

Grate Bar. G. S. Sargeant, Greensboro, N. C., 1,081,350, Dec. 16, 1913. Filed Apr. 30, 1912. Serial No. 694,053.

Grate Shaking Guard. J. L. Shani, Paragould, Ark. 1,092,654, Apr. 7, 1914. Filed Jan. 4, 1913. Serial No. 740,169.

Miner's Cap. D. F. Brubaker, Glen Campbell, Penn., 1,081,659, Dec. 16, 1913. Filed June 1, 1912. Serial No. 701,060.

Mine Car Wheel. W. M. McCoy, Birmingham, Ala., 1,081,318, Dec. 16, 1913. Filed July 3, 1913. Serial No. 777,350.

Boiler Furnace. J. M. Woodling, Morganton, N. C. 1,091,996, Mar. 31, 1914. Filed May 4, 1912. Serial No. 695,087.

Coal Washing Jig. F. L. Boone, Greensboro, Penn. 1,091,797, Mar. 31, 1914. Filed Dec. 31, 1912. Serial No. 729,483.

Steam Generator. E. Pielock, Berlin, Germany. 1,082,136 Dec. 23, 1913. Filed Jan. 23, 1913. Serial No. 672,934.

Tangential Flame Furnace. W. N. Best, New York, N. Y. 1,091,475, Mar. 31, 1914. Filed Feb. 19, 1904. Serial No. 194,310.

Sprinkling Car for Mines. J. J. Harris, Canonsburg, Penn. 1,093,268. Apr. 14, 1914. Filed Apr. 24, 1913. Serial No. 763,416.

Coke-Oven Door. H. Barenter, Essen-West., Germany. 1,093,522, Apr. 14, 1914. Filed Jan. 19, 1914. Serial No. 813,039.

Steam-Boiler Furnace. C. Lloyd, Philadelphia, Penn. 1,093,790, Apr. 21, 1914. Filed Aug. 30, 1913. Serial No. 787,412.

Bit for Mining Machines. J. J. Moore, Springfield, Ill., 1,081,131, Dec. 9, 1913. Filed Nov. 15, 1912. Serial No. 731,613.

Smoke Consumer. A. J. Wilkins, Coal Center, Penn., 1,081,417, Dec. 16, 1913. Filed Feb. 7, 1913. Serial No. 746,839.

Coal-Washing Apparatus. C. H. Boardman, Columbus, Ohio. 1,091,910, Mar. 31, 1914. Filed May 17, 1910. Serial No. 561,582.

Smoke Recording Apparatus. H. C. Alger, Chicago Heights, Ill. 1,093,903, Apr. 21, 1914. Filed Sept. 6, 1912. Serial No. 719,009.

Apparatus for Coking Coal. H. L. Doherty, New York, N. Y., 1,080,142, Dec. 2, 1913. Filed June 22, 1909. Serial No. 503,732.

Self-Oiling Mine Car Wheel and Axle. W. H. Bines, Barnesville, Ohio. 1,091,796, Mar. 31, 1914. Filed Oct. 2, 1913. Serial No. 792,980.

Miner's Lamp Holder. N. Frieband, Shenandoah, Penn., 1,080,434, Dec. 2, 1913. Filed May 10, 1913. Serial No. 766,783.

Smoke Preventer. H. Lindsay and W. B. Jackson, Cleveland, Ohio. 1,092,582, Apr. 7, 1914. Filed Aug. 4, 1911. Serial No. 642,308.

Safety Catch for Mining Cages. C. Methven, Herminie, Penn., 1,080,648, Dec. 9, 1913. Filed Nov. 14, 1912. Serial No. 731,300.

Igniting Device for Miners' Lamps. A. Paserbski, Mikultschultz, Germany. 1,091,891, Mar. 31, 1914. Filed Sept. 28, 1911. Serial No. 651,861.

Locomotive Fireman's Coal Shoveling Recorder. G. G. Weston, St. Louis, Mo. 1,092,466, Apr. 7, 1914. Filed Apr. 11, 1913. Serial No. 760,549.

Furnace. J. H. Parsons, assignor to Parsons Engineering Co., Wilmington, Del. 1,092,851, Apr. 14, 1914. Filed Oct. 29, 1907. Serial No. 399,702.

Boiler Flue. H. W. Jacobs, Topeka, Kan., and F. W. Shupert, Bristol, Ind. 1,093,429, Apr. 14, 1914. Filed June 29, 1912. Serial No. 706,567.

Water Tube Boiler. E. H. Wells, assignor to Babcock & Wilcox, Bayonne, N. J., 1,080,613, Dec. 9, 1913. Filed April 3, 1912. Serial No. 688,131.

Steam-Boiler Control. J. Wilkinson, assignor to General Electric Co. New York, N. Y. 1,095,133, Apr. 28, 1914. Filed Oct. 5, 1912. Serial No. 724,016.

Steam Generator with Forced Circulation. P. Fonque and G. Charpentier, St. Denis, France, 1,082,312, Dec. 23, 1913. Filed Jan. 6, 1913. Serial No. 740,467.

Mining Machine. H. B. Dierdorff assignor to the Jeffrey Manufacturing Co., Columbus, Ohio, 1,081,818, Dec. 16, 1913. Filed Oct. 25, 1909. Serial No. 524,416.

Boiler Furnace. J. M. Cameron, assignor to Cameron Smokeless Boiler Co., Johnson City, Tenn. 1,093,911, Apr. 21, 1914. Filed Sept. 6, 1912. Serial No. 626,846.

Limber Pin for Mine Skips. C. H. Sawyer and J. Bowditch, Newcastle, New South Wales, Australia. 1,092,750, Apr. 7, 1914. Filed Sept. 13, 1913. Serial No. 789,715.

Furnace Front. F. M. Clark, assignor to Multiple Grate Bar Endless Chain Stoker Co., New York, N. Y. 1,094,702, Apr. 28, 1914. Filed May 3, 1912. Serial No. 694,822.

Apparatus for the Treatment of Smoke from Furnaces. W. L. Thomas, assignor to Smoke Eliminator Syndicate, Ltd., London, Eng., 1,082,245, Dec. 23, 1913. Filed Dec. 11, 1911. Serial No. 665,121.

Supporting Mechanism for Endless Traveling Grates. F. M. Clark, assignor to Multiple Grate Bar Endless Chain Stoker Co., New York, N. Y. 1,094,703, Apr. 28, 1914. Filed May 3, 1912. Serial No. 694,823.

CONSTRUCTION NEWS

Scranton, Penn.—Penn Forest Coal Co. is building a breaker between Beaver Meadow and Weatherly to prepare the fuel to be mixed from the recently tapped veins on the Penrose tract.

Connellsville, Penn.—It is reported that within a short time, the Republic Iron & Steel Co., expects to begin operating the 80 by-product ovens now nearing completion. About 200 additional men will be given work.

Pineville, Ky.—The Pioneer Coal Co. has announced plans for the erection of a new building for the commissary department which will be enlarged. The company has ordered also the construction of a number of new homes for its miners.

Falmouth, Ky.—Surveyors are at work on the survey of a rojected railroad line to run from Newport, Ky., along the ast bank of the Licking River, to be called the Virginia & icking River R.R. The operations are being made to enable n estimate of the cost of the railroad to be reached. The romoters would open up some 80,000 acres of coal lands in his vicinity and propose to handle their product through lewport and Cincinnati.

Jackson, Ky.—The Kentucky interests of the Lete-Maupin Engineering Co. have been purchased by W. S. Canning, f this city. In the new Kelly Kash building, now in course f construction here, Mr. Canning will install a coal-testing aboratory and a completely equipped engineering office by he first of June.

PUBLICATIONS RECEIVED

Virginia Geological Survey, Bulletin No. IX, "The Coal Resources and General Geology of the Pound Quadrangle n Virginia," by Charles Butts. Sixty-one pages 7x10 in. vith maps and diagrams.

Illinois Coal Mining Investigations, Bulletin 2, "Coal Mining Practice in District VIII (Danville) by S. O. Andros." Forty seven pages 6x9 in. illustrating and describing shaft, rift and strip mining in Vermilion and Edgar Counties, Illinois.

University of Texas, Bulletin No. 307, "The Fuels Used in Texas," by William B. Phillips and S. H. Wowell. Two hundred and eighty seven pages, 6x9 in. illustrated. Discusses in considerable detail the coal, lignite, oil, gas and other fuel resources of Texas, and the present development of the same.

TRADE CATALOGS

The American Blower Co., Detroit, Mich. Bulletin No. 23. The Sirocco System of Purifying, Cooling, Humidifying." Eight pages 8½x11 in.

The National Tube Co., Pittsburgh, Penn., National Bulletin No. 18 A. "National Reamed and Drifted Pipe." Ten pages 8½x11 in. illustrated.

Standard Underground Cable Co., Pittsburgh, Penn., Bulletin No. 400-1 "Weatherproof Insulated Wires and Cables." Twelve pages 6x9 in. illustrated.

The Goulds Mfg. Co., Seneca Falls, N. Y., Bulletin No. 118, Centrifugal Fire Pumps." Twelve pages 7¾x10 in. illustrating and describing centrifugal fire pumps.

G. L. Simonds & Co., Chicago, Ill. "The Vulcan Soot Cleaner." Forty-eight pages 6x9 in. illustrating and describing the operation and benefits of the Vulcan soot blower.

The National Tube Co., Pittsburgh, Penn., National Bulletin No. 11 B "History, Characteristics and the Advantages of National' Pipe." Twenty-seven pages 8½x11 in. illustrated.

Alberger Pump and Condenser Co., New York. "Alberger Expansion Joints." Fifteen pages 6x9 in. showing various kinds of straight line expansion joints without stuffing boxes.

The Wagner Electric Mfg. Co., St. Louis, Mo. Bulletin 04. "Portable Instruments." Forty-seven pages 8x10½ in. Illustrating and describing portable electric testing appliances.

NEW INCORPORATIONS

Edmonton, Ky.—The Premier Products Co. has been organized with a capital stock of $300,000, to mine coal and on.

Harlan, Ky.—The Harlan Coal Co. has been incorporated with a capital stock of $10,000. The incorporators are J. L. Smith, A. M. Gregory and John Reese.

Stillwater, Ohio—The Stillwater Coal Mining Co., of Stillwater, O., has filed amended articles of incorporation increasing its capital stock from $350,000 to $600,000.

Dewar, Okla.—The Electric Coal Co. has been organized with a capital stock of $5000. The incorporators are J. T. Buckner, Ora Buckner and E. A. Jennings, all of Dewar.

Columbus, Ohio—The Wm. J. Hamilton Co., coal and kindred products, has been incorporated with a capital stock of $10,000. The incorporators are Wm. J. Hamilton, L. E. Ridgway, A. Morse and D. M. Hamilton, all of Columbus.

INDUSTRIAL NEWS

Wilkes-Barre—The Lehigh & Wilkes-Barre Coal Co. has decided to substitute horses for mules in hauling coal and supplies about the collieries and in the city. The company has found that horses are better suited for the outside work than mules.

Massillon, Ohio—General Manager John Whalen, of the Massillon Coal Co., has announced the opening of three new mines west of Massillon upon which work will be started immediately. These will furnish employment to between 400 and 500 men.

Springfield, Ill.—The Montour Coal Co. recently resumed activities. Its mines are the Empire, located near the state fair grounds, and those at Virden, Auburn and Girard. The Pittsburgh Coal Co., of Illinois, with branch offices in the Reisch Building, will handle the output of these mines.

Whitesburg, Ky.—A good-sized coal operation on the Sandy Valley & Elkhorn R.R. is to be begun shortly east of here in coal lands lying on the border of Letcher and Pike Counties. The operation will be by the Bucalo Creek Coal Co., organized and recently incorporated with a $50,000 capital.

Uniontown, Penn.—At a meeting of bituminous-mine inspectors held recently, preliminary arrangements were completed for the annual meeting of the Mine Inspectors' Institute of America, which will be held in Pittsburgh commencing June 9. The technical program is being worked out by a committee and will be announced probably early in May.

Hazard, Ky.—The opening up of two large tracts of coal properties, one on the Racoon Branch and the other on Davidson Creek, in Perry County, has been begun by W. E. Davis, formerly interested in the Jellico district. In the operation of the latter property it will be necessary to build a bridge in order to convey the coal from the mines across the river to the railroad line.

Washington, D. C.—Increased rates on coal from grouped mines in southern Indiana and Illinois to points on the Mason City and Clear Lake and the interurban railways in Iowa, proposed by the Rock Island and other railroads, have been approved by the Interstate Commerce Commission, and the order of suspension lodged against the advances withdrawn. The increased rates are to take effect May 8.

Louisville, Ky.—The Harlan Coal Mining Co., of Louisville, which recently disposed of two large operations near Coxton, Ky., by lease, owns another large tract in Harlan County upon which the company is considering the establishing of an operation. The plans in this direction, however, are indefinite, and if the opening up of the mine should be decided upon it would take place late this year at the earliest.

Turley, Tenn.—Messrs. Seabrook & Howard, and other parties of Atlanta, have purchased the old Rock Springs Coal Co. on the Southern R.R. at Turley, Tenn., and have organized the Turley Coal Co. The present plant will be entirely overhauled and machinery installed under the direction of A. H. Wood, an experienced mining engineer of Petros, Tenn. The new company intends to handle a large tonnage.

Pittsburg, Kan.—The Pratt-Durkee Coal Co., of Cherokee County, Kan., recently filed a petition in voluntary bankruptcy and Edward I. Martin, of Columbus, Kan., was appointed receiver. It was reported that the company's assets were slightly more than its liabilities. The cause as given for the condition is that the price of coal is too low to make a profit for the operator, and that labor conditions make it impossible to operate economically. This is the first strippit company to go into the hands of a receiver.

St. Louis, Mo.—The Coal Operators' Traffic Bureau of St. Louis has been organized, consisting of about 30 operators of mines in the Inner District, producing commercial coal. The Inner District mines are that group of mines taking the 32c. freight rate to East St. Louis. R. W. Ropiequet has been retained as traffic manager, under contract. The purpose of the organization is to take action against the railroads entering East St. Louis that own coal minees, and which roads are operated exclusively for the purpose of hauling this coal to the St. Louis market.

Coal Trade Reviews

General Review

Heavy movement of anthracite with demand centering particularly on stove coal. Bituminous down to the bottom, but has failed to round the corner yet. Surplus stocks being cleaned up.

The cool April weather, together with the heavy demand for storage purposes, resulted in a large movement of anthracite last month. Many orders were carried over into the current month and an active situation prevails among the large companies. The demand is centering particularly on stove coal, while the steam grades are now showing a tendency to ease off under the heavily increased production, and some companies are reported as putting these back into storage. In the dealer trade, the situation is by no means so favorable. Some of the prepared grades are still offering, at certain points, down to the April circular, with no buyers. The Lake business in anthracite is opening up slowly, and indications point to a light movement for the season.

The most encouraging feature in the bituminous situation is the general belief that the trade is down to an irreducable minimum and that any change must be for the better. Large tonnages are still reported at the Atlantic Coast loading ports, with considerable on demurrage, while cancellations on contracts are becoming more frequent. There is less shipping on consignment, however, and there are reports that the surpluses accumulated prior to Apr. 1 are now nearly cleaned up.

Production in the Pitsburgh district is slightly increased, but there is no movement whatever in the Lake trade, due to the absence of demand and the light iron-ore tonnage; the iron industry is again down to approximately the low level of last December. The trade generally is not anticipating better prices any time this summer.

Nothing is being done toward effecting a settlement of the wage scale in Ohio, but considering the prices the West Virginia product is bringing, the local operators feel they have little cause to worry. Some Lake vessels have cleared from Ohio ports for the Northwest, but the opening is slow and this business will not get actively under way before June 1. The surplus coal at Hampton Roads has been greatly reduced and is now about normal. Some sales involving small tonnages are reported at practically the circular, with others of considerable size being negotiated, but generally speaking, the trade continues dull and flat.

The situation in the Middle Western market is still rather mixed, there being absolutely no demand at some points, with operators showing a complete indifference as to when work is to be resumed. The Indiana mines, on the other hand, are gradually resuming operations and are making preparations for a heavy production in the event of a deadlock in the adjoining states. Although the market continues rather heavy generally, there is a widespread feeling that the consumers are now reaching the end of their storage supply, and will soon be forced into the market again.

EASTERN MARKET

BOSTON

Dull market continues and general curtailment still in force. Pocahontas and New River reasonably firm at $2.85 f.o.b. Hampton Roads. Other grades also dull. Anthracite companies well supplied with orders for May.

Bituminous—The demand for spot coal is practically nil and shipments even on contract are in light volume. Water power in Maine and New Hampshire is the heaviest for several years and is another factor accentuating the stagnant situation. The tonnage of Pocahontas and New River standing at the loading piers is still large and this in face of a general curtailment in the mining districts. For inland distribution there is practically nothing doing, the shipment of coal on the market having largely ceased on account of the poor success shippers have lately met in that respect.

Prices, however, are rather well maintained and operators are apparently adhering to the policy of netting $2.85 f.o.b. Hampton Roads or keeping the coal in the ground. Less is now heard of new business on contract; the buyers who have stayed out of the market so far are disposed to be consistent in their attitude. June and July, they figure, will be a more favorable time for them than May.

Georges Creek and the Pennsylvania grades are also dull and aside from special orders there is only a small tonnage coming forward. The Central Pennsylvania labor troubles seem to be no nearer settlement, although in some quarters the mine-workers show an accommodating spirit and allow their employers to fill some of the more urgent orders that happen to come in.

Anthracite—April shipments were hardly as heavy as tidewater New England expected, and there is still a good volume of orders being carried over into May. With the larger shippers it will be well into June before spring orders are filled. The shortage of stove is steadily becoming a greater cause for worry on the part of dealers everywhere. In some cities this year the retail price of stove has been placed on a parity with chestnut, in the hope of diverting some of the popular demand for the former size.

Bituminous prices at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.95@1.50	$1.20@1.65	$1.67@1.77	
Philadelphia*	2.20@2.75	2.45@2.90	2.92@3.02	
New York*	2.50@3.05	2.75@3.20	3.22@3.32	
Baltimore*	.....	.....	2.85@2.95	
Hampton Roads*	.....	.....	.....	$2.80@2.85
Boston†	.....	.....	.....	3.65@3.78
Providence†	.....	.....	.....	3.58@3.73

* F.o.b. †On cars.

NEW YORK

Surplus stocks of bituminous dwindling but the market continues heavy. Production still much curtailed. Anthracite at wholesale remains active but the dealer trade is slowing down with concessions on the circular obtainable on odd lots.

Bituminous—There is some indication that the large stocks accumulated in anticipation of curtailed mining are beginning to be exhausted, but no material benefits to the trade have been experienced yet. As a matter of fact, the situation is steadily becoming more flat. There is no business whatever being done in the prompt market, while cancellations or orders for restricted shipments on contracts, are still coming in. It is thought by some that the middle of the current month will see surplus stocks generally depleted to a point where more buyers will be forced into the market. A great deal of coal is still reported on demurrage, much of which is selling at sacrifice prices.

As a result of petty strikes, the absence of orders and the refusal of some of the miners to resume work, production is down to something less than half capacity. Negotiations on contracts for the new coal year have practically ceased for the time being. The nominal market continues on the following basis, with scarcely any business being done: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—The customary spring activity prevails with the large hard-coal companies. Full time operations are the rule, while orders for April and May coal are in excess of the supply.

But in retail circles there is a different situation. The rail business continues moderately good, but the trade at tide is quiet, a distinct falling off being noticeable during the past week. Odd lots of domestic coal are selling at 10c. off the circular, with chestnut particularly hard to move. Dealers state that they cannot continue filling the bins of customers who already owe them money. Pea coal is offered at 25 to 30c. off the circular, with no demand even at these figures. There is no activity in the May buying, and the coal is going out very slowly, even April prices failing to stimulate business. The New York hard-coal market is quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.70		$4.65	
Egg	4.95	$4.85@4.95	4.90	$4.80@4.90
Stove	4.95	4.95	4.90	4.80@4.90
Chestnut	5.20	5.20	5.15	5.05@5.15
Pea	3.55	3.55@3.50	3.45@3.50	3.20@3.45
Buckwheat	2.80	2.75@2.80	2.50@2.75	2.30@2.75
Rice	2.30	2.30	2.00@2.25	1.75@2.25
Barley	1.80	1.75@1.80	1.70@1.75	1.30@1.70

PHILADELPHIA

Anthracite situation still favorable, with prospects good. Past month showed a better tonnage than corresponding period of last year. Steam sizes dull. No improvement in bituminous trade.

Anthracite—The tonnage moved the past month has been as large, if no larger, than any corresponding period. This is due to the fact that the cool weather has delayed the drawing of fires, and supplies were being laid in against the coming fall and winter. Orders for the domestic sizes still continue plentiful, and renewal of orders not shipped during April has been most satisfactory. The trade looks for a prosperous May, but are not inclined to be optimistic about the summer months.

The only noticeable falling off is in the steam sizes and pea coal. The latter is essentially a domestic article in this locality, and the demand up to the present time has about absorbed the production, owing to the cool weather, but inasmuch as higher temperatures will prevail from now on until fall, concessions—and liberal ones at that—will doubtless be made in order to create a market. It is understood that the large companies are beginning to stock all of the junior grades. In the large sizes, the demand seems to be centered on egg and stove. Stocks of the former are still being depleted to meet the market requisitions, but chestnut is inclined to drag. Large quantities of this size are now being sent to the Great Lakes terminals, for transshipment to the Northwest.

Prices at tidewater rule as follows:

	Circular	Individual
Broken	$4.35	$4.35 @ 4.45
Egg	4.60	4.60
Stove	4.60	4.70
Chestnut	4.85	4.85
Pea	3.25	

Bituminous—No improvement is noted in the soft-coal situation, but it is now so bad, that the turning point must be an improvement. Coal is being used, and as the stocks dwindle, buyers may be disposed to purchase at better figures, but the present situation does not seem to hold much hope in the immediate future. Many operators seem to be of the opinion that the central Pennsylvania district miners will finally compromise with a renewal of the wage scale of 1912, but there is nothing definite as yet. In the meantime, demand continues light, and prices on about a parity with the week previous.

BALTIMORE

A dull, featureless week in the bituminous business, with prices shading off still farther. Late call for anthracite, due to the continued cool weather. Export figures show an increase.

The spot trade in bituminous has apparently disappeared for the time being, and curtailment on contracts continues to worry the trade. Despite the fact that the week saw the opening of shipments to the Lake ports, prices fell a little lower in some cases as a result of the poor demand. In West Virginia slack was a particularly weak feature, some forced sales being recorded at 50c., while three-quarter was bringing around 75 and 80c. In Pennsylvania, while the tendency was to hold the market at least to the dollar mark, some sales of low-grade fuels were made around 90c. Better coals commanded from $1.20 to $1.35.

A belated call for anthracite coal is taking place and is a somewhat confusing element, as this is the period usually devoted to buying for next season. Dealers report that more inquiries are now coming in for May and June delivery, and that the business as a whole looks healthy.

Export figures for April show a total of nearly 75,000 tons, a gain of about 10,000 tons over the month previous. It was a loss over April of 1913, due to abnormal shipments to take the place of English coals stopped by labor troubles in Great Britain.

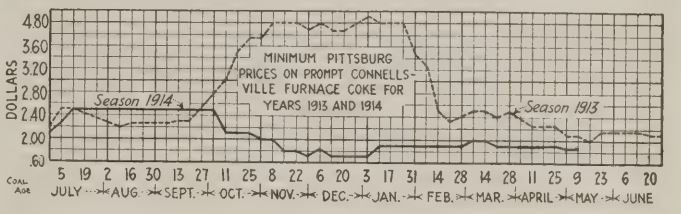
CENTRAL STATES

PITTSBURGH

Coal production slightly increased, at about 40% of capacity for Pittsburgh district. Stocks not all liquidated and consumption low. Regular prices cut for prompt lots. Coke stagnant with prices weak, and production and shipments decreasing.

Bituminous—There has been a slight improvement in mining operations, and the Pittsburgh district as a whole is probably operating at 40% of its full normal capacity. The domestic demand is almost entirely absent. Manufacturing demand is light as there are still some stocks in the hands of consumers, while manufacturing activity is at a low ebb. In some well informed quarters it is estimated that the steel industry is not operating at over 50% of capacity, whereas early in March it was operating at about 75%. Conditions in the steel trade, in other words, are approximately as bad as they were last December before the short-lived revival took place.

There is little movement of lake coal, and it is hardly expected now that there will be much movement before July 1, as it is restricted both by the absence of demand and the small iron-ore movement. Little ore is likely to be bought for awhile and the ore movement is expected to be light for the first half of the season at least. Regular prices on coal are as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh. These prices are frequently shaded on prompt lots.



Connellsville Coke—Thus far there has been scarcely any demand for furnace coke for May, there being merely small purchases of prompt lots. The large operators are still quoting $2 on furnace-coke contracts, but it is recognized that there is hardly any chance of effecting sales at this figure, the small uncovered requirements being easily met by purchases of odd lots. We quote: Prompt furnace, $1.85@1.95; contract furnace, $2; prompt foundry, $2.35@2.50; contract foundry, $2.35@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Apr. 25 at 313,757 tons, a decrease of 20,898 tons, and shipments at 310,209 tons, a decrease of 15,236 tons. Production exceeded shipments by 3548 tons.

BUFFALO

Trade still waiting for a reduction in the surplus accumulations; also the fixing of an agreement with the bituminous miners. Anthracite about as dull as bituminous and coke the same.

Bituminous—The supply in consumers' hands is still large and some selling interests are urging sales instead of waiting till the consumer begins to ask for more. There is not much coal being mined in the districts tributary to this market, some large operations being entirely idle and most others not working more than half time.

The consumers are naturally indifferent to the situation and all purchases are at reduced prices as a rule and not then till much of the coal has paid demurrage. The operating interest is quite aware of the chance it is taking in putting coal on the market under such conditions, but in many cases this is done on account of a desire to keep the miners together against any improvement that may develop. As a rule the trade does not look for any better prices but conditions may occur as was the case last summer.

As a rule the operators are looking after contracts and regular orders believing any attempt to urge new sales would prolong the congestion and keep prices down perhaps all summer. In fact many are of the opinion that there will be no stir in either consumption or price before fall, if then. There is still some coal sold at close to circular prices and sellers refuse to admit a further reduction in quotations which are as follows: Pittsburg lump, $2.80; three-quarter, $2.70; mine-run, $2.55; slack (still much stronger than sizes), $2.25. Allegheny Valley sizes are about 15 to 25c. lower, slack not reduced.

Coke—The demand for all grades of coke is as light as ever, but prices are regarded as at the bottom, for the ovens will as a rule close down on any further reduction. Quotations remain on the basis of $4.50 for best 72-hr. Connellsville foundry.

Anthracite—The continued scarcity of egg coal is the feature of this trade. Consumers are afraid that the mines are deliberately cutting down the production of this size, on account of the lower price. Never has April closed with so little clamor for coal but shipping agents generally appear to regard the situation with satisfaction as they have never been reconciled to the selling of the bulk of the coal in April and November.

Most of the larger companies have resumed loading into lake vessels, some of them having made considerable sales, as shipments to minor ports indicate. The indication, however, is that the season's movement will be much smaller than last year. The winter-loaded coal is now about all out of port, but the amount reported is not large, being only 76,000 tons for the week.

TOLEDO

Situation continues dull and quiet. Some vessels have cleared with coal for the Northwest, but even this trade is slow.

Market conditions have changed little, if any, during the past week, and there is small movement of coal. The railroads are showing some little uneasiness and indicating by inquiries that they may be in the market for coal at an early date but have as yet placed no orders.

There is considerable coal at the various docks held over because of the open winter, but the lake movement has begun. A number of vessels have cleared from Toledo and others are now loading. There is an immense amount of coal in the railroad yards in this city, and it is also stated that there was a great deal held over at the mines which is now making its appearance.

COLUMBUS

No progress in the wage agreement. Conferences in the various sub-districts will probably be arranged soon. Little demand for coal and loss due to suspension will be negligible.

The wage scale has not yet been settled and there are no immediate prospects for its adjustment. At the time of the adjournment a week ago, provisions were made for conferences in the sub-districts of the state but so far none of these have been held. Some preliminary steps were taken but the miners made such unreasonable demands that negotiations were discontinued. In the meantime all of the Ohio mines are closed and it will probably be another month before work will be resumed.

But Ohio operators are not losing a great deal of business because of the shut-down. In fact there is very little demand for either steam or domestic sizes and stocks in the hands of consumers are apparently sufficient for several months. There have been a few inquiries received which indicates a change, but these are not sufficient to cause any uneasiness. Some West Virginia coal is coming into the state but this is usually sold at low prices. In fact prices are too low to cause Ohio operators any apprehension over the business they are losing.

Steam business is slow and most of the steam users have ample stocks for some time to come. Railroads are not requiring any great amount of fuel since the freight movement is lax and many of the passenger trains have been taken off. Domestic trade is about over for the season and there will not be much doing in that department until after the stocking up period arrives. There is, however, some demand for the fancy grades of domestic lump such as Pocahontas and splints which are selling at fair prices. Not much is doing in lake trade although some West Virginia operators are going after the business and some coal has been loaded on boats for shipment to the Northwest.

Word has been received that all of the miners in the Kanawha district of West Virginia went on a strike May 1. Steps are also being taken by the Ohio miners to call a strike soon. This will not change the status of the miners so far as the negotiations with operators are concerned but will enable them to secure strike benefits which are impossible under a suspension.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.35
¾-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack	0.85@ 0.80		0.85@ 0.80	0.75@ 0.70
Coarse slack	0.75@ 0.70	0.95@ 0.80	0.75@ 0.70	0.65@ 0.60

CINCINNATI

Local market still dull despite the labor situation in West Virginia and Ohio. The lake movement hampered by unusual transportation conditions. Smokeless market is sold up for some weeks ahead, but other lines are lifeless.

The rather remarkable state of the coal market can be attributed to a general continuation of slack business conditions. In view of the serious labor situation in West Virginia and Ohio, this has produced a condition full of complications and serious possibilities. The quietness in manufacturing lines has made the demand for steam coal extremely slow, so that even the present light production of screenings is more than required.

The same quiet has resulted in such a surplus of rolling stock on the railroads that many operators find they are unable to get cars moved on account of the sidings being choked with empties. This is especially true on the lines between West Virginia and the lake ports, due to the idleness in Ohio. The lake situation is especially irritating at this time, inasmuch as the shipping season should be in full swing; there are few bottoms available, and many of these cannot be loaded because the operators cannot get coal through.

If the strike in the Kanawha district gets much beyond the incipient stage things should improve materially, as this will undoubtedly cause a decided shortage. The general opinion seems to be, however, that the trouble will be settled, in which case the market may have to await better business among the manufacturers before it experiences any improvement. Contracts for steam fuel are well closed up at the usual figures, 85 to 90c., but orders to cease shipments are now the rule.

DETROIT

Market generally dull, but surplus tonnages are being cleaned up. Some improvement anticipated soon. Anthracite moving freely.

Bituminous—No change is noticeable in the local situation and coal on track seems to be reduced if anything. Contracting for the new year continues on the same basis as last season. The steam market is generally dull just now, but the outlook is more promising. There is no demand whatever for domestic fuel except Pocahontas, egg and lump, which are moving rather freely at the circular. It is thought that the next week will see the surplus fuel well cleaned up, and with a better demand, prices will firm up at the fall circular.

Anthracite—Unusually heavy shipments are the rule in anthracite, but orders are not coming in as freely as expected. However, a better movement is anticipated.

Coke—The outlook in coke continues discouraging, the past week having been one of the dullest of late. Connellsville coke is selling at $2.55 with Semet Solvay at $2 and Gas House at $2.75, f.o.b. ovens.

HAMPTON ROADS

Large shipments both foreign and coastwise. Several inquiries in the market, but no large amount of spot coal reported sold. Good dumpings during the week.

The movement from Hampton Roads for the week has been good, leaving only an average number of cars in the local yards. Several inquiries for large quantities have been made, but no extra large amount of coal is reported sold. Some small cargoes of spot coal have been moved at practically circular prices.

Foreign shipments for the week have been to Dakar, Havana, Venice, Naples, Geona, Para, Kingston and Canal Zone. In addition to coastwise and foreign shipment the government has taken some coal for Key West.

The total dumpings of the three railways at Hampton Roads during the month of April amounted to 1,063,719 tons, of which the Norfolk & Western dumped 535,032 tons, the Chesapeake & Ohio Ry. 267,269 and the Virginian Ry. 261,418. It will be seen from these figures that the dumpings of the Norfolk & Western amounted to over 6000 tons more than those of the other two roads combined. Although there was a general complaint during April of poor movement, these figures indicate good shipments.

LOUISVILLE

Southeastern Kentucky mines working exceptionally well, but situation generally, dull and quiet. Some contracting at less than last year's figures.

Few changes in the local market, prices remaining about at the same level, except that there has been a drop of 25c. in retail quotations on domestic sizes, usual, however, at this time of year. Business generally is slow to poor with the manufacturers and the railroads taking little coal of any kind. There has been no change in the labor situation, another futile conference between the operators and the miners' representatives of the western Kentucky field having been held in Louisville.

Nut and slack and the various steam sizes are plentiful in spite of the lack of stocks of domestic sizes. This is more true in the Eastern field than in the Western. In the former contracts are being renewed at an average reduction of from 5 to 10c. a ton. In western Kentucky nut and slack, and pea and slack are scarcer, but there are no orders. These mines are being worked on short time, some only one day a week and others as much as three.

Prices at the mines range from 45 to 65c for pea and slack or nut and slack in western Kentucky, to 60 to 75c. for the best grades of these sizes in eastern Kentucky, with the poor qualities priced at 40 to 50c. Eastern Kentucky block coal ranges from $1.30 to $1.80 with the average around $1.50 a ton.

SOUTHERN AND MIDDLE-WESTERN

INDIANAPOLIS

More mines open, due to storage stocks being exhausted. Railroads still have coal and until they resume buying, screenings will continue scarce. Higher-priced Indiana grades likely to benefit from the more disturbed condition in adjoining states.

The large consumers who stocked up for thirty days are in the market again for coal and mines are gradually resuming operations. The railroads are apparently within two weeks of exhaustion of surplus supplies and are beginning to make inquiries and contracts so that about half the Indiana mines have opened again. All grades of coal are in ample supply except slack, for which premiums of 20 to 30c. a ton are obtainable. At the present rate of improvement in demand, all the state mines should be again in operation by June 1.

Retail dealers unexpectedly put their summer schedule into effect May 1. Perhaps the fact that Indiana miners decided not to strike has had something to do with the dealers' changed attitude. They say that the lower prices now in effect are good only for sixty days, instead of until fall, as is customary. Indiana operators and selling agents of Eastern bituminous mines say a long list of mines could be named that would be glad to have some spring orders.

If Illinois miners decide to strike and the conditions continue in Ohio as they are, Indiana mines see busy times ahead in about two weeks. The new retail prices in Indianapolis are:

Anthracite, chestnut	$7.75	Hocking Valley lump	$4.00
Anthracite, stove and egg	7.50	Luhrig lump	4.00
Anthracite, grate	7.25	Luhrig washed egg	4.25
Pocahontas, forked lump	5.50	Cannel	6.00
Pocahontas, shoveled lump	5.00	Linton No. 4 lump	3.00
Pocahontas, mine run	4.00	Linton No. 4 egg	3.00
Pocahontas, nut and slack	3.50	Indiana washed egg	3.25
Blossburg	5.50	Brazil block	4.00
Jackson (Ohio)	4.75	Indianapolis lump coke	6.50
Kanawha lump	4.00	Indianapolis crushed coke	6.50
Kanawha, egg and nut	4.00	Connellsville lump	6.00
Pittsburgh lump	4.00	Citizens egg coke	5.50
Raymond lump	4.00	Citizens nut coke	5.50
Winifred lump	4.00		

CHICAGO

Railroads reported down to near the end of their storage supplies. Some inquiries already noted and more anticipated shortly if the labor situation does not clear up. Prompt market still comparatively dull.

The Chicago market is decidedly unsettled. The large consumers are down to about the last of their storage coal and the demand for new stock is expected shortly. Queries for coal from large consumers have been very few.

It is expected that many steam coal buyers who stocked up extensively for April will have sufficient to run well into the present month, the consumption being smaller than was anticipated but a number of railroads will be obliged to come into the market shortly. The purchase by the Wabash railroad of 25,000 tons of coal for early delivery has stimulated the spot market. The Wabash did not buy very extensively in March. The Pennsylvania and the New York Central roads are expected to need a large supply, while other Illinois roads are facing the exhaustion of their storage piles at no far distant date.

Screenings have eased off to $1 as compared with $1.10 to $1.15 a week ago. It is expected that the price will recede to about 85 or 90c. when the mines resume operations again. Conditions in the anthracite market have been dull. The retailers are buying slowly as the result of a money shortage, it is believed. There have been few purchases for storage for next winter and the current demand is small.

A few Pocahontas coal contracts have been closed up at prices arranged some time ago, and conditions in this coal are generally dull. There are few contract shipments and spot buying has practically stopped, with consignment coal selling as low as $1 a ton in order to move it. With little coke being consumed the market is very quiet.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.65@1.87	1.95@2.05	1.67@1.87	

Coke—Connellsville and Wise County, $5 and $5.25; by-product egg, stove and nut, $4.45; gas house, $4.25.

ST. LOUIS

An agreement nearly reached in some fields but operators as a rule are showing no anxiety to resume operations. Long idleness beginning to tell on the miners.

A little more anxiety as to the future has developed during the past week. The early part of the week conditions at Peoria looked favorable for a settlement between the Illinois operators and the miners, regarding their wage scale. The insistence on the part of the miners that the differential of 4c. a ton between the Standard and the Carterville field be equalized was apparently the only point at issue. The Carterville and southern Illinois producers refuse to concede this and as there is no demand for coal the operators of both fields are indifferent about working.

On the other hand, the miners for the most part are getting to that point where hunger is not far distant. At several mines in the 5th and 9th District, the miners' locals voted not to continue work any further during the past week, believing that as long as coal is mined the operators will hold out in the Peoria Conference. A few mines continue to work a couple of days a week in the Carterville field, but there is no demand for coal, with the exception of the finer sizes for steam purposes and possibly Nos. 1 and 2 nut for domestic.

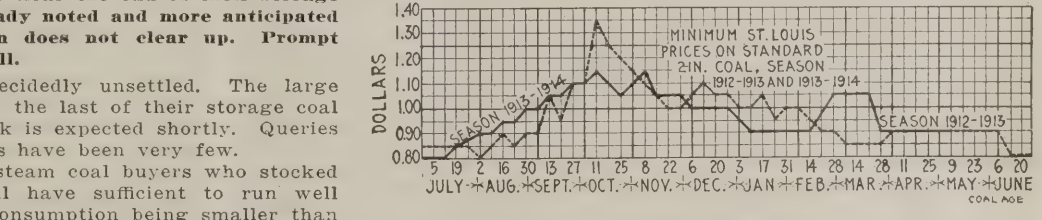
The end of the month saw a good volume of anthracite move in at the April figure, but deliveries seem slow and not much is expected until the latter part of this month or the early part of June.

The St. Louis circular is as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	$1.20	$0.90 @ 1.00	$1.15
3-in. lump	.....	.....	1.25	.....	.....
6-in. lump	$1.25 @ 1.40	.....	1.35	1.20 @ 1.80	1.35
Lump and egg	1.85 @ 2.15	$2.25	.....	.....	1.15
No. 1 nut	1.35 @ 1.50	.....	.....	.....	.....
Screenings	0.85 @ 1.00	.....	.....	0.65 @ 0.70	0.75 @ 0.80
Mine-run	1.10 @ 1.20	.....	.....	0.80 @ 0.85	.....
No. 1 washed nut	1.50 @ 1.60	2.25	1.50	.....	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.25	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.80 @ 0.85	.....	.....	.....	.....

Anthracite—The wholesale May circular on hard coal is: Chestnut, $7.15 egg and stove, $6.90; grate, $6.65. The May retail circular is: Chestnut, $8.10; egg and stove, $7.85; grate, $7.60.

Coke—Coke is quoted at $4@4.25 at wholesale and $5.25@5.50 retail.



KANSAS CITY

Steam grades fair, but domestics weak. Some concessions offered, but the market is fairly steady as a whole.

Demand for coal in the Southwest is quiet with the attention of operators concentrated on labor conditions rather than movement of coal. Steam lines are moving well, but are not unusually good. On the other hand, lump is slow and is causing operators much anxiety. The market has been generally steady at summer quotations. It is reported in some quarters that prices are being cut in order to secure business, but the trade is at its normal strength, considering the season.

PORTLAND, ORE.

Summer prices go into effect, making a reduction of 50c. per ton in lots above five tons. Bunker rates still up for consideration with the railroads.

It was announced here this week that summer rates on coal will be in effect at once, meaning a reduction of 50c. per ton. Some of the dealers are beginning to take business in bulk instead of in sacks, giving the consumer a concession of $1 per ton. It is believed that this method of delivery will be regarded as the most satisfactory.

The mine strike in Colorado has not affected conditions here and it is thought no effect will be felt as this district buys no coal from Colorado at present. But should other districts which depend upon the Colorado product for their supplies, start using the Montana, Wyoming and Utah coals, it may create a scarcity of these.

PRODUCTION AND TRANSPORTATION STATISTICS

BALTIMORE & OHIO

The following is statement of coal and coke tonnage moved over this system and affiliated lines during March and the first three months of this year and last year:

	March		Three Months	
	1914	1913	1914	1913
Coal	3,173,972	2,538,039	8,477,049	8,091,860
Coke	356,164	405,220	896,499	1,215,751
Total	3,530,136	2,943,259	9,373,548	9,307,611

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for March and the three months of 1913 and 1914, in short tons:

	March		Three Months	
	1914	1913	1914	1913
Anthracite	1,086,344	741,209	2,706,391	2,743,504
Bituminous	4,740,313	4,050,247	12,414,492	12,117,747
Coke	1,027,339	1,247,451	2,700,237	3,756,325
Total	6,853,996	6,038,907	17,821,120	18,617,576

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for February, 1913-14, and for the eight months ending February, 1912-13-14, in long tons:

	8 Months		February	
Imports from:	1912	1913	1914	1913	1914
United Kingdom	5,861	7,355	8,460	137	3,547
Canada	625,238	954,363	654,641	110,401	75,570
Japan	7,307	42,217	81,476	12,213	7,170
Australia and Tasmania	149,396	107,917	172,127	8,709	30,843
Other countries	1,444	3,257	2,010	2,809	43
Total	780,246	1,114,209	918,714	134,269	117,173
Exports:					
Anthracite					
Canada	2,258,887	3,170,607	2,445,231	357,854	203,130
Uruguay	.....	.....	84	.....	.....
Other countries	42,290	53,997	45,360	3,639	3,683
Total	2,301,177	3,224,604	2,490,675	361,493	206,813
Bituminous,					
Canada	7,475,621	7,559,065	8,956,986	556,190	440,712
Panama	303,019	307,759	257,704	38,000	16,650
Mexico	211,374	206,908	205,144	51,692	22,171
Cuba	712,451	805,162	787,134	98,386	101,375
West Indies	442,694	402,705	380,457	73,269	43,186
Argentina	.....	.....	76,410	.....	23,609
Brazil	.....	.....	185,687	.....	15,166
Uruguay	.....	.....	22,039	.....	5,181
Other countries	519,057	642,367	773,377	79,253	98,259
Total	9,664,216	9,923,966	11,644,938	896,790	766,309
Bunker coal	4,453,131	4,794,941	5,110,588	564,252	535,529

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for February and the eight months ending Feb. 28, 1912 and 13, in short tons:

	February				Eight Months			
Destination	1914	%	1913	%	1914	%	1913	%
Tidewater	240,689	21	323,469	24	2,264,182	19	2,391,580	22
East	190,530	16	220,991	17	1,745,564	15	1,739,698	16
West	663,868	58	671,742	51	7,232,229	60	6,109,197	57
Total	1,095,082		1,216,202		11,241,975		10,240,466	
From Connections								
Bituminous	55,494	5	88,546	7	727,218	6	423,111	4
Anthracite	1,063		1,480	1	10,476		8,829	1
Total	1,151,639	100	1,306,228	100	11,979,669	100	10,672,406	100
Coke	34,194		29,643		251,447		195,343	

SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern tonnage for November and the first eleven months of the years 1912 and 1913:

State	November		Eleven Months	
	1912	1913	1912	1913
Missouri	293,360	290,958	2,731,523	2,658,393
Kansas	489,387	571,165	4,641,892	5,241,322
Arkansas	203,295	187,703	1,782,800	1,804,183
Oklahoma	334,818	346,064	2,719,096	3,210,114
Totals	1,320,860	1,395,890	11,875,311	12,914,012

This statement only covers the tonnage of members of the association, which is estimated to be at least 95% of the entire production.

COAL FREIGHT DECISIONS

I. C. C. No. 4894—Rogers & Prinkey vs. Baltimore & Ohio R.R.

Basis proposed by Baltimore & Ohio Railroad for construction of joint through rates on coal from mines on the line of the Indian Creek Valley Railway Co., which basis makes rates 10c. per ton higher from these mines than from mines in the Meyersdale group on the Baltimore & Ohio Railroad, not found to be unreasonable or unjustly discriminatory.

FOREIGN MARKETS

GREAT BRITAIN

Apr. 24—The market is firm for prompt deliveries. Buyers are holding back forward orders in the hope of obtaining reductions. Quotations are approximately as follows:

Best Welsh steam	$4.56	Best Monmouthshires	$4.11
Best seconds	4.38	Seconds	3.96
Seconds	4.20	Best Cardiff smalls	2.82
Best dry coals	4.20	Seconds	2.64

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry, $5.28@5.52; furnace, $4.08@4.56.

British Exports—The following is a comparative statement of British exports for March and the three months of the last three years, in long tons:

	March		3 Months		
	1913	1914	1912	1913	1914
Anthracite	216,151	201,899	558,004	701,516	721,987
Steam	4,144,761	4,294,733	9,046,223	12,609,068	12,712,882
Gas	833,547	1,002,414	1,938,998	2,610,246	2,771,197
Household	141,867	119,887	299,234	435,454	377,249
Other sorts	262,448	290,789	630,613	882,725	847,054
Total	5,598,774	5,909,722	12,473,072	17,239,009	17,430,369
Coke	76,340	82,898	277,123	282,180	301,749
Manufactured fuel	156,210	178,100	373,332	507,202	502,181
Grand total	5,831,324	6,170,720	13,123,527	18,028,401	18,234,299
Bunker coal	1,654,142	1,689,304		4,951,231	5,035,448

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending May 2:

	Week's Range			Year's Range	
Stocks	High	Low	Last	High	Low
American Coal Products	83	83	83	86¼	82
American Coal Products Pref	103	103	103	106	102¼
Colorado Fuel & Iron	28⅛	24	27	34½	24
Colorado Fuel & Iron Pref	140	140	140	140	140
Consolidation Coal of Maryland	....	....	102¼	..	....
Island Creek Coal Com	47¾	47	47¾	....	....
Island Creek Coal Pref	86	85	86	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20⅜	19¼	20	23½	17⅜
Pittsburgh Coal Pref	88½	86½	88⅜	93½	84
Pond Creek	17½	16½	17	....	....
Reading	164⅛	158½	163⅜	172¼	158½
Reading 1st Pref	88½	88½	88½	89	87½
Reading 2nd Pref	89	87	87½	93	87½
Virginia Iron, Coal & Coke	42	42	42	52	40

	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Bonds						
Colo. F. & I. gen. s.f.g. 5s	..	97½	97⅛	Apr. '14	91½	99
Colo. F. & I. gen. 6s	105	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	..	74	73½	73½	73½	82
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89¼	90¼	89	Mar. '14	89	89
Gr. Riv. Coal & C. 1st g 6s	89	..	99⅛	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	98½	102⅜	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	89½	..	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	86½	87½	87	88	84	88½
Tenn. Coal gen. 5s	77	81½	77	78	77	82
Birm. Div. 1st consol. 6s	101⅛	..	101½	Apr. '14	97½	103⅛
Tenn. Div. 1st g 6s	101¼	103	102	102	101½	103
Cah. C. M. Co. 1st g 6s	101	103	102	Mar. '14	101	102½
Utah Fuel 1st g 5s	101	..	101½	Mar. '14	101½	101½
Victor Fuel 1st s f 5s	..	84	73	73	73	73
Va. I. Coal & Coke 1st g 5s	90	93	92⅜	Apr. '14	92⅛	95

DIVIDENDS

Delaware, Lackawanna & Western Coal—Special dividend of 10%, payable to May 15, to holders of record May 5.

New Central Coal Co.—Dividend of 2%, payable May 1, to holders of record Apr. 28 to Apr. 30.

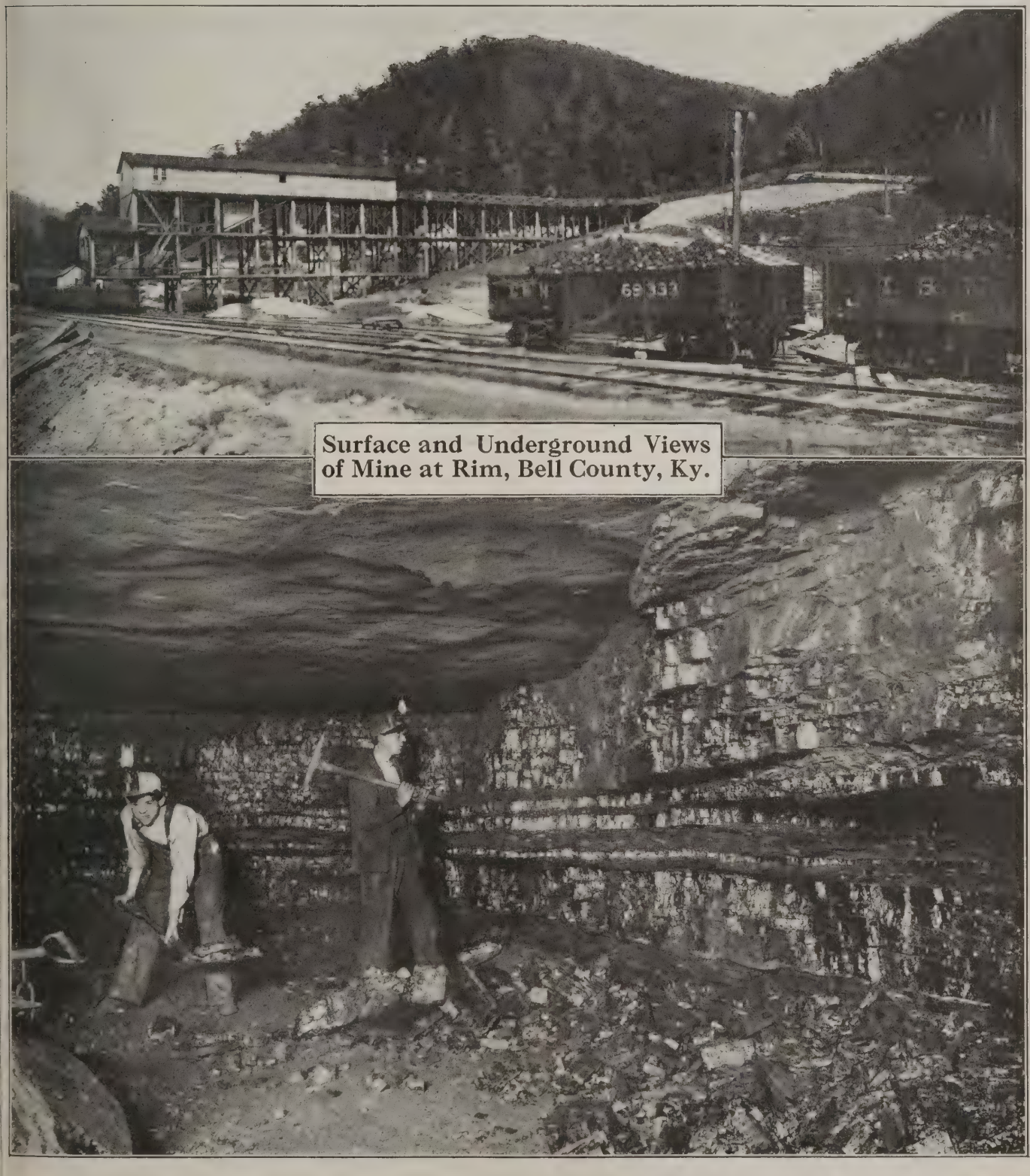
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

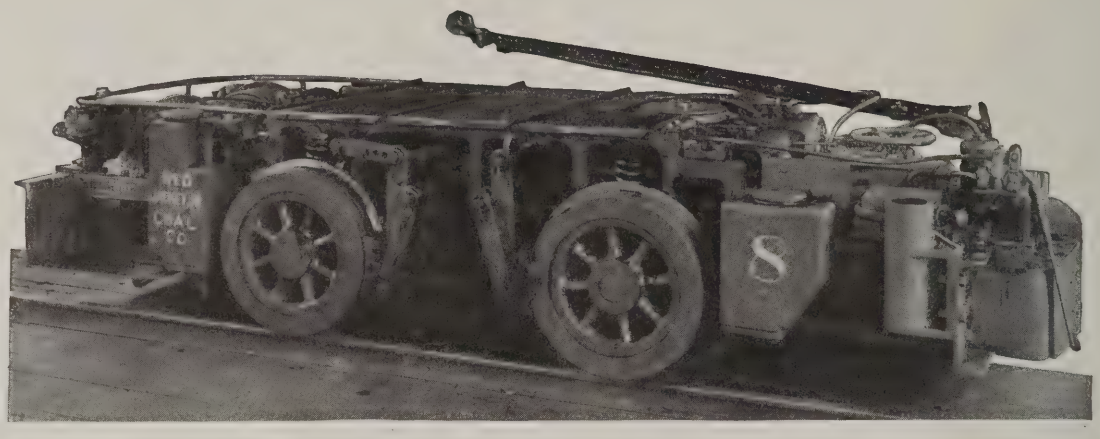
Volume 5, No. 20
Issued Every Saturday
Hill Publishing Company

NEW YORK, MAY 16, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Surface and Underground Views of Mine at Rim, Bell County, Ky.



A Barsteel Gathering Locomotive
That Will Operate in a 29-Inch Clearance

Here is an illustration of a Baldwin-Westinghouse Barsteel electric gathering locomotive that operates successfully in a clearance of twenty-nine inches—36 inches was heretofore considered about the limit for locomotives.

Great care has been exercised in keeping the overall height to a minimum, as is shown in the general construction of the locomotive and the location of the reel.

There is not a projection above the top of the frame anywhere and ample room has been provided to permit the operator to crouch upon his seat.

The reel is driven by an independent motor contained inside the reel drum. This motor is in effect an electrical spring. It tends to wind the cable up and its turning force acts as a brake and keeps the cable taut when the locomotive enters the room and promptly takes up all slack when the locomotive returns.

With this type of reel there is easy access to the locomotive motors, because of its being located out of the way on the rear of the frame. The armature of the reel motor can be readily removed for inspection and overhauling.

Locomotives of this type have successfully solved the problem of gathering in very low rooms. Our specialists in mine haulage, who make a careful study of various mining problems will be glad to assist you in selecting the proper equipment for your mines.

Get in touch with them by writing to either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MAY 16, 1914 NUMBER 20

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 795

The Two Spirits. Poem by Berton Braley.

*REMODELING AN OLD MINE: *Pages* 796-797

The need both of increased capacity of the ventilator and of ability to reverse the current. Description of method used to replace old timbers with steel I-beams, without interruption of the operation of the mine. John E. Ambrose. COAL AGE, Vol. 5.

ELECTRICITY IN COAL MINING: *Page* 797

This is the first article of the series and deals with the calculations employed in direct-current work. The formula used is explained by examples. David R. Shearer. COAL AGE, Vol. 5.

*THE FRIEDRICH HEINRICH COLLIERY AT LINTFORT, GERMANY: *Pages* 798-800

A recent German development, embodying many features not found in American plants. COAL AGE, Vol. 5.

PORTABLE ELECTRIC LAMPS: *Page* 800

ACCIDENTS IN ANTHRACITE MINES: *Page* 800

LESSONS OF THE VANCOUVER STRIKE: *Pages* 801-802

A brief review of the strike in Vancouver Island. A strange condition presented by the mines of Vancouver, which are working regularly and producing all the coal the market demands, while a waiting list of 100 names of miners, for whom no places can be found, shows plainly that there is in fact no strike. COAL AGE, Vol. 5.

*AN INTERESTING FOSSIL: *Page* 802

THE CONSUMER AND HIGHER ANTHRACITE: *Page* 802

STUDY COURSE IN COAL MINING: *Page* 820

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 821

COAL AND COKE NEWS: *Pages* 822-825

*SELF-CONTAINED PORTABLE ELECTRIC MINE LAMPS: *Pages* 803-807

The frequent occurrence of mine explosions caused by defects of oil safety lamps has encouraged the development of electric lamps. Satisfactory results, however, have been obtained only since the invention of the tungsten filament, permitting the use of smaller storage batteries. H. O. Swoboda. COAL AGE, Vol. 5.

WILKES-BARRE DISTRICT MINING INSTITUTE: *Page* 807

SNAPSHOTS SHOWING SAFETY PRECAUTIONS UNDERGROUND: *Page* 808

*THE COLORADO STRIKE: *Pages* 809-811

The interest in the situation shifts from the battlefield to the state capitol. Peace continues, but what will happen if the regulars are removed seems uncertain. The action of the United States Government is simply to restore the condition of affairs prior to the Ludlow battle. COAL AGE, Vol. 5.

ITINERARY OF FEDERAL MINE-RESCUE CARS: *Page* 811

EDITORIALS: *Pages* 812-813

Special Anthracite Number—The One Thing Needful—Proposed Oriental Legislation in Colorado—The Government Mine at Williston, N. D.—The Court of Public Opinion.

SOCIOLOGICAL DEPARTMENT: *Pages* 814-817

*Saline County Mine Safety Association Meet. COAL AGE, Vol. 5.

DISCUSSION BY READERS: *Pages* 818-820

The Certificate Law. Letter No. 28—The Air Factor in Mine Explosions—The Mine Foreman. Letter No. 4.

COAL TRADE REVIEWS: *Pages* 826-830

INDEX OF COAL LITERATURE: *Pages* 831-832

ADVERTISING INDEX: *Page* 34

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

The Measure of Success

The Weekly Ad-Talk Page

"THE SUCCESS of any technical paper" said a man, who knew what he was talking about, the other day, "depends upon the *intelligence* put into its advertising pages."

Do you "get" that, Mr. Reader? "The *intelligence* put into the advertising pages."

"Intelligence" does not mean trickery and "hot air" in inducing manufacturers to spend money in the advertising pages.

It means a complete comprehension of the needs and opportunities of the paper's field, persistence and commonsense in inducing the advertiser to fill his advertisement with real information, to leave exaggeration alone, to make it possible for the reader actually to believe what he reads in the advertisements.

This is the "intelligence" that spells the success or failure of a technical paper. That is the intelligence you are getting, week by week, in COAL AGE.

It should interest the reader to know that while there are just four men soliciting "space" for COAL AGE there are 16 men who devote their time to helping the advertiser put this "*intelligence*" into the advertising.

The ads in COAL AGE ***are*** *worth reading*!

COAL AGE

Vol. 5 NEW YORK, MAY 16, 1914 No. 20

The Two Spirits

By Berton Braley

Written expressly for Coal Age

Two spirits waited at Heaven's gate
And one was confident, smug, sedate,
The other was weary and labor-bowed,
Mighty shouldered and blackly browed,
And the cultured spirit drew away
With a glance at the other's rough array.

"Speak up, you spirits," St. Peter cried,
"And tell me why you would step inside."
"Sire," said the polished one, "Let me in,
A golden crown I am fit to win,
For the world has always known of me
As a splendid giver to charity,
A leader of uplift, near and far,
So let me in where the good souls are."

"I'm wise," said Peter, "You got your rents
From rotten houses and tenements,
Then thought to cheat your God, good lack!
By giving some of the money back.
You gave your gold—on a wholesale plan,
But did you ever, your whole life's span,
Help some poor devil—as man to man?
Did you ever toil, did you ever learn
What a dollar means that you have to *earn*?"

The head of the cultured soul hung low,
And meekly and faintly he answered, "No."

"You're sort of a useless thing, my lad,
But I reckon your bringing up was bad,
So I'll send you back to the earth once more
Don't putter around as you did before,
But get in the rough world's work and strife
And learn the joy and the pain of life,
And play and work with your fellow men
—And after awhile you can call again!"

To the other spirit St. Peter said,
"What did you do in the life you led?"

"Just dug the coal," was the soul's reply,
St. Peter viewed him with kindling eye,
"What else?"—
"Why nothing," returned the soul,
"Nothing important—just digging coal."

"Nothing important, just digging coal!"
St. Peter laughed at the puzzled soul,
"Just digging coal—to make the steam
Which makes a fact of the dreamer's dream,
Just digging coal—whose power has hurled
Man's mightiest engines round the world,
Just digging coal, whose white hot glare
Beats back the winter's bitter air,
Just digging coal!—oh friend of Man,
Come in and join the Heavenly clan,
You did your work nor shirked nor swerved,
And Heaven is made—*for those who served*!

Remodeling an Old Mine

By John E. Ambrose

SYNOPSIS—The need of both increased capacity of the ventilator and the ability to reverse the current. Description of method used to replace old timbers with steel I-beams without interruption of the operation of the mine.

Some time ago, it was my fortune to have charge of the work of remodeling a shaft sunk to the Pittsburgh seam, for the Federal Coal & Coke Co. This shaft is located at Grant Town, on a branch line of the Baltimore & Ohio R.R., about 11 miles from Fairmont, W. Va. Upon a change of management, it was decided to make a number of improvements, both in the equipment of the mine and the arrangement of the underground workings.

The Ventilating System

The ventilation of the mine, up to that time, had been produced by an exhaust fan located at the mouth of the airshaft but set a short distance back from the top of the shaft, with which it was connected by a fan drift constructed of sheet steel. This ventilator produced good results, but the later development of the mine would require a larger quantity of air in circulation, which would be beyond the capacity of the fan to produce. Moreover, since the mine generated gas, it was decided that a reversible fan was needed that would throw a larger quantity of air under a low water gage. The fan chosen for this purpose was a Robinson fan of the reversible type.

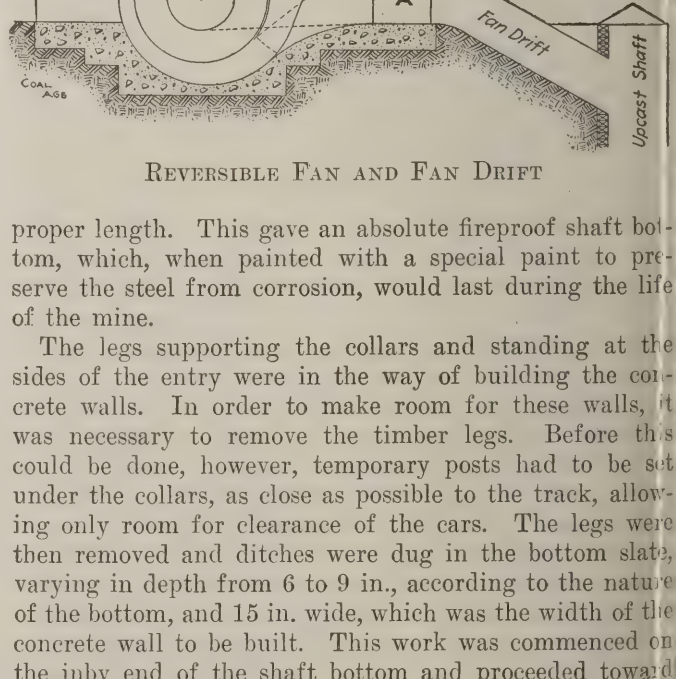
The general arrangement of the fan drift and its connection with the upcast shaft is shown in the accompanying figure. The air current coming up the shaft and entering the fan drift is divided by the doors *A A*, so that half the current enters each side of the fan. These doors can be swung into the position indicated by the dotted lines *B B* when it is desired to operate the fan on the blowing system. It is then also necessary to open other doors in the side of the fan drift, to admit the free outside air to the fan, and to close the door that permits the fan to discharge the air into the chimney, instead of which the air passes from the fan into the fan drift and thence into the mine. By this means, the fan can be converted at once from an exhaust fan into a blower. The last doors mentioned are not shown in the figure.

The walls and floor of the fan drift were constructed of concrete; and, as shown in the figure, this drift was carried down on an angle of about 30 deg. and intersected the shaft 10 ft. below the surface. The foundation of the concrete walls were 18 in. thick, but these were carried up with a thickness of 12 in. above the ground line. The roof was constructed of 30-lb. steel rails laid across the top of the sidewalls and covered with concrete reinforced with ¾-in. round iron and steel wire netting. The fan drift was 10x10 ft., giving a sectional area of 100 sq.ft.

Plan of Conducting the Work

It is not intended, here, to give a full description of the details of this work. Before remodeling, the shaft bottom was timbered with 12x14-in. oak timbers, 25 ft. long, the collars being supported on legs, on each side of the entry, at a height of 5½ to 6 ft. above the rail. The timber sets were generally put in on 3-ft. centers, but close to the shaft the frames were set "skin to skin." It became necessary to remodel the shaft bottom, because many of the timbers contained dry rot that caused them to break in the middle. More room was also required for the handling of the necessary supplies.

It was decided to replace the oak timbers with 12-in. I-beams, having 8-in. flange faces, the thickness of the central web being 0.35 in. These beams were to be set on sidewalls of concrete at such height as to give 7 ft. headroom or clearance above the rail. A short distance from the shaft, the roof slanted upward until it attained a height of 13 ft., at the shaft. The purpose of this was to expedite the handling of the heavy 40-lb. rails used on the haulage roads and to enable these to be loaded on trucks directly from the shaft. The I-beams supporting the roof were to be lagged with 20-lb. steel rails cut to the proper length. This gave an absolute fireproof shaft bottom, which, when painted with a special paint to preserve the steel from corrosion, would last during the life of the mine.



Reversible Fan and Fan Drift

The legs supporting the collars and standing at the sides of the entry were in the way of building the concrete walls. In order to make room for these walls, it was necessary to remove the timber legs. Before this could be done, however, temporary posts had to be set under the collars, as close as possible to the track, allowing only room for clearance of the cars. The legs were then removed and ditches were dug in the bottom slate, varying in depth from 6 to 9 in., according to the nature of the bottom, and 15 in. wide, which was the width of the concrete wall to be built. This work was commenced on the inby end of the shaft bottom and proceeded toward the shaft. As quickly as a few legs were removed, the ditches were dug on both sides, the necessary forms constructed and concreting commenced.

Two gangs of men were kept busy, one standing the temporary posts and removing the old legs from the side of the entry, and the other digging the ditches, building the forms and filling them with concrete. While the work was in progress, about one-third of the length of the shaft

bottom was thus supported on temporary posts and the hoisting of coal was not interrupted. When the timber gang had reached a point close to the shaft, they were brought back and began the work of removing the old collars and replacing them with the steel I-beams. This work was difficult, as anyone experienced in retimbering mine passageways will realize. Great caution was necessary in order to prevent a fall of roof that would block the entries and delay the hoisting of coal.

At a point about halfway from the shaft, it became necessary to saw off the ends of the collars, in order to provide the necessary height of the sidewall to give 7 ft. of headroom above the rails in the completed entry. Again, at a point about 15 ft. from the shaft, the walls had to be run up on an angle of about 28 deg., to make the 13 ft. of headroom at the shaft, as previously mentioned. To do this, it was necessary to take down 6 ft. of toprock, which proved a tedious operation, inasmuch as some of the roof was loose and it was impossible to set posts to secure it properly, as the concrete walls had to be built before the steel I-beams could be put in place. It was also necessary to keep all the tracks clear.

Electricity in Coal Mining

By David R. Shearer*

SYNOPSIS—This is the first article of the series and deals with the calculations employed in direct-current work. The formula used is explained by examples.

It is presumed that the reader is acquainted with the fundamentals of direct or continuous current, but a brief outline of the characteristic features will be here given.

A direct current of electricity may be compared to the steady flow of a stream of water in a pipeline and in the same manner, electrical action may be compared, for clearness of conception, to hydraulic phenomena as follows:

The pressure of the supply of electricity is measured in volts and can be compared to the pressure in pounds per square inch in a water or steam pipe. Thus, we say a generator works at a pressure of 250 volts just as we would speak of a boiler working at 80 lb. As an example, the electrical pressure or voltage of an ordinary dry cell is 1.5 volts, of a storage cell 2 volts, of the standard lighting circuit 110 volts and of the usual mine supply system 250 volts, although in some of the older installations a pressure of 500 volts is still used.

The flow of an electrical current or quantity per unit of time is measured in amperes and may be compared to the flow of a stream of water in gallons per minute.

Resistance is measured in ohms and may be compared to the friction of the waterpipe restricting flow.

Certain dependent relations may also be compared hydraulically, for instance, the higher the voltage, the greater will be the flow of current through a given wire, just as more water will flow through a given pipe, if the pressure is raised; also, just as the friction on a pipe increases in proportion to the length and varies in inverse proportion to the cross section, so the resistance of a wire increases directly with the length and inversely with its cross-sectional area.

The Law of the Electric Circuit

The fundamental law of the electric circuit known as Ohms law is: $I = \frac{E}{R}$. Where I = current in amperes, E = electrical pressure or voltage and R = resistance measured in ohms. This formula or law may be transposed to other forms, viz.: $IR = E$, $R = \frac{E}{I}$.

The power of the circuit is IE in watts and as the watt or $^1/_{746}$ horsepower (hp.) is an extremely small unit, the kilowatt (kw.) or 1000 watts is more generally used in rating power installations. Now, as 746 watts = 1 hp. and 1000 watts = 1 kw., then 1 kw. = 1.34 hp. nearly. As an example, what is the theoretical horsepower of a motor requiring 14 amperes at 110 volts?

Solution: $hp. = \frac{I \times E}{746} = \frac{14 \times 110}{746} = 2.06$

A definite amount of power is always lost in forcing the current through any conductor, this loss, of course, being proportional to the resistance of the circuit. This is usually known as voltage drop or lost volts and the actual power or wattage thus dissipated is easily computed. Example: The resistance of a line of wire is 2 ohms, the voltage at the sending end is 110 and the current forced through the wire is 5 amperes. What is the voltage drop at the receiving end and the power lost in the line?

Solution:

$I = \frac{E}{R}$ or $E = IR$ $\qquad E = 5 \times 2 = 10$ *volts lost*

$110 - 10 = 100 =$ *voltage at receiving end.*

Power lost $= I \times E = 5 \times 10 = 50$ *watts* $= {}^1/_{14}$ *hp.*

By substitution in watts lost

$I \times I \times R =$ *watts lost or* I^2R

In calculating actual mechanical power produced by an electric current of given voltage, we must further consider another factor, the efficiency of the generator or motor. This means that there is some loss in converting mechanical energy into electricity and *vice versa*. The efficiency is usually written as a decimal or in percentage. Example: The efficiency of the generator is 80% or 0.8, how much current will be produced at 110 volts by a 10-hp. engine driving the generator?

Solution:

10 *hp.* = 7460 *watts theoretical hp. produced*

$7460 \times 0.8 =$ *actual electrical hp. produced*

$= 5968$ *watts*

*Knoxville, Tenn.

[Note—Many good engineering handbooks are to be found dealing with the details of electrical construction; however, there is a considerable demand for information concerning the application of electricity to coal-mining work. With the idea of somewhat filling this want, Mr. Shearer has compiled some valuable data on electrical engineering as applied to coal mining, and a large part of this material will be published in succeeding issues of "Coal Age." Later, the complete text of the articles will be issued in book form by the McGraw-Hill Book Co., of New York.—Editor.]

The Friedrich Heinrich Colliery at Lintfort, Germany

By P. Büssing

SYNOPSIS—A recent German development, embodying many features not found in American plants.

The very recent opening of this German mine, 1913, makes the particulars of its development of unusual interest. The property covers about 11,000 acres and is situated in the northern extremity of the Rhine Province, not far from the well known Krupp Works, at Essen. As the mine is unusually wet, the two shafts, 20 ft. in diameter each, were sunk by the freezing process. Operations were begun in July, 1907, and the mine was ready to be worked in February, 1913.

At present, the drainage water is removed by an electrically operated unit, consisting of two centrifugal pumps of five stages each, directly driven by an intermediate motor and designed to handle 1000 gal. per min. over a 1900-ft. lift. The motor develops 900 hp. at 1480 revolutions. The low-pressure pump rings are of cast iron, the high-pressure ones, of steel. Each ring is cast in one piece with inlet and outlet.

The Surface Plant Is Particularly Interesting

The plant above ground is of especial interest, embodying the latest German engineering practice for the comfort and convenience of the workmen, as well as for the most economical operation, due regard being had for the future and for general appearance as well. Care was taken to design all the buildings in one style, so that each forms a harmonious unit of the whole plan. The Administration Building and the homes of the manager and his staff are on the west side of Friedrich Heinrich Ave. The mining plant and all its buildings are on the opposite eastern side (see Fig. 1).

The offices for the foremen and timekeepers are in the same building as the baths, the former being arranged around three sides of an open light court (see Fig. 2);

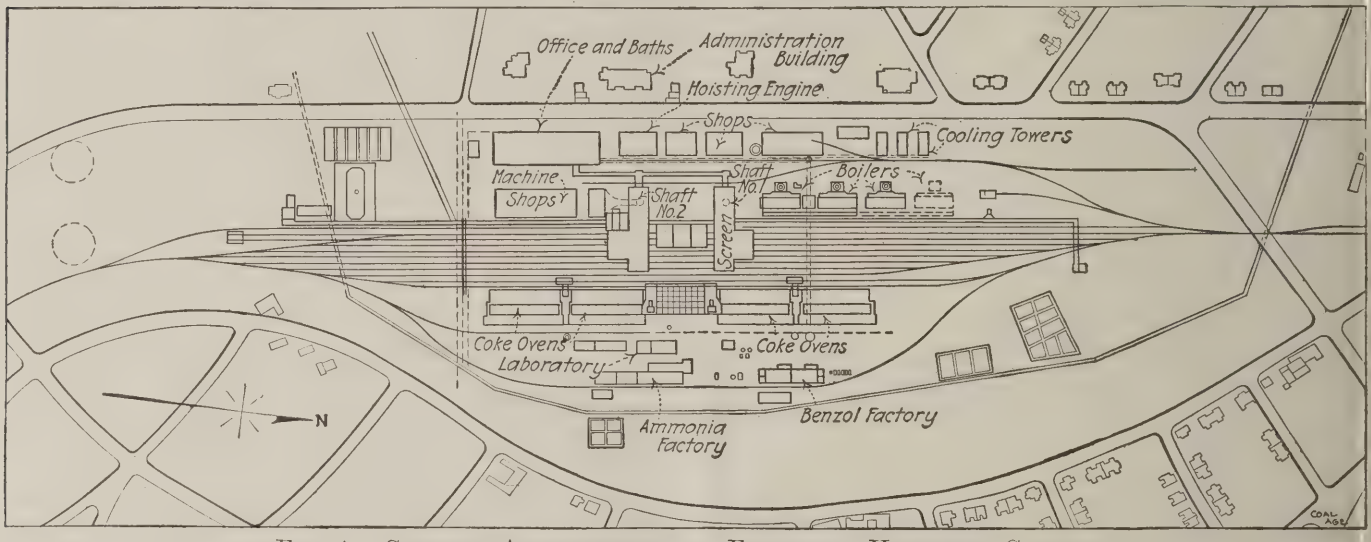


Fig. 1. Surface Arrangement at Friedrich Heinrich Colliery

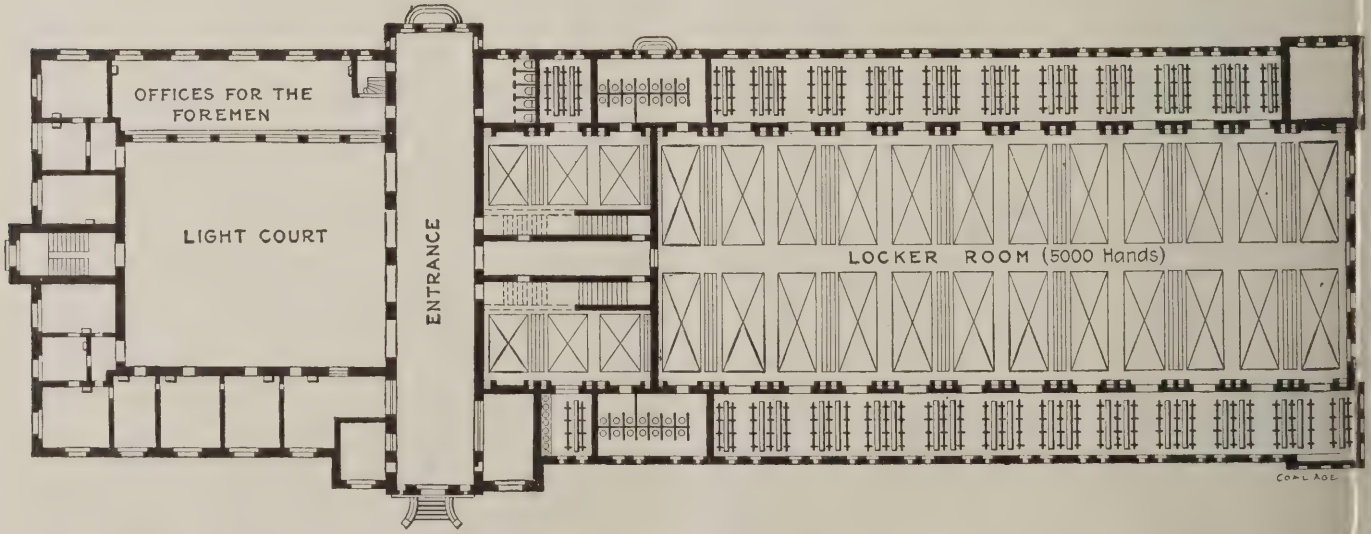


Fig. 2. Ground Plan of Offices and Baths

Note—Translated and abstracted from series of articles appearing in the Feb. 7, 14 and 21 issues of "Glückauf."

the bathing arrangements taking the rest of the floor. The baths for the management are on the upper story. The locker room is large enough for a payroll of 5000 men and occupies the center, while the showers and toilet rooms are on both sides. The men in charge of the baths are stationed on a platform, from which all the rooms can be overseen and on which the valves for the heating system, as well as for the hot and cold water, are located.

The entire building is heated by a hot-water exhaust-steam system.

In Fig. 3 is shown, on a larger scale, the arrangement of the shafts, hoisting engines, store house, power house, etc. In the store house, in addition to the oils, supplies and machine repair parts, is a garage for an electric ambulance, a doctor's office and an emergency room. The location of the shops is clearly shown in Fig. 1.

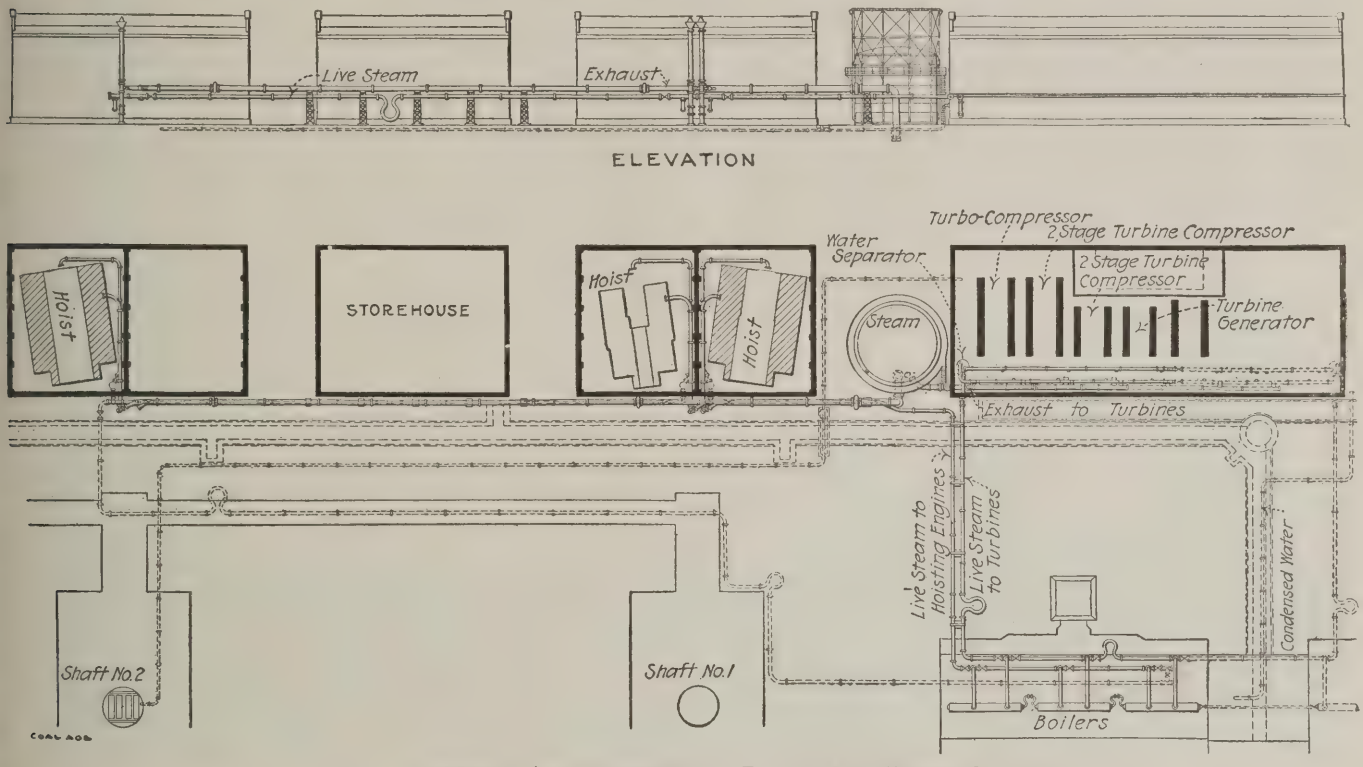


FIG. 3. GENERAL ARRANGEMENT OF PLANT AND STEAM PIPING

Above the baths is the lamp room, from which covered bridgeways lead to the shafts. The entrance to and exit from the shafts are separated completely, so that the workmen never interfere with each other on going to and from the mine.

Under the offices, in the basement, is a steam laundry, an eating room for the miners and day laborers, a bar for the sale of milk and nonalcoholic drinks, a bicycle room and a room for instruction in life-saving work.

THE POWER SYSTEM IS INTERESTING

The power system is as follows: There are three hoisting engines, two for shaft I and one for shaft II, all alike in design (see Fig. 4), using superheated steam at 572 deg. to 662 deg. F. and 190 to 200 lb. pressure. They have a capacity for handling 11,000 lb. at a depth of 1500 to 2400 ft., at the rate of 65 ft. per second. The steam from the hoisting engines exhausts into a receiver

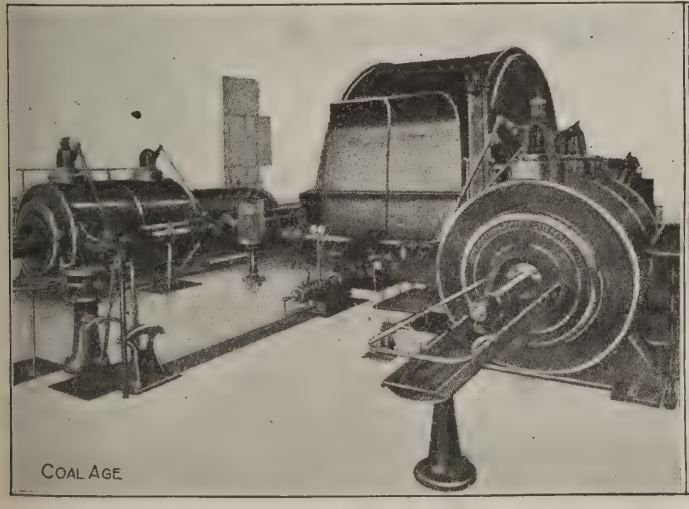


FIG. 4. HOISTING ENGINE FOR SHAFTS

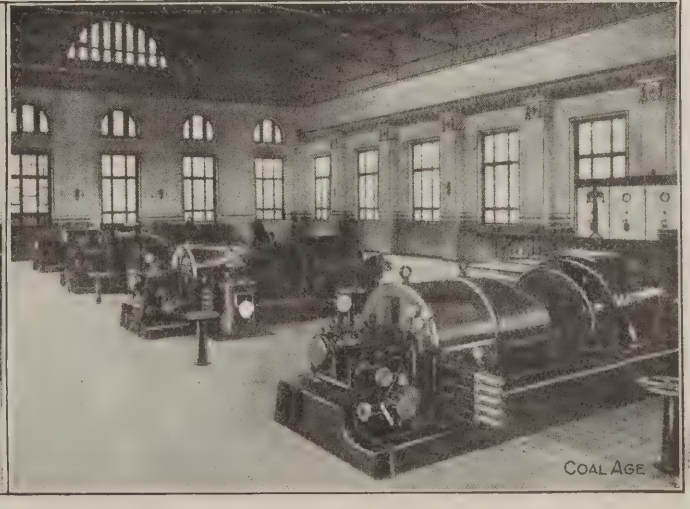


FIG. 5. INTERIOR OF CENTRAL POWER HOUSE

(see plan and elevation, Fig. 3), which resembles and operates like a gas holder.

In the central power house (see Fig. 5), direct-drive turbines are used exclusively, for both the electrical and the compressed-air systems. The cut shows two turbine compressors and two turbine generators. Each machine has a surface condenser directly under it, in the basement, and each condenser has its own pumping system. The two units in the foreground of Fig. 5 are turbine generators, the other pair are the air compressors.

The turbine for the two-stage centrifugal compressor, under normal conditions, takes steam from the receiver at a pressure of about 15 lb., absolute. The generator turbine is of the same general design. Each turbine consists of a high-pressure part, which acts as a velocity wheel, and a low-pressure end operating by reaction, the thrust being equalized by a piston.



FIG. 6. SHAFT TRESTLES, WASHING AND SCREEN PLANTS



FIG. 7. VIEW OF COKING PLANT, SHOWING OVENS AND COKE YARD

The other two turbines are for reserve and are designed for superheated steam at 140 lb. pressure and 572 deg. F. Should the steam supply in the low-pressure holder run short, so that there is danger of the receiver being connected with the condensing apparatus and collapsing, live steam is admitted automatically. Moreover, the turbines can be driven by a mixture of live and exhaust steam. The rating of the turbo-generators is 1000 kw. each, and they operate at 3000 r.p.m. The duty of the turbine air compressor is 675 cu.ft. per min. to 90 lb. pressure.

In Fig. 6 we have a view of the trestle work of the two shafts, washery and screen. The daily output is 5000 tons, of which 4000 tons pass through a 3-in. mesh and are sent to the washery.

There are in operation 180 coke ovens with 60 more under construction (see Fig. 7). The chief byproducts are tar, ammonia and benzol. The total outlay of the company to date has been about $9,000,000.

Portable Electric Lamps

The Bureau of Mines has just issued Schedule 6, "Procedure for Establishing a List of Permissible Portable Electric Mine Lamps." This schedule sets forth the character of the tests and the conditions under which they will be made, together with the fees that will be charged for testing the lamps. It is the purpose of these tests to establish a list of portable electric lamps that are suitable in all respects for the unusual requirements of mine service. All lamps that pass these tests will be specificially approved by the bureau, and all the mine inspectors will be notified of the bureau's action.

Accidents in Anthracite Mines

A statement issued by the State Department of Mines shows that the fatal accidents in and about the anthracite coal mines for the three months ended Mar. 31, 1914, numbered 123, as against 146 for the same period in 1913. The inside accidents numbered 100, as against 128, and the accidents on the surface 23 as against 18.

Of the 100 killed inside during 1914, 41 were killed by falls, 16 by mine cars, 9 by explosions of gas, 5 by suffocation from gas, 4 by explosives, 12 by premature blasts, 6 by falling into shafts and slopes and 7 by miscellaneous causes.

In 1913, 68 were killed by falls, 27 by cars, 7 by explosions of gas, 1 by suffocation by gas, 5 by explosives, 14 by blasts, 7 by falling into shafts and slopes and 17 by miscellaneous causes.

During 1914 the inside fatal accidents were 28 less than in 1913. The accidents on the surface were 5 more in number.

By the Way

No man's religion ever survived his morals.

He who is not ready today will be less so tomorrow.

A man's character reaches town before his person.

The remedy of tomorrow is too late for the evil of today.

A prompt refusal has in part the grace of a favor granted.

It generally costs more to revenge injuries than to bear them.

Most men reason from their heads but act from their hearts.

The worst punishment of all is that in the court of his own conscience, no guilty man is acquitted.

Lessons of the Vancouver Strike

By Special Correspondence

SYNOPSIS—A brief review of the strike in Vancouver Island. A strange condition presented by the mines of Vancouver, which are working regularly and producing all the coal the market demands, while a waiting list of 100 names of miners for whom no places can be found, shows plainly that there is, in fact, no strike. A comparison of conditions and wages in Vancouver with those of miners in the States is invited. The lesson of the strike.

The mining situation on Vancouver Island has now reached a most curious stage. In a previous article, I dealt with the origin, causes and history of the Vancouver strike, which was engineered by paid officers of the United Mine Workers of America. The strike began in September, 1912, at the Cumberland and Ladysmith mines of the Canadian Collieries Co. For a couple of months, the production of these mines was badly crippled. The company, however, began to get command of the situation again, in May, 1913, whereupon, the U. M. W. of A. officers called out the men of Nanaimo and South Wellington. Again, the Island output of coal was seriously curtailed, until September of the same year, when the companies resumed mining operations. Progress at first was slow, but gradually quickened until today it can be said that, while the trouble on the Island still continues, the strike is over.

A Strange Spectacle Presented

This is the curious feature of the present situation. If by a strike is meant the stopping of any industry, then most emphatically there is no strike at the coal mines of Vancouver Island. It is an easy matter to establish this assertion, as the following facts will prove. In the first place, the operators are unable to give employment to all the men seeking work. In Nanaimo, for example, there are 100 names on the waiting list at the mines—100 men waiting their turn for work, as places are found for them. In the second place, in addition to this surplus of labor, more coal is being produced than can be marketed. The Jingle Pot mine is working little better than half time, while the Cumberland mines are working less than full time. The Nanaimo mine, alone, is working every day. At this time, the mines on the island are producing more coal than can be sold. In the third place, there are the figures for the total output of coal that demonstrate the same truth. In the boom year of 1911, the aggregate daily output of all the Island mines was about 5250 tons. Today, the total daily output of all the mines in operation is 4800 tons, which shows a difference between the production in the record year 1911 and the present of only 450 tons.

No further evidence is necessary to prove conclusively that there is no longer a strike on the Island. It is true that the U. M. W. of A. trouble still continues, inasmuch as a large number of its members are yet idle. The officers of this organization, the leaders and makers of all the trouble, still tell their followers that they will win the strike, notwithstanding the real facts of the situation which have just been related. The U. M. W. of A. may continue the trouble as long as it chooses; but the strike itself is absolutely all over as far as the mines are concerned. The U. M. W. of A. as an organization does not in any way affect the operations of the mines; and the situation on the Island, which the miners in the United States are blindly contributing to maintain, is an anomaly.

Comparison of Working Conditions in Vancouver Island

Compare, for a moment, the working conditions and wages of the miners on Vancouver Island with those of the American miners, who are financing this strike and who have been given to understand that its object is to secure better conditions and higher wages for the men here. As a matter of fact, it is extremely doubtful if the miners in the United States are as well off in this respect as the men on Vancouver Island. In the first place, the miners here have an 8-hr. day, from bank to bank. In Nanaimo, this means that the men, on an average, work less than 6½ hr. a day, at the face. For this working day, the datal wage is $3.46; firebosses, $4.01; shotlighters, $3.78; face men, $3.56; drivers (single) $3.15½, (double) $3.30; pushers, $3.02 and brattice-men, $3.46.

The above are all scale wages and it is unnecessary to quote the list further. Diggers and loaders (the latter following machines) are employed by contract. For the higher seam, the price is 74.8c. a ton; and, for the lower seam, 80c. a ton, with scale allowances for rock. The average daily earnings of diggers, for months past, as before the strike began, have been over $5; while loaders, during the same period, averaged $4.35 a day. These are the wages made by the miners of Nanaimo, and the mines are operated with every care for safety. The Western Fuel Co. was the first, in the province, to install a Draeger rescue station; and is admitted to have lived up to its avowed policy of "Safety First" at any cost. With these facts before them, American miners can make the comparison for themselves, and then ask why they should be taxed to support a strike that, as a fact, no longer exists.

The Lessons Taught by the Strike

The lesson taught by the whole trouble is that no industry is secure against the machinations of the paid agitator. The miners on the Island did not want a strike. Had they been left to themselves, there never would have been a strike. In the case of Nanaimo, the miners were never even consulted. They were called out and were refused the ballot that they demanded. At Cumberland, the strike was begun under false pretenses. There were no grievances that could not have been adjusted in half an hour's conference. In Nanaimo, there were no complaints at all and, moreover, the men were working under a regular agreement with the operators. Yet with no grievances at hand and with the mining industry itself more prosperous than ever before in its history, a couple of paid agitators were able to stop the whole machine of production. They cajoled or forced the miners into a strike, for no reason that the men themselves knew, and imposed the burden of supporting it upon the miners of the United States, who knew nothing about the true situation. It was as unfair to the miners here as it was unjust to the miners in the States.

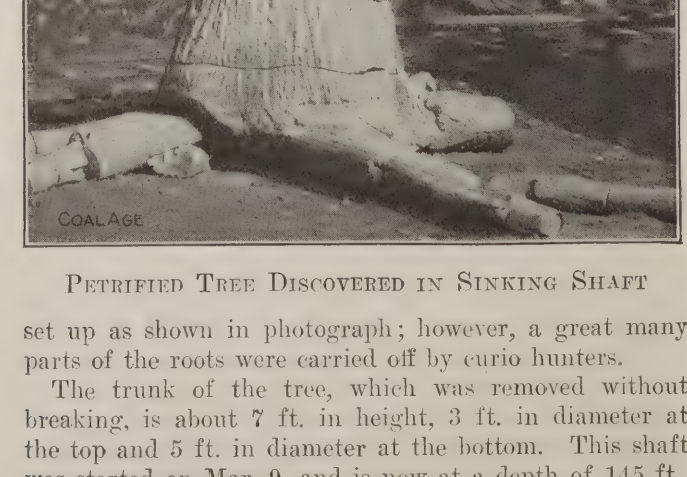
Viewed from any angle, the attempt to force this strike

upon contented miners must stand as a severe blow to organized labor and a disgrace to trade unionism. It cannot be freed from the suspicion of ulterior motives. The only persons who have benefited from it are the two or three men who engineered it and who fell into well paid billets as a reward for their work. They have drawn their salaries all through the strike; and it is even charged that some of these men have drawn strike pay as well. These charges are being investigated in the local union now. They are the men who tried to tie up the mines on the Island and who have kept hundreds of men from their work, for over a year, and imposed a heavy burden upon the miners of the United States. In the last analysis, with the laws of the country as they are, no industry is secure against the schemes and plots of one or two professional agitators. This is the great lesson of the strike on Vancouver Island.

An Interesting Fossil

The accompanying photograph shows a fossil petrified tree, which was discovered at a depth of 35 ft. from the surface at the new No. 9 shaft, which is being sunk by the Rock Island Coal Mining Co., at Alderson, Okla.

The strata in the immediate neighborhood of the tree were of a very soft nature, the rest of strata being a hard sand rock; in digging around the tree it was pried off in layers, as shown in photograph. The roots were quite extensive and well preserved, but, of course, broken by shots. After being removed to the surface the tree was



Petrified Tree Discovered in Sinking Shaft

set up as shown in photograph; however, a great many parts of the roots were carried off by curio hunters.

The trunk of the tree, which was removed without breaking, is about 7 ft. in height, 3 ft. in diameter at the top and 5 ft. in diameter at the bottom. This shaft was started on Mar. 9, and is now at a depth of 145 ft., 115 ft. of which has been in solid sand rock. At a depth of about 118 ft. the shaft went through what looked to be a creek bed, which was full of fossil shells, and stems of different descriptions; this character of strata continued for a depth of about 18 ft. After going through this soft strata, the shaft again struck sand rock and is still in same.

This shaft will be in the neighborhood of 804 ft. in depth, and will be the deepest pit in the southwest. It will be equipped with the latest improved machinery.

The Consumer and Higher Anthracite

An official of one of the railroad anthracite companies says: "Apparently the last thing a public service commissioner, or interstate commerce commission, or department of justice representative thinks about, if he considers it at all, is public service or cost to the public. Increase railroad costs and reduce efficiency seem to be the watchwords.

"Look, for instance, at the suits to separate the railroads from their anthracite holdings. Suppose the Government wins! In that event there will be more independents in the field, and there will be absolutely no bar to higher prices for anthracite. It is well known that the anthracite railroad companies keep the price of anthracite within moderate levels. Whenever severe weather brings about a squeeze, the independent demands a premium of $1 or $1.50 a ton, and gets the largest premium possible.

"In the case of any commodity, where the demand at times far exceeds the supply, a high price is bound to come in an unrestrained market. It needs no deep study of statistics to show that the demand for anthracite is increasing with the growth of population, and, with the greater use of this coal in the West, to a larger extent than the supply. If unrestrained competition is permitted to rule, a higher cost to the anthracite consumer is inevitable.

"To mine anthracite, companies of the largest financial strength are necessary. Look at Reading's experience back in the late 90's. With all its wealth of unmined coal the road became bankrupt. Look at the Philadelphia Coal & Iron Co.'s income account, and see how small the margin of profit, and at times the losses from mining coal. The withdrawal of the railroad companies from extending their financial support to the mining of anthracite which will be a result if the Government wins, will increase the cost of anthracite to the consumer.

"The Interstate Commerce Commission has increased our switching expenses and delayed our service to the consumer, and has really benefited no one by breaking up this practice. Formerly, all our coal gathered at New York tidewater was considered as merely so much coal. From the general supply orders were filled or the company got its fuel as needed. Now no car is loaded at the mines without a definite consignment, and when the cars reach tidewater an infinite amount of switching has to be done."

"The sacrifice of efficiency and the increase of cost to the consumer, of course, are minor matters when theories make principles for the operation of railroads and the course of prices. The Standard Oil trust was dissolved, and everyone agreed that unrestrained competition came to prevail, but the increased cost to the consumer of gasoline and oil was noteworthy. Eventual higher cost to the consumer of anthracite is no rash prediction."—*Wall Street Journal.*

Self-Contained Portable Electric Mine Lamps

By H. O. Swoboda*

SYNOPSIS—The frequent occurrence of mine explosions caused by defects of oil safety lamps has encouraged the development of electric lamps. Satisfactory results, however, have been obtained only since the invention of the tungsten filament, permitting the use of smaller storage batteries. The general requirements for electric lamps are: Absolute safety, uninterrupted production of light for at least one shift, and a foolproof design.

It is a well known fact that many mine explosions with enormous losses of life and property, have been caused by defects and improper handling of the so called miners' safety lamps, built on the Davy principle. The Bureau of Mines, for instance, mentions in one of its reports that at least two disasters in this country in 1912 were caused in this manner, killing more than a dozen men, and the Prussian Government states that during the decade from 1902 to 1911 at least 27 per cent. of all explosions in the coal mines of that country were to be blamed on these lamps. Therefore, it is only natural that attempts to develop a portable *electric* safety lamp were made many years ago. Satisfactory results, however, have only been obtained since the carbon filaments were superseded by tungsten. Due to their high economy in current consumption they permit the reduction of the battery to such an extent that the weight and size of the portable lamps no longer prevent the miner from moving around freely in performing his duties.

General Requirements

Electric safety lamps must fill the following requirements: Absolute safety against ignition of mine gases, uninterrupted production of a steady and sufficient amount of light for at least one shift, and absolutely foolproof design.

Besides this, it is essential: That they have a simple and durable construction, that their weight is kept at a minimum, and that the charging and inspecting of the batteries is made easy.

Careful experiments, conducted by the Bureau of Mines in Pittsburgh, and also at Gelsenkirchen, Germany, have shown that the only source of danger in a portable electric lamp is the glowing filament of the bulb.

As long as the maximum short-circuiting current of these batteries does not exceed

100 amperes for batteries with not more than 2.5 volts
85 amperes for batteries with not more than 4.0 volts
65 amperes for batteries with not more than 5.0 volts
45 amperes for batteries with not more than 6.0 volts

sparks obtained by the breaking and establishing of the electric circuit are not of sufficient strength to ignite mine gases, due to the low voltage and amperage of the batteries used. Therefore, it is not necessary to provide special protection against sparking on the switch and on the connections between battery and lamp.

As the filament under normal conditions is operated in a vacuum and enclosed in a glass bulb, the danger of igniting mine gases exists only in case this bulb is smashed without the filament being broken at the same time, so that the latter continues to glow until it burns out. Several absolutely safe methods can be employed to prevent the filament from glowing after the bulb has been broken, and one method which has been in actual use for a number of years will be described in the course of the paper.

Steady and Sufficient Light

The miners' *old* safety lamps furnish a flickering light of about 0.8-c.p. capacity, which rapidly decreases during the shift to about one-half. This is not sufficient light for the miner to perform his work satisfactorily, and, according to the investigations made by Dr. T. Lister Llewellyn, England, is the principal cause of the special eyesickness (miner's nystagmus) with which miners become affected. For this reason it was considered advisable to equip the *electric* mine lamps with incandescent lamps of at least 1.5 c.p.

The only source of electrical energy which will produce this amount of light satisfactorily for at least one shift or approximately ten to twelve hours is the storage battery, primary batteries for such an output being entirely too large for use in portable equipments. Years of development have resulted in fairly satisfactory batteries and it seems, in the present state of the art, that the lead cell, regardless of its weight, on account of its comparatively high voltage and the steadiness with which that voltage is maintained, while discharging, is the most suitable type.

Foolproof Design

Miners' lamps are exposed to extremely rough handling by inexperienced hands and the least mechanical or electrical weaknesses are liable to result in a failure to supply light. The following are about the most important points which must be observed in a successful lamp: The lamp must be locked so that the miner absolutely cannot get at any part of the mechanism. It must burn in any position, even under water, and if dropped on solid material, such as rock, iron or cement from a height of several feet must continue to burn. The incandescent lamp bulb must be thoroughly protected so that it is almost imposible to break it. The electrolyte of the battery must not leak out. Construction of this character is possible, and that lamps satisfying such conditions are in actual use, will be shown later on.

Lamp Designs

During the year 1912 prizes were offered by the British Government for the best portable electric mine lamp and 197 applicants entered into competition and submitted samples. After careful tests extending over several months, the first prize of $3000 was awarded to the makers of the "Ceag" lamp, described in this paper. Since this lamp has also been accepted by practically all other

*Consulting electrical and mechanical engineer, Pittsburgh, Penn.

Note—Article read Apr. 9 at the 293d meeting of the American Institute of Electrical Engineers, Pittsburgh, Penn. This meeting was held under the auspices of the committee on the use of electricity in mines.

European governments and was the first lamp approved by the Bureau of Mines as answering all safety requirements, and still remains today the only approved *hand* lamp, it might be well to study its construction carefully.

The bulb is covered by a heavy glass dome *D*, which is protected by four heavy steel rods *H* held together by a sheet-steel roof *I*. A substantial hook is attached to this roof; thus, the miner can either stand the lamp on the ground or hang it to a post in the immediate neighborhood of his working place. The bottom part, made of heavy corrugated galvanized sheet steel, contains the storage battery. By turning the upper part on the lower, the miner can turn the light on and off.

The construction of the lamp is easily understood from a section shown in Fig. 1.

The Lighting Mechanism

The incandescent lamp rests in a socket, which is pressed upward by a spiral spring *O* against another spring *P* between the bulb and glass dome *D*, providing a complete spring support and preventing breakage even with the most severe shocks. Electric connection is established for one pole through the socket spring *O*, and for the other pole by another smaller spring *E* inside the socket spring, and insulated from it. In case the bulb breaks, the socket spring pushes the socket upwards, and as the inner spring does not expand as much as the socket spring, the circuit is interrupted.

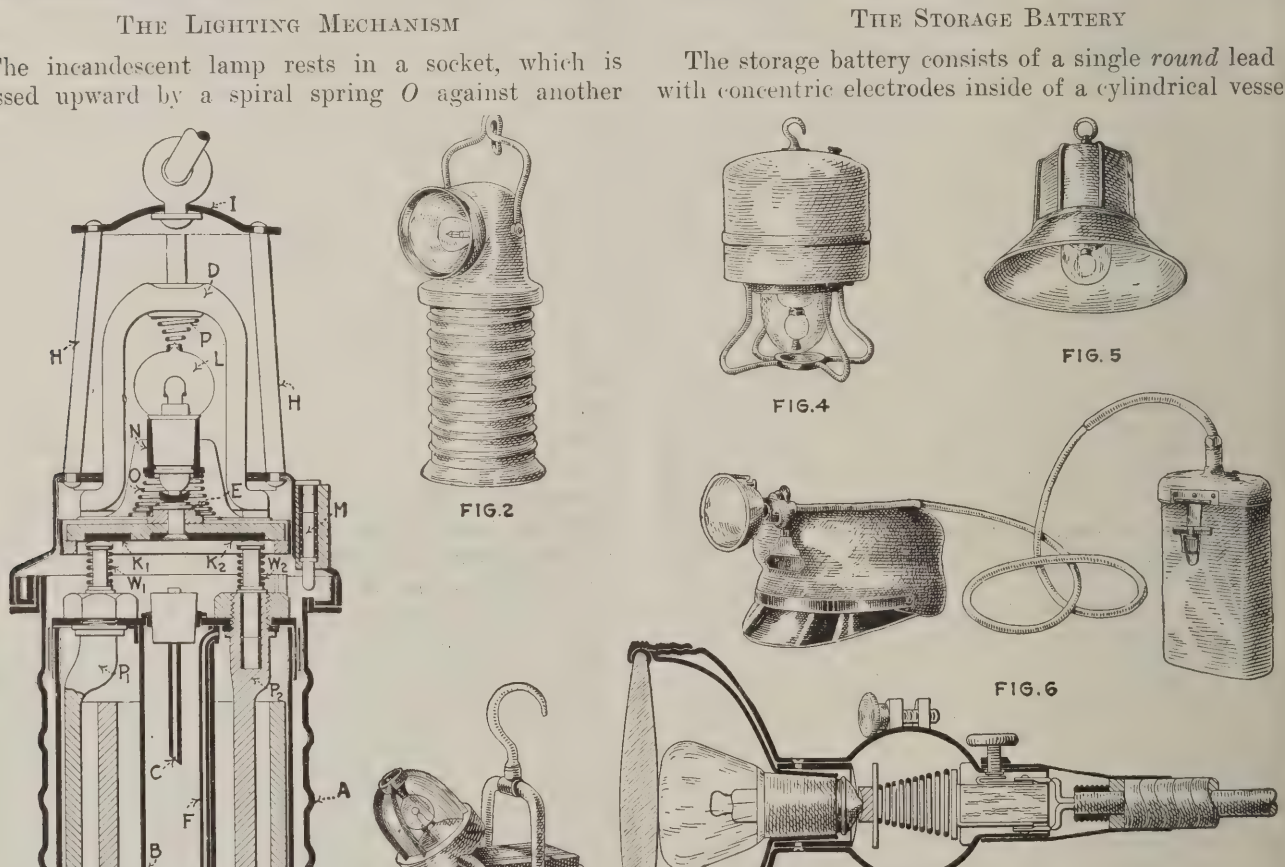
Lately, another safety device has been added, but it is not shown in this illustration. It consists of a fuse, which blows the moment the bulb of the incandescent lamp is broken. This eliminates the possibility of obtaining sparks or getting the filament to glow in case the miner should attempt to push the bulb back into its normal position; it also protects the battery from being short-circuited for any length of time, in case the leads to the bulb have become short-circuited during the accident.

As stated before, the upper part of the lamp turns on the lower part, opening and closing the switch. This rotating movement is limited by a soft iron pin *M*, which acts as a magnetic lock. This pin can be withdrawn in the charging room by a strong electromagnet, and when this is done, the upper and lower parts of the housing separate, and the battery can be removed for charging.

The Storage Battery

The storage battery consists of a single *round* lead cell with concentric electrodes inside of a cylindrical vessel *A* covered with a waterproof lid of the same material. Cylindrical electrodes are preferable to flat ones, as they are stronger and therefore stand rougher handling. They also warp less, so that in charging, the current density can be increased and the length of time correspondingly decreased.

The holes in the terminal sockets contain bushings made of acid-proof metal, into which removable terminals P_1 and P_2 are fitted. These terminals are pressed upward by the terminal springs W_1 and W_2 against the



Various Forms of Electric Mine Safety Lamps

ontact segments K_1 and K_2 of the switch, carrying in his manner the current to the incandescent lamp. Terminals and springs can easily be taken out and cleaned by washing in warm water, an important point. The use of nonremovable springs has been found impractical, as they are difficult to clean and consequently are liable to corrode and break easily. First-class contact springs, however, are imperative for an uninterrupted light service.

In charging storage batteries, gases develop, which must have an opportunity to escape. It is, therefore, impossible to make the cells airtight. An ordinary opening, on the other hand, would have the disadvantage that the acid would run out, in case a cell were upset, and this would destroy the housing of the lamp. In order to overcome this difficulty, the center of the cell is equipped with a celluloid tubing B, which communicates by means of a small side tubing F, with the upper part of the cell, where all gases collect. The gases therefore can pass from the cell through the side tubing F and finally through center tubing C into the open, whereas



Fig. 8. Magnet for Opening Lamps

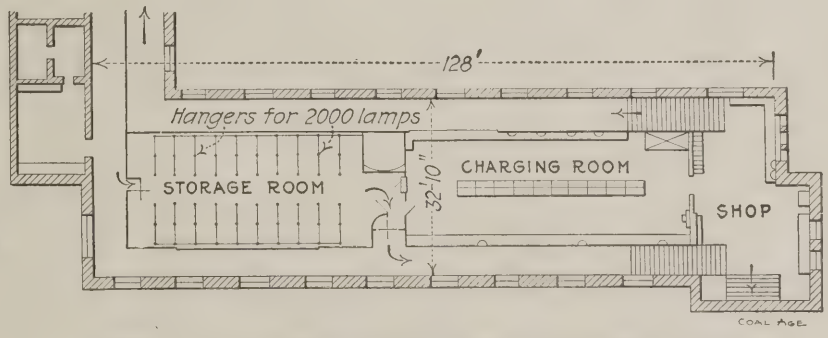


Fig. 9. A Large Electric-Lamp Charging Station

ny particles of acid carried along by the gases, will be eposited in cylinder B. Even if the cell is turned upside own, no acid which may be in the cylinder or any other cid, can escape. In other words, the lamps will burn n any position, without the acid being able to leak out.

The principal dimensions of this lamp are as follows: he weight of the lamp complete is about 5 lb. (2¼ kg.); s height, not including hanger, is 10¼ in. (26 cm.); s largest diameter is 3¾ in. (9.5 cm.) The incandesnt lamp consumes 0.85 amp. at 2 volts. The battery as a capacity of 16 amp.-hr., and the maximum charging urrent should not exceed 2 amperes.

To meet various requirements this standard design is ot only made in four different sizes, ranging in weight om 1½ to 5 lb. (⅝ to 2¼ kg.), but it is also made ith two storage-battery cells connected in series, resultng for the entire line in capacities ranging from four to xteen hours of life for one discharge and producing ght from 0.75 to 3 c.p.

Lamps for Special Purposes

Beside this, a number of other modifications have en developed, so that mines can be completely equipped day with electric safety lamps, wherever a permanent iring in connection with the lighting plant is impossible. Lamps are made for rescue parties, cages, powder agazines, shaft lighting, shaft inspection, loading places, asting, cars and locomotives (head and tail lamps), etc. A few of these modifications are shown in the illustrations.

The standard lamp, being of the "lighthouse" type, distributes its light uniformly over the entire surroundings. The modification shown in Fig. 2, known as the "trip" lamp, has the incandescent lamp mounted on one side combined with a deflector concentrating the light rays in one direction. This design is mostly used for inspection trips and head and tail lamps for cars and locomotives. It is made in the same capacities as the standard lamp.

The "shaft" lamp, illustrated in Fig. 3, is arranged with an adjustable arm, on which the incandescent lamp is mounted, so that the light can be sent in any desired direction. It is made to furnish from 8 to 24 c.p. and to burn from 7 to 12 hours with one charge.

Fig. 4 represents another type of "shaft" lamp, without an adjustable arm. It is made for 8 and 12 c.p. and for 15 and 10 hours of life for one charge.

The lamp illustrated in Fig. 5 is especially suitable for places in which ordinary illumination is not sufficient. It is made for 8 to 32 c.p. and for a life of 7 to 15 hours for one charge.

Cap Lamps

The lamps so far described were designed to take the place of the Davy safety lamp, which is in use in gaseous mines all over the world. In this country, however, the designer of electric safety lamps is confronted with yet another problem. In many of the mines the men have and still use "naked" lamps fastened to their caps. On account of the strict enforcement of the mining regulations in recent years, many of these mines have been and will be compelled to substitute safety lamps.

It is only logical that the men in these mines clamor for a type of electric lamp which is as nearly identical as possible with the present form of naked lamp. To meet this demand, electric cap lamps have been developed, the batteries of which are carried by the miner on his belt and are connected to the lamp by a well protected special flexible cord. This lamp is shown in Fig. 6.

The principles of construction of the cap lamp (see Fig. 7) are identical with those of the hand lamp. But several new features have been added. One is the mounting of the incandescent lamp inside a parabolic reflector, the opening of which is closed by a lens, instead of being covered with a glass dome; another is a ball joint, permitting the miner to direct the light rays wherever they are needed.

A third feature is embodied in the flexible conductors connecting battery and lamp. In case of an accident, there is a possibility that the two conductors may become short-circuited and therefore red hot, eventually setting the insulation afire, if they are made of copper or similar material. To prevent this a special alloy has been prepared, the melting point of which is considerably below the temperature which is required to ignite insulation or mine gas. Consequently, if a short-circuit should take place, the conductors would melt and interrupt the circuit, before there could be a possibility of danger.

From the foregoing description, it can be seen that portable self-contained electric mine lamps of this type have passed the first stage of development, and if one considers that more than one hundred thousand are in daily use in Europe, apparently producing excellent results, there is no reason why the adoption of electric mine lamps in this country should not make rapid progress in the immediate future. The question whether hand lamps or cap lamps, or both, should be used, is a mere matter of detail, which will adjust itself. European practice has adopted the hand lamp exclusively; the sentiment in this country, however, seems to be in favor of the cap lamp. Men who continually change their location in performing their duties will prefer such a lamp, which leaves both hands free for action; men who stay at work in the same place most of the time will favor the hand lamp, which can be set aside or hung up in the neighborhood, relieving them from carrying unecessary weight.

Lamp Service

When the shift leaves the mine, the lamps have to be delivered to the lamp room for recharging and cleaning. For this purpose the magnetic lock has to be opened, so that the battery can be removed from the housing and placed on the charging rack. The unlocking is accomplished by pushing the lamp lock against the pole pieces of an electromagnet (shown in Fig. 8), which lifts the soft iron pin holding the upper and lower parts of the housing together.

Special charging racks have been designed to receive the batteries. Racks are used holding 80 cells connected in two series of 40 each. Each circuit is equipped with a switch, ammeter and rheostat, so that the operator can determine the status of the charge at any time. The rheostats are provided with a surplus of resistance, so that less than 40 cells in a series can be charged, if necessary. A portable voltmeter with a capacity of about three volts is provided to take the voltage readings on the individual cells. Cells are charged, ready for service, when their voltage reaches a value of 2.6. When more than 80 cells are to be charged, two, three or more racks can be combined, and all the cells can be charged at one time.

After the batteries are charged and the contacts and housings have been carefully cleaned, the lamps are reassembled and hung up on special racks, from which the miners remove the lamps, when they begin a new shift.

Lamp Houses

For mines using a large number of lamps, it is essential that charging, cleaning and repairing be handled systematically. For this reason special lamp houses are being erected on the same general principles as those for the Davy safety lamps, but simpler and cheaper, because the lamps need no benzine or oil for the safe storage of which special provision must be made. The ground plan shown in Fig. 9 represents a lamp house erected for 4000 lamps. It consists of a building about 128x33 ft. (39x10 m.), containing a charging room with 20 racks, six opening magnets, three small motors for buffing and cleaning and a small distribution board with a watt-hour meter. To the left of the charging room is the storeroom for receiving the lamps when they are ready for service, and to the right is a small shop for making repairs. Besides this a small room has been provided for a number of benzine lamps, which are used by the firebosses, and on another floor a washroom for the shift.

Importance of Care in Maintenance

Proper care of the lamps has considerable effect on the reliability of the service. One of the large German mines, having several thousand electric lamps in daily use, reports that at first about 5 per cent. of all lamps taken into the mine at the beginning of the shift were returned at the end of the same shift, either burning poorly or not at all. By a careful study of all details in the lamp house and by putting a skilled man in charge of the lamp-house work, this percentage has been reduced to less than 1.5, with the expectation that it will soon drop below 1 per cent.

That this last named figure is not an exception, is verified by the Bullcroft Main Colliery Co., Ltd., Doncaster, England. This company has more than 10,000 lamps in daily use and reports the number of defective lamps per shift to be less than 1 per cent.

The investigation of these defects, when they amounted to 1.5 per cent., showed the following causes:

CAUSES OF FAILURE

	Per Cent.	Per Cent.
Defects due to other causes		0.1
Defects caused by the incandescent lamps:		
Lamps, burning dark	0.6	
Lamps, with broken filaments	0.2	
Lamps, with broken bulbs	0.2	
Total incandescent lamp defects		1.0
Defects caused by the batteries:		
Batteries, leaking	0.1	
Batteries discharged ahead of time	0.3	
Total battery defects		0.4
Total number of defective lamps		1.5

Records covering cost of installing and operating electric mine lamps in this country are not available to any extent, because the number of lamps installed is so far not large and the time during which they have been in operation is comparatively short. However, it should be possible to form some idea of what can be expected, from the experience in Europe.

Cost of Operation 10 to 15 per Cent. Lower Than with Benzine Lamps

While the first cost of electric lamps is undoubtedly higher than that of those burning benzine, the cost of operation, including maintenance, is claimed to average from 10 to 15 per cent. less. Whether the same results can be obtained in this country, the future will have to decide. It may be added that the cost of the electrical energy is small and that the cost of maintenance consists about one-third of labor and two-thirds of renewals of parts, and depreciation.

Of especial importance is the cost of renewing the electrodes of the storage batteries, replacement of complete lamps, which are broken on account of rough hand

ling and accidents, and renewing the incandescent bulbs.

The life of the electrodes for lead cells ranges from about 100 to 400 shifts, depending entirely upon the treatment which they receive. At the present time large claims are being made for the alkaline cell, which is supposed to last as long as 2000 shifts. This, however, requires verification by actual tests.

Besides this, it must be borne in mind that the higher cost of the alkaline cell, the necessity of using two cells, in series, instead of only one as in the lead battery, and the increase in the renewal of the incandescent lamps, due to the large variation in the voltage, will fully wipe out this apparent advantage. However, the weightiest argument against this claim is the fact that the physical life of mining lamps cannot reach 2000 shifts, as shown below, and that the natural deterioration of all parts is considerably below this limit.

The replacement of complete lamps which are broken on account of rough handling and accidents undoubtedly varies more or less in accordance with the character of the work performed in the mine. European practice shows that about 0.1 per cent. of all lamps per shift are lost in this manner.

The incandescent-lamp renewal already has been expressed in figures, in connection with the reliability of service. Excellent results have been obtained, the average life of the lamps being approximately 1000 hours.

The Electric Lamp Has Yet to Cause a Mine Explosion

From the lamp designs and the lamp service as described above, it can be seen that the development of the portable electric mine lamp has made rapid progress during the last few years, and since, up to this writing, no explosions have occurred wherever installations have been made, it can be said without exaggeration that the electric mine lamp is a success and that it is bound to be adopted more and more.

Of course, as is the case with any new appliance, objections have been raised against the electric mine lamp, and especially for the reason that it does not detect inflammable gases as does the Davy lamp. There is no doubt that this detail will be overcome in the near future, as there are several principles which can be used for the construction of mine-gas detectors. In fact, the German government only lately has ordered several hundred of these devices, constructed in accordance with the directions of Dr. F. Haber, on the acoustic principle and known as "mine-gas whistles." These will be distributed to the various mines for a thorough trial.

Wilkes-Barre District Mining Institute

The seventh annual banquet of the Wilkes-Barre District Mining Institute was held at Irem Temple, Wilkes-Barre, Penn., Wednesday night, May 6, and more than 1100 men who are interested in the mining industry and the production of coal were present. The banquet was one of the most successful the Institute has ever conducted and it brought the various members together in a spirit of friendliness that will have a great effect in keeping the ranks solidly built.

The members and guests assembled at the Y. M. C. A. auditorium in the evening and at 7 o'clock they formed a line and marched to the magnificent home of the Masons and Shriners, where a dinner was served. The catering was splendid when it is taken into consideration that the crowd was so large.

The dinner over, Thomas H. Williams, general manager of the Kingston Coal Co., called the banqueters to order and Dr. Charles E. Guthrie, pastor of the First Methodist Church, delivered the invocation. President Williams, in opening the after-dinner speaking, gave a short history of the Institute and the things it has accomplished. He urged upon all those who are interested in mining to avail themselves of the opportunities of the Institute and better prepare themselves for a study of underground conditions and for a practical, systematic manner of dealing with mine problems.

After-Dinner Speeches

Judge J. Butler Woodward, of the Luzerne County courts, was toastmaster, and he opened his remarks with an interesting comparison of the science of engineering and that of law and medicine. He called upon Judge P. A. O'Boyle, also of Luzerne, as the first speaker of the evening. Judge O'Boyle paid a splendid tribute to the anthracite miner and then drifted off into a patriotic address in which he declared that he hoped the American flag would wave from the capitol of Mexico and that it would remain there.

Former Judge Benjamin R. Jones, of Wilkes-Barre, was the next speaker, and he paid a fine tribute to the mining institute as the means of promoting harmonious relations between officials of the coal companies and their employees. He urged men to become members of the Institute and better conditions for themselves and their employers by taking up the splendid course in mining.

Fourteen Men Graduate

President Williams then called 14 young men to the speakers' table and presented them with certificates showing that they had successfully passed a three-years' course in mining at the Institute. He also presented each young man a check for $24, which represented the amount of money he had paid as tuition. The following received certificates: Thomas E. Jones, Llewelyn Jones, William L. Davis, John L. Picton and Patrick Mangan, all of Plymouth; Edward P. Davis and William D. Thomas, of Edwardsville; Michael Boland, of Swoyersville; Isaiah Kershaw, of Larksville; Richard Bowena and Jacob Urban, of Plains; Frank J. Carter, of Forty Fort, and Richard Lewis and Edward Roberts, of Wilkes-Barre.

During the evening solos were rendered by Prof. E. E. Griffith, Roger Howell, Prof. D. H. Lewis. The Institute quartette, composed of John W. Griffith, Thomas W. Morgan, Richard Morgan and John Mason, also rendered several selections. The benediction was pronounced by Dr. T. C. Edwards.

The officers of the Institute are: President, Thomas H. Williams; first vice-president, H. G. Davis; second vice-president, James J. McCarthy; secretary-treasurer, F. M. Devendorf. The board of directors follows: Thomas Thomas, Samuel R. Morgan, Charles Enzian, Benjamin D. Amos, P. H. Devers, Thomas H. Price, M. J. Flaherty, Thomas Martin, G. William Edwards, J. S. Hammonds, E. J. Newbaker, Lewis J. Davis, Gilbert S. Jones, Thomas J. Williams, A. L. Williams and Thomas A. Evans.

Safety Precautions in Mines



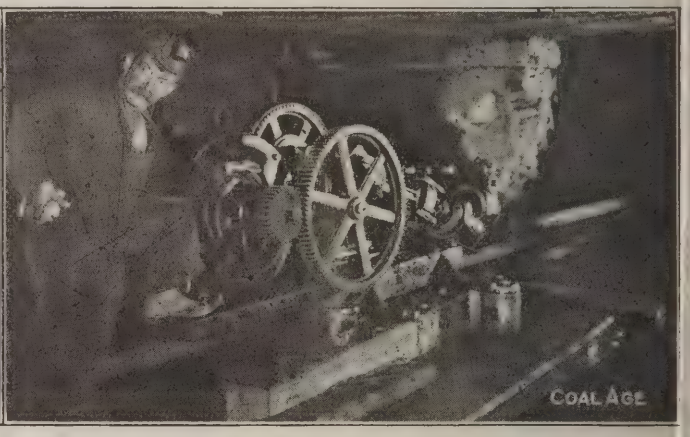
Showing Method of Protection against Electric Shock from Machine and Light Wires by Board Guards Nailed to Pegs Inserted in the Roof



Boards Suspended from Hangers to Protect Electric Trolley Wires. Photo Also Shows Signboard at Intersection of Entries Pointing Way Out



Switch Box Built into Coal Seam with Brick and Cement to Protect against Mine Fires. Also Shows Board Guard to Protect Trolley Wires



This Shows a Condition Common in Many Mines. An Electric Pump Has Been Installed with All Gear Wheels Entirely Unguarded



"Draw Slate" Overlying the Coal Seam. The Picture also Illustrates an Incorrect Method of Posting



This Photo Indicates Plainly Just How the Miner Should Post a Dangerous Piece of Draw Slate Overlying a Coal Seam

The Colorado Strike

SYNOPSIS—The interest in the situation shifts from the battlefield to the state capitol. Peace continues, but what will happen if the regulars are removed seems uncertain. The action of the United States Government is simply to restore the conditions of affairs prior to the Ludlow battle. Mines then working are allowed to work, miners then in the district are permitted to remain, but the mines must continue at rest and all new arrivals must leave and none enter the strike zone.

The issue of last week passed rapidly over the Ludlow battle, omitting many important details which have since come to hand It is, therefore, desirable in the interest of truth to supplement the account then made. The military board, comprising Judge Advocate Major E. J. Boughton, Captains W. C. Danks and Philip S. Van Cise, of the Colorado National Guard, makes a long report of the occurrence. It declares that they examined under oath as many as possible of the soldiers, deputies, mine guards and townspeople of Ludlow and nearby coal camps. They made a personal request for testimony of J. R. Lawson and J. McLennan, of the United Mine Workers of America, but they, in the presence of their attorney, H. N. Hawkins, refused to give evidence on the ground that the inquiry was not publicly conducted.



GROUP OF ARMED STRIKERS AT TRINIDAD, COLO.

GREEKS USED PRESENCE OF WOMEN AS DEFENSE BUT KEPT THEM OUT OF DANGER

The military board condemned the operators for having introduced lawlessness in the persons of "ignorant, lawless and savage Southern Europeans." They declare that the Greeks deliberately prepared for battle, and from the report it may be gathered that the Greeks desired to fire on the militia from the camp, hoping that the fire would not be returned because there were women and children living there. To protect these noncombatants, however, they constructed shelters or pits for some of them and removed others before opening fire on the militia.

The board declared that the Greeks intended on the Greek Easter to open fire on the militia, but they were too drunk at that time to prosecute their scheme. The attack was then to be made on Tuesday, but the moving of the militia from Cedar Hill to Water Tank Hill made the strikers believe that an attempt would be made by the militia to attack the camp and secure the person of Carindo Tuttoilmando, a nonunion miner who was held prisoner in Ludlow camp. Corporal Patton, in fact, according to the official report of Major Hamrock, was sent to make the demand of Louis Tikas.

Hamrock's report to General John Chase says in part:

He refused to see me under any circumstances. I phoned Lieutenant Lawrence to bring the Cedar Hill detachment to drill. Louis must have tapped the wire for he telephoned he would meet me at the railway station. Lieutenant Lawrence reported with detachment and machine gun. On the way I ordered him to assemble and drill in the vicinity. Then Louis arrived, and I saw 300 armed men leaving the colony and going south, while the women and children took cover in an arroyo to the north. I told Louis to get control of his men, and he agreed and went back to the colony. I ordered Lieutenant Lawrence to take a position on Water Tank Hill on the southeast, and then saw Louis with a field glass and gun in hand signal the men in the colony to take cover in the northern arroyo.

PUT LINE OF RIFLE PITS AROUND CAMP

The commission says:

We find that in apparent anticipation of the battle of Ludlow, rifle pits were prepared by the Greeks on the south and west side of their colony, along the country roads and close to the tents. These rifle pits show conclusively the careful and deliberate preparation of the strikers for the battle; and the location of these pits along the front and side of the colony nearest to the militia camp was such that when used they could not be defended without firing into the colony. Such care had the strikers themselves for their women and children that these pits were located where any return of the fire from them would be drawn directly into the colony itself.

Major Hamrock tested his range with the machine gun and sent them directly into the first tents of the colony. It could not be supposed that any women, children, or other noncombatants remained in the camp itself. They had been seen departing early in the morning, and it was impossible to believe that the strikers would draw the fire of the opponents from all sides into the colony if any women and children remained there.

THE RESCUE OF THE WOMEN FROM THE BURNING TENTS

As one tent caught fire after another, some of the men having nearly reached the tent colony heard the screams of the women and called to the men whom they saw firing from the tents to get their women out. The only answer was the words: "You go to ——," spoken with a foreign accent and accompanied by a rain of shots.

The men in the colony being driven back and the presence of women thus being known, Captain Carson, Lieutenant Linderfelt and other officers and men made a dash in among the burning tents for the purpose of rescuing the women. At first they took several women from the tents, some of which were burning and some not. They then dis-

covered subterranean pits beneath many of the tents, and some of them were stored with human occupants.

When the pits were discovered, the difficulty of getting out the women and children increased. Lieutenant Linderfelt took a woman from one tent who could not speak English. She made him understand he must return. She went back with him and indicated one of the holes in the ground, from which the lieutenant took two little children in the nick of time. Captain Carson related that when he was in an apparently open-floored tent he heard the crying or whining of something living beneath. He had to chop away the floor, which was nailed down upon these people, to get them out.

BRAVERY OF MILITIA

During the whole time that this rescue work was going on the colony was under fire, and by taking the greatest risk of destruction by making targets of themselves in the light of the burning tents, the uniformed militia did its noteworthy work.

We find that the work of rescuing some 25 or 30 women and children by Lieutenant Linderfelt, Captain Carson, and the squads under their command, was under all the circumstances truly heroic and must stand out boldly in contradistinction to the abandonment of the helpless women and children by their own people, and the subsequent efforts to kill their rescuers regardless of the safety of the rescued.

DOUBTFUL IF WOMEN AND CHILDREN WERE SUFFOCATED BY FIRE

It was supposed by the officers after a thorough search of the colony that all the remaining women and children had been taken out. The event proved that one of the pits had been missed in the search. In this pit was discovered two women and eleven children, all dead. This chamber of death measured in feet, 8x6x4½. When found it was almost closed. If these women and children were placed in this pit at any time during the morning, it is our belief that they died of suffocation hours before the pit caught fire.

We find that the tents were not all destroyed by accidental fire. Men and soldiers swarmed into the colony and deliberately assisted the conflagration by spreading the fire from tent to tent. Beyond a doubt it was seen that the fire would destroy the whole colony. This was accompanied by the usual loot. So deliberate was this burning and looting that we found that cans of oil found in the tents were poured about them and the tents lighted with matches.

GREEK ACTIVITY RESENTED BY TENT COLONY

We find that the dominant feeling among the refugee colonists on Monday night, and before the second thought came to them or was suggested to them, was resentment toward the Greeks for starting the battle. This resentment prevailed even over their animosity against the soldiers, but the incident was later made a candle to inflame the minds of these deluded men to the acts of slaughter and rapine that followed throughout the state.

It was made the excuse of many bold and defiant utterances and acts of treason against the state by certain union leaders, who had the opportunity by their influence and authority to prove themselves really great and good men, and worthy citizens. Instead, by all means of exaggeration, incendiarism, and treasonable practices, they made of the battle of Ludlow a means of organizing a real rebellion with its attendant awful consequences.

COMMISSION NONCOMMITTAL AS TO CAUSES OF TROUBLE

We do not presume even to hint where the ultimate responsibility lies in the present strike. It may be that the coal operators or the union are wholly to blame for the conditions that have made such results possible. It may be that both sides are partly at fault. But the conditions have been brought about and being actually existent, whatever may be the cause, we feel that for their treason and rebellion against organized society, with the horrible consequences of anarchy that followed, certain union leaders must take the responsibility before God and man.



MILITIAMEN READY TO OPERATE MACHINE GUN, LUDLOW, COLO.

DEATH OF THREE PRISONERS

The report also says that during the evening, Louis Tikas, James Filer and an unknown striker were taken prisoners. Lieutenant K. E. Linderfelt swung his Springfield rifle, breaking the stock over the head of Tikas. This incident followed a heated controversy between the lieutenant and the Greek. The report continues:

An attempt to hang Tikas went so far that a rope was produced and held over a telegraph pole. This lynching was prevented by Lieutenant K. E. Linderfelt, who turned Tikas over to a noncommissioned officer, whom he directed to be responsible for his life. Shortly after, all three prisoners were killed by gunshot wounds. The only bullet found in Tikas' body was of a kind not used by the soldiers, although two other wounds may have been made by Springfield rifle

bullets of the uniformed men. When the colony was looted by participants and spectators in the battle, it was found that 15,000 rounds of ammunition were stored in a tent marked "Headquarters of John Lawson."

SNYDER, THE NONCOMBATANT, SLAIN BY STRIKERS ACCIDENTALLY

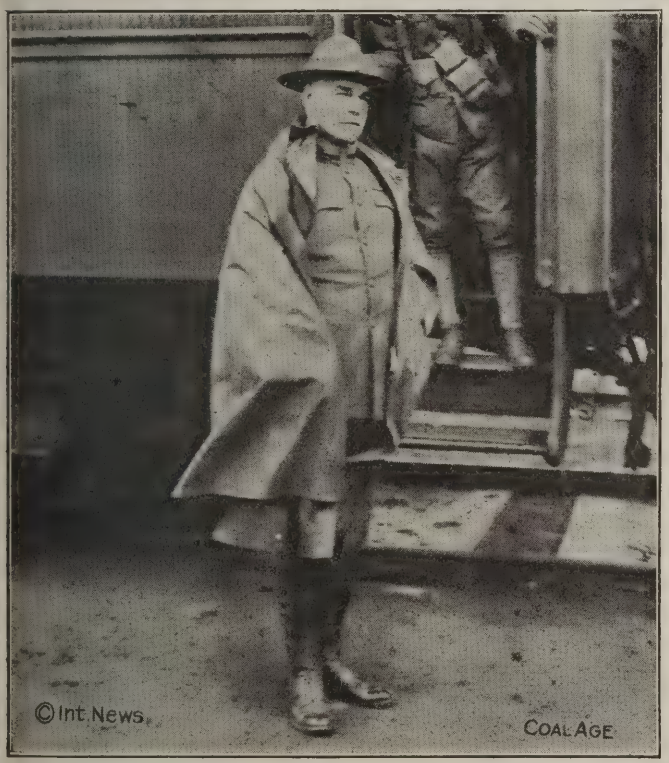
Only one person was killed or wounded in the colony by gunshot; Frank Snyder, a 12-year boy, was shot in the head. His father stated that he thinks that his boy had gone outside the fence and was shot in the forehead while facing the arroyo from which the strikers' fire came.

The colony was not swept by machine guns. This is proven by the fact that the chicken houses, outhouses, tent frames and posts still standing in the colony exhibit no bullet holes; while the buildings and fences along the railroad tracks were riddled by the machine guns.

The report also makes the statement that the militia was frenzied as the result of the discovery of Private Martin's body severely mutilated, and that this discovery may have accounted for some of the things which took place later near the tent colony itself. Hockersmith and Chavez, both privates, were also horribly mutilated.

THE LEGISLATURE

The meeting of the Colorado Legislature on May 4 was addressed by Governor Ammons. He stated that he had been obliged to borrow money at 4 per cent. to pay the militia.



MAJOR HOLBROOK, COMMANDING THE U. S. REGULARS IN COLORADO'S STRIKE ZONE

This had to be done at a time when neither the country nor the state was in good financial condition. So the clearing houses at Colorado Springs and Pueblo were asked to supply the money, and thereby exhibit their sense of good citizenship. But before the clearing houses could consider the matter, the auditor sent word that he would not agree to pay the certificates.

The militia, however, was ordered to take the field, and when it came to the payment of the first certificates, they were not issued; the governor was, therefore, compelled to go into the Supreme Court and ask that body to order the auditing of the bills and the issuance of the certificates, which was done. The banks of three cities are carrying $250,000. The railroad agreed to carry theirs until the legislature provided for payment, and some patriotic citizens also agreed to wait.

The governor urged the passage of an arbitration bill and of one establishing a constabulary like those already in existence in Nevada and Pennsylvania. The governor states that the militia has been unable to do effective work because it cannot legally stop the importation of arms, or disarm the gunmen of the strikers and others or close the saloons. There seems some degree of disingenuity about this statement. Surely when a governor declares martial law the authorities in control can regulate such matters without circumventing recognized military practice.

AMMONS WINS IN ALL CONTESTS IN LEGISLATURE

On May 7, the progressive democrats and progressives in the Senate placed on record a resolution condemning the Ammons' administration for failure to control the situation, and the House failed to pass a resolution asking the governor to extend his call for a special session, so as to permit legislation on the entire strike situation. On May 8 a resolution was introduced by Representative Bliss in the State House, providing for an investigation by five members of that body, having power to subpoena and compel the attendance of witnesses.

MONEY VOTED BUT CONSTABULARY BILL NOT PASSED

A bill was passed empowering the governor to close saloons in the strike zone. This was opposed by the progressives, merely for the purpose of determining the strength of the contending parties in the legislature. The constabulary bill was killed by common consent, it being realized that it would imperil the Democratic party to pass it. The Senate also turned down a resolution appealing for Federal arbitration of the strike war. The House on May 11 passed the third reading of the bill, providing a $1,000,000 bond issue to pay for past, present and future expenses of the state militia in the strike field.

WOMEN HAVE DECIDED THE ISSUE AND WILL SEE THAT GOVERNOR OBEYS THEM

The Colorado Women's Peace Association, led by Mrs. Alma V. Lafferty, threatens with 5000 women to camp on the capitol grounds if the militia is called out again. We sincerely hope with them that he will not do so as long as the United States troops can be induced to remain. However, the hysterical plans of these women enable us to size up the whole Colorado situation, which is not marked by reason, but by sentimentalism.

The miners are somewhat slowly giving up their guns. They have been made to believe that as soon as they surrender them the mine guards will attack them savagely. Hoping that the coal companies may soon be short of men and that miners may leave, some of the leaders are doubtless not overkeen in their favor of disarmament. When guns are available for picketing purposes, it will be hard to bring new men into the district to replace those who may leave.

MARTIAL LAW RULING

The operators are slowly surrendering their arms, though their position is precarious. Should the troops leave before the strikers are disarmed, the loyal men and the companies would be apt to lose both life and property. With the present administration, nothing can be foretold.

In fact, the present rulings of Secretary of War Garrison are most unfair. He forbids the opening of any mines which were idle before the Ludlow affair and forbids the companies to take on any new men. We are trying to encourage trade in Vera Cruz, Mex., and suppressing it in Trinidad, Colo. On the other hand, the government is endeavoring to drive out all those armed men who came into Colorado after the Ludlow battle to terrorize the country. Every man has to give the name of his former working place, and if on inspection of the pay-roll his name is not to be found, he is to be summarily removed from the state. It is obvious that this latter provision will not be enforced against the law-abiding.

It is also difficult to determine why the Federal troops are going to permit the rebuilding of the Ludlow camp. This camp should be removed to some place where violence is less likely to be attempted. Even though as reported, the colony will have its membership restricted, there will always be a danger that it will be put to the use for which its location fits it and will be converted into an armed camp.

Itinerary of Federal Rescue Cars

Car No. 1

1914 Arrive	Leave	Address
May 16	May 24	Seattle, Washington
May 24	June 4	Roslyn, Washington

Billings Car No.5

1914 Arrive	Leave	Company	Address
May 18	May 23	Car Repairs	Spokane, Wash.
May 25	May 30	Bear Creek Coal Co. Montana Coal and Iron Co. International Coal Co.	Bear Creek, Mont.
June 1	June 6	Anaconda Copper Mining Co. Smokeless and Sootless Coal Co.	Washoe, Mont.
June 8	June 13	Northwestern Improvement Co.	Red Lodge, Mont.

Editorials

A Special Anthracite Number

The June 6 issue of Coal Age will be devoted entirely to anthracite mining. Much of the information in this particular number will be applicable to soft-coal operations, and therefore will be of interest to bituminous men. We especially request that our readers in the anthracite field submit articles describing mining methods, ventilation, pumping, haulage, etc., in the hard-coal mines.

All such articles as are accepted will be handled promptly and paid for at a liberal rate. Join in and help us make the June 6 issue of Coal Age the most interesting compilation of anthracite information ever published in a single copy of any paper.

The One Thing Needful

It has been said that the model mines are those which most frequently blow up. The most notable of our mines are approached by shafts. Only a strong operating concern can afford to sink a deep pit and equip it with machinery, and such a company is likely to plan the colliery in the most expensive scale.

It is also true that shaft mines have a record for explosions, which is out of all proportion to their numbers. Because, therefore, shaft mines are at once best equipped and most dangerous, the dictum as to the danger of model mines has almost been regarded as an adage. As a rule, gas is generated in their workings and they are usually somewhat warmer and therefore drier than drift mines. But the presence of gas is the important characteristic which makes shafts dangerous. Model mines are not as dangerous in the anthracite region as are others, because nearly all are shaft mines and contain gas. The best mines and the worst in that district are subject to the same class of risks and accordingly the better mines have the clearer record for safety.

It was almost certainly the presence of gas in Eccles No. 5, which caused the violent explosion at that colliery. The mine was really model—in its discipline, its equipment and its morale. But there were a few things needed and all the multiplicity of precautions failed for want of these few things.

Every department of industry relies on all the elements of success, or it will be a failure. It is useless to build a railroad and equip it splendidly, leaving, however, one broken rail. And it is a mistake to provide elaborate ventilating equipment, fans, stoppings, overcasts and canvas more than ordinarily complete, and then to use open lights, electric haulage, and let the miners fire their own shots.

The mine safety in that event depends as at Eccles, wholly on the ventilation. The operators at that mine staked everything on that thin line of defense. They saw to it as far as they could that that one line was perfect, unbreakable, but apparently it broke and the flame was there to blow the mine up. They had provided that flame, trusting it would have no gas to ignite. But they could not assure the absence of the gas should the ventilation for one moment fail.

This is a time when drastic measures are sure to be put in force. By compensation laws such losses as that at Eccles will be distributed among the operators and these men will combine to enforce greater safety on every one. In a short time it will not be possible to work a gaseous mine with an explosive dust like that at Eccles without safety lamps. In the report of 1912, the inspector says: "This mine liberates gas in all working places." The other operators in West Virginia cannot continue to let mines so gaseous as this be operated with open lights, if they are going to be partners with such mines in providing compensation.

No. 5 Eccles was an admirably managed mine. Read what the Department of Mines has to say: "Posting in rooms is done by timbermen; shot-firers are employed; Monobel powder is used exclusively. The mine is damp throughout. All stoppings are of brick or cement." All these statements are true except that the shot-firers only fired the shots for machine-mined coal, which least needs such care. In fact, the report understates rather than overstates the care shown by the management in the operation of the mine.

The men working were satisfied and so were the managers. Even the vice-president and general manager, F. Guiterman himself, was willing to make a monthly trip into the workings. He was ready to expose himself to equal risk with his men. But the few things needed were not done, and it is a folly to say that we are surprised at the result.

We ask those who fear to admit, by introducing safety lamps, that their mines are dangerous, to think carefully. If their mines blow up, there will be more than their admission to advance the notion that the mine is a dangerous operation. They will have to fight thereafter not only the fear and dislike of safety lamps, but the dread inspired by the history of a mine which, in its time, has slain its hundreds.

Proposed Oriental Legislation in Colorado

The Colorado Progressives have a remarkable program of reform which proceeds on the basis of oriental law, that anyone guilty of the slightest infraction of a statute should be adjudged as worthy of total deprivation of property.

They also would provide that the right of determining guilt should be placed entirely in the hands of one person for determination, who was not at the time he prepared the decision cognizant of the importance of the issues he was determining. This program is a conclusive proof that if Governor Ammons and his followers are to be reprobated, his opponents in the legislature are also to be regarded as men of neither judgment nor principle.

In fact, the legislature of Colorado is conspicuously unworthy of public esteem.

The Progressives demand changes in the state laws governing the leasing of coal properties, so that the state may compel lessees, under pain of forfeiture of leases, to comply with all safety regulations to save lives in mines; that the state shall say who shall be employed in mines, that forfeiture of leases shall include forfeiture of improvements; that all present lessees who are proved guilty of violating state statutes for safety in mines shall be deprived of their rights, the report of the state inspector in the last two years to decide this point; that the state shall reserve the right to fix the price of coal to consumers making the price to cover the cost of mining, transportation and sale, with a small profit to the operators. The Progressives also declare that the present royalty of 10c. per ton for coal mined on state lands is not enough.

In such ridiculous propositions the legislators waste their time while foreigners in hordes overrun their state with arms, tying men down to the floors of houses and setting fire to them, hitching mules to the number of 28 in a barn and firing the building, taking prisoners, clubbing, shooting and murdering better men. The Progressives have nothing more valuable to say than that if any operator has let a portion of his mine get dry during the last two years, or has failed to put a shelter hole at a certain definite distance from its neighbor, his property shall be confiscated by the state. We do not wonder with men like this to misrepresent the people that feeling runs high in Colorado.

Government Mine at Williston, N. D.

We are by no means ardent friends of such capitalism as does not serve the interest of the public. Conversion of most of us to all forms of state socialism would be comparatively easy could we be convinced that government ownership was economically sound and would give a higher return for the labor rendered, that it would promote safety in operation and be anything else than an unstimulating system under which all would live on a lower plane.

In a quiet way the reclamation service has opened a mine at Williston, N. D. This department of the United States Government, like all the others, is free from graft and has had a reputation of being free from sterility and sluggishness. Many works it has accomplished have added to the wealth and been creditable to the enterprise of the nation. So we do not single out a discredited graft-ridden organization in order to condemn state ownership when we discuss the achievements of the reclamation service in coal mining.

The mine which the service is working is small; in fact, in ordinary parlance, it would not be called a mine, but a "country bank." There are only 12 or 15 men employed, but six to ten tons are mined by each miner. So the coal must be thick and conditions favorable.

The rate of pay is reasonable and runs, we are told, from 60 to 80c. per ton, according to the location. The pay per working day on the surface is $1.75, and underground $3. All these figures are like those paid in the coal regions throughout the United States, though probably the miners in central Pennsylvania, where they have been trying to increase the pay of outside workers, would strongly object to such differences existing between daylight and dark.

Now with a small mine, with favorable conditions, with a wage scale not high but about that obtaining in Pennsylvania, Illinois and Ohio, the reclamation service produces coal for $1.78 per ton, "including all maintenance charges."

The average price of bituminous coal at the mines throughout the United States was $1.15 in 1912. So, if the reclamation service had to go out and do business in the markets under the average conditions, it would lose 63c. on every ton of coal mined, or 35 per cent. on each sale.

The writer, Raymond W. Pullman, on whose report we rely, states: "Of course, Uncle Sam can't do anything, and when he does, he always makes a failure of it. This coal mine and the reclamation service are proofs of things, don't you know." Indeed they are, Mr. Pullman, indeed they are.

The Court of Public Opinion

We are approaching a crisis in the industrial conditions of America, and the coal industry has apparently been selected as one of the principal battlegrounds on which the conflict is to be waged.

We have had actual civil war in both West Virginia and Colorado, and the contending factions have resorted to a show of force rather than an appeal to reason.

We doubt if violence is a good substitute for logic, and we are sure that if the same amount of money and effort, now being expended by organized labor in Colorado, was to be used in a broad campaign of public education, whatever wrongs exist would soon be righted.

Have we reached a point in our business life where each man who is not satisfied will exert physical force to correct the ills that beset him? Are we coming to a state where we must smash something every time we want a raise in wages?

Capital and labor must soon learn that the one court of last resort is public opinion, and they must know that no unjust condition can withstand for long this force of public thought.

Every social movement based on intimidation and violence has been doomed to failure before it was well started. The "Molly Maguires" tried physical force 40 years ago and failed, and every campaign of lawlessness and bloodshed since then, including that of the suffragettes in England, has been equally unsuccessful.

We hold no brief for the mine owners. Some of them are as unjust and selfish as employers can be. May speedy retribution come to them and may they and the rotten conditions they stand for be banished forever.

The coal industry is filled with enough earnest, honest, Christian men to conduct its affairs on a plan of social justice to the employee, and equal fairness to the capital employed.

The time has arrived when employer and agitator alike must stop exploiting the decent workingman, who is aiming to get a fair wage for an honest effort. Most of our social ills could be avoided by submitting all differences to "public opinion.," the one and only court that can be depended on certainly and finally to exercise justice to all.

Sociological Department

Saline County Mine Safety Association Meet

Saline County, Illinois, held its first annual first-aid contest at Harrisburg, Ill., on Saturday, May 2, under the auspices of the Saline County Mine Safety Association. Every effort was made by the officials in charge to make the event a success. How well they succeeded could be easily told from the satisfied expression worn by both members and visitors when the event closed. As the weather was most favorable and the contest well managed, fully six thousand spectators attended and all remained till the proceedings ended.

At ten o'clock in the morning, the officers of the Saline County Mine Safety Association, followed by the first-aid teams which were to take part in the contest, and the members of the association, formed in line on South Main Street and marched around the square to the Interurban line, where cars were ready to take them to the White City.

After a selection by the Harrisburg Union Band, M. S. Whitley, master of ceremonies, introduced O. M. Karraker, mayor of Harrisburg, who in an interesting and appropriate address welcomed the crowd to the city. H. H. Stock, dean of the department of mining engineering of the University of Illinois, was next introduced, and in a brief address told of the origin of first-aid work and the benefit derived from its introduction.

An Exhibit of Safety Work

A most interesting and well-planned exhibition of mine rescue work was then performed. A mine entry had been constructed opposite the grand stand, representing four rooms and an entry which was several feet in advance of the inner room. The spectators were informed as to the movements of the men in the mine by George W. Riggs, of the U. S. Bureau of Mines, who acted as announcer during the day. First the examiner, equipped with testing rod, safety lamp and anemometer, entered the mine, marking the dangerous roof, testing the rooms for gas, and measuring the air current with the anemometer, and making his report of the condition of the mine to the manager, who arrived just as the examination was completed.

Next the miners appeared ready for work, reporting to the mine boss, and being checked in by him. The miner in Room 4 was cautioned not to enter his place until an accumulation of gas found in it by the examiner had been removed and the place made safe. After considerable discussion, the machine men succeeded in getting the bit boy to bring in the bits for the machine, and they began work cutting the face of Room 1. In the meantime, the timberman had received his orders from the examiner, and had gone about his work, supporting the roof where necessary, and taking down such material as was dangerous.



View of First-Aid Field and of Imitation Mine for Exemplification of Rescue Work

Exhibit of Carelessness

The tracklayer, after a more or less social visit with the miners in each chamber, finally reached Room 4, where he and the miner in charge of the place were soon engaged in a heated discussion as to the relative position of the track and the face, the miner claiming that he was unable to load his coal because the track was too far back, and the tracklayer asserting that he had laid track in that room just the day before. The discussion finally became too hot, and, forgetting all about the danger sign across the entrance to the room, the two men started up to the face to prove who was right.

A moment later, an explosion was heard, and dense smoke began to pour out along the entry. The miners working outby from Room 4, hearing the explosion,



First-Aid Contestants and Helmet Men at Harrisburg, Saline County, Illinois

rushed in to give assistance, and were themselves overcome by the smoke. Some of them were rescued by their comrades, for those who were uninjured, finding the smoke and afterdamp too bad, sent in a call for the rescue team. Two automobiles soon arrived, bearing the rescue men and their equipment, and after testing the apparatus in the smoke room on the surface, the rescue crew entered the mine, carrying a life line, stretcher, and electric lamps.

The two men who were overcome by the explosion and afterdamp were soon discovered, and on being brought to the surface, were turned over to hastily organized first-aid teams, which administered to them until the arrival of the ambulances. The entire demonstration was realistic, and received such enthusiastic applause that the officials decided to repeat the performance in the afternoon, so that all might have an opportunity to see a mine-rescue team at work. Following the exhibition, an adjournment was made for dinner, and at half-past one in the afternoon, the first-aid contests were called.

First-Aid Work

The first event was the single-man contest, and believing that this is by all odds the most important event, the Judge-in-Chief, Dr. A. F. Knoefel, made the problem for this event a rather hard one. When a man is injured, there is often but one man in the neighborhood who is capable of administering first aid to him, and as a consequence, it was thought that the best measure of a man's ability is his work in the single event. There were 26 men entered for this contest, and the problem given them was as follows:

While two miners are engaged in mining with the machine, the coal falls from the face upon one who is shoveling slack, he being caught under the fall. The following injuries are sustained: Severe lacerated wound back of left knee with profuse hemorrhage; fracture of tibia and fibula of left leg in its upper third; cut of forehead; fracture of right arm. Time limit, 35 minutes.

The following men were entered in the event, and finished in the order given:

1. John Krainock, with Charles Elliott as subject. Bunsen Coal Co., 93 per cent.

2. John Griffiths, with Matthew Dewar as subject; Big Creek Coal Co., and James Struthers, with Dan McLaughlin as subject; Superior Coal Co., tied with a percentage of 92. To decide this event, a final test was given to these two men, the second and third prize depending on the result of the final. The problem given was to "put on a skull-cap dressing of the head," and in this John Griffiths made a mark of 95 per cent. and James Struthers made 94 per cent., giving them second and third place, respectively in the single event.

4. James Weir with Robert Weir as subject; Superior Coal Co., 91 per cent.

5. Three men were tied for this position: Steve Gosnell, with Michael McTaggart as subject; O'Gara Coal Co.; T. B.



First Five Contestants in the One-Man Event. Third Man from Left Is John Krainock, Winner of First Prize

Trigg with James Ford as subject; Big Creek Coal Co.; and William B. Griffiths, with A. Robasse, subject; Big Creek Coal Co., 90 per cent.

8. Two men were tied for eighth place: Bertram Peak with Frank Futrell as subject; Saline County Coal Co.; J. Estwanik, with Fred Creswell as subject; Big Creek Coal Co., 88 per cent.

10. Two men were tied for tenth place: John Lyons, with Peter Boland as subject; Madison Coal Corporation; No. 8 mine; and Charles Miller, with Sam Anderson as subject; Superior Coal Co., 86 per cent.

12. Three men were tied for 12th place: Oscar Horn, with Thomas Thornton as subject; Chicago & Carterville Coal Co.; John Cowden, with Wm. B. Orr as subject; Superior Coal Co.; and James Law, with Paul Henderson as subject; Saline County Coal Co., 82 per cent.

15. Two men were tied for 15th place: Steve Shaeffer with Jos. De Barba as subject; Bunsen Coal Co.; George Tincey, with George MacNab as subject; Saline County Coal Co., 81 per cent.

17. Two men were tied for 17th place: Earl Mitchell, with Carl Heine as subject; O'Gara Coal Co.; and Stephen Tovey, with C. E. Noonan as subject; Bunsen Coal Co., 80 per cent.



Bunsen Coal Co., U. S. Steel Corporation Subsidiary, Won Second Prize

19. Wm. G. Taylor, with Joe Goff, Jr., as subject; O'Gara Coal Co., 79 per cent.

20. Two men were tied for 20th place: E. Parkins with Robt. Lanton as subject; Big Creek Coal Co.; and James Pepper, with William McNab as subject; Saline County Coal Co., 78 per cent.

22. Charles Cathcart, with John Cathcart as subject; Saline County Coal Co.; 72 per cent.

23. Robert Henderson, with James Long as subject; Saline County Coal Co., 71 per cent.

24. Two men were tied: T. F. Bailey, with D. H. Wilson as subject; Chicago & Carterville Coal Co.; and William S. Lang, with Daniel Simms as subject; Saline County Coal Co., 70 per cent.

26. Guy Biggs, with Oscar Peak as subject; Saline County Coal Co., 54 per cent.

Following the single-man event, the full-team event was called. The problem presented was:

Following a gas explosion, a miner who is in the entry sustains the following injuries: Second degree burns of the face, neck and forearm; fracture of the sixth, seventh and eighth ribs on the right side; fracture of the left thigh; also a fracture of the right patella. Perform artificial respiration, load patient on stretcher, carry and load in ambulance. Time limit, 30 minutes.

The teams and the order in which they finished were:

1. Superior Coal Co. Team No. 1, Gillespie, Ill. James Weir, captain; James Struthers, John Cowden, Charles Miller, Robert Weir. Field No. 2. 95 per cent.

2. Bunsen Coal Co., Westville, Ill. John Krainock, captain, Chas. Elliott, Steve Shaeffer, Joseph De Barba, C. E. Noonan. Field No. 5. 90 per cent.

3. Two teams were tied for third place, and the following problem was given to decide to whom the third prize was to be awarded: "In removing a prop, the miner was caught by a fall of slate, and sustained a fracture of the right clavicle, a dislocation of the right shoulder, and his right ear was torn off." The two teams tied were the Chicago & Carterville Coal Co., Herrin, Ill., and the Cuba first-aid team, Big Creek Coal Co., Mine No. 3, Cuba, Ill., with a percentage of 89. In the final the Chicago & Carterville team won third place, with a percentage of 98, the Cuba team scoring 82 in the final, and receiving fourth place. Chicago & Carterville team, Oscar Horn, captain, Harrison Wilson, Thomas Thornton, T. F. Bailey, Clark Miller. Field No. 8.

4. Cuba first-aid team, T. B. Trigg, captain, D. B. Griffiths, John Griffiths, Joe Estwanik, E. Parkins. Field No. 6.

5. O'Gara Coal Co., Eldorado first-aid team, Eldorado, Ill. Steve Gosnell, captain, Michael McTaggart, Joe Goff, Jr., Wm. Taylor, Robt. Taylor. Field No. 4. 88 per cent.

6. O'Gara Coal Co. No. 9 Mine, Harrisburg, Ill. A. Goodman, captain, C. Sprague, James Ford, E. Mitchell, Carl Heine. Field No. 9. 86 per cent.

7. Saline County Coal Co. Independents, Harrisburg, Ill. Geo. Tincey, captain, James Lang, William S. Lang, Robert Henderson, James Pepper. Field No. 1.; and Saline County



Chicago & Carterville Coal Co. Team, Which Secured Third Place

Coal Co. Mine No. 3, Harrisburg, Ill. Charles Cathcart, captain, Bertram Peak, James Law, Guy Biggs, Frank Futrell. Field No. 3. 85 per cent.

9. O'Gara Coal Co. Mine No. 4, Harrisburg, Ill. Thomas Eddy, captain, Sherman Walters, Arthur Love, V. E. Pry, John Mead. Field No. 7. 84 per cent.

Officials and Prizes

The officials of the contest were:

Judge-in-chief, Dr. August F. Knoefel, Terre Haute, Ind.; assisted by Dr. H. M. Orr, La Salle, Ill., and Dr. Frank Deason, Bush, Ill. Timer, D. B. McGehee, O'Gara Coal Co. Clerk of contest, J. R. Henderson, Saline County Coal Co. Scorers, Oscar Cartlidge, Illinois Mine Rescue Commission, and E. C. Lee, Illinois Miners' & Mechanics' Institutes. Announcer, George W. Riggs, U. S. Bureau of Mines. Marshall of the day, C. A. Horning, O'Gara Coal Co.

Following the announcement of the results, the prizes were presented as follows:

First prize in full team event, silver loving cup; presentation made by Hon. J. J. Parish. Each member of the winning team was given a gold medal, each member of the second team a gold medal, and each member of the third team a silver medal, the presentation being made by H. H. Stoek. Professor Stoek also presented the medal for the winners in the one-man event, gold medals being given for first and second place, and a silver medal for third place. In addition to the prizes given by the local association, American Mine Safety medals were awarded to each member of the winning team.

Rules of Contest

The following rules governed the contests.

1. A team is composed of five men. Upon demand the members must certify that they are not doctors or trained nurses.

2. Each team must select its own patient from among the five members.

3. In team events the captain will control his team in its field work by giving audible commands.

4. No coaching or prompting will be allowed from the visitors or the patient.

5. Anyone desiring to participate in the event must file entry before noon of the day of the contest.

6. At the conclusion of any event the captain will raise his hand and announce his team number. The team will remain at its post until relieved by the judges.

7. Teams will bring their own first-aid materials, including bandages, splints, blankets, etc., and will not be allowed to leave the patient in order to secure materials.

8. The triangular bandages will be the standard used in the contest, but roller bandages may be used and equal credit will be given for their proper use as with the triangular bandage.

9. All splints must be prepared on the field for each event requiring their use. Specially designed splints may be used but they must be assembled during the time of each event requiring their use.

10. No practicing will be allowed on the field preceding the contest.



Treating Patient for Traumatic Shock in One-Man Event



Dr. Knoefel Examining John Lyons in Same Event

11. The teams will be numbered consecutively, beginning at No. 1, and they will occupy their respective positions on the field.

12. Notice will be given before the beginning of the contest as to the number of teams assigned to each judge.

13. In all events requiring resuscitation, rescue of the patient and stretcher drill, the judge may require the teams to perform separately.

14. Each judge will mark the team number, event, and discounts for each team judged, sign his name and deliver his report to the recorder.

15. The recorders will foot up discounts and announce the scores to the judges. In case of a tie, the teams with the same scores will be compelled to participate in another event, those receiving the highest score in this event being accorded first, second and third places, respectively.

16. Time will not be an element, unless the team or men performing run over the allotted time, or fail to give proper treatment. All events shall commence and be finished at proper signal.

Evening Session

At 7 p.m., a moving-picture exhibition was given in the Orpheum Theatre. Four reels from the Bureau of Mines were used, and after the first performance, W. D. Ryan, of the Bureau of Mines, was introduced by President Johnson of the local association, and gave a talk on mine safety. He was followed by H. H. Stoek, who gave a talk along similar lines, and then several slides showing accident prevention were explained by E. C. Lee. The program lasted until about 11 p.m..

Other guests at the exhibition were: Thomas Devlin and John Jeremiah, of the Illinois Mine Rescue Commission; Martin Bolt, James Forrester and John Bohlander, of the State Mining Board; R. Y. Williams and Clarence Bonnell, of the Illinois Miners' and Mechanics' Institutes; the entire force of state mine inspectors, and G. L. Morgan, T. P. Back, D. Z. Thrush, P. Hogan, J. Kaney, J. Garrity, J. McClintock, B. Roberts, W. Hartman, A. Frew and J. Starks. Dr. J. A. Holmes and J. T. Ryan, of the U. S. Bureau of Mines, were expected to be in attendance, but were called to West Virginia to assist in the rescue work at the Eccles explosion.

The officers of the Saline County Mine Safety Association responsible for the excellent showing made during the day are William Johnson, president; T. W. Johnson, vice-president; Bert Tavender, secretary; and Wm. R. Taylor, secretary.

The Rocky Mountain Coal Mining Institute

Owing to the continued unsettled conditions in the Colorado coal-mining industry, the executive board of the institute, by an almost unanimous vote, has also decided to postpone the next meeting of The Rocky Mountain Coal Mining Institute.

It was thought with an Institute such as ours that beneficial results could be obtained only by the hearty interest and coöperation of all the members belonging. Such interest and coöperation is hardly possible at the present time.

It is to be hoped that when the time rolls around for the November meeting, we will all be enjoying such a period of peace and prosperity that every member will find it possible to be in attendance.

E. H. WEITZEL,
President.

F. W. WHITESIDE,
Secretary-Treasurer.

Coming Meetings

The New York section of the **American Institute of Mining Engineers** will hold its final meeting for the year on May 21 at 7 p.m., at Brown's Chop House, 1424 Broadway. Following the brief annual meeting, a beefsteak supper will be served; price, $1 per plate.

The summer meeting of the **West Virginia Coal Mining Institute** will be held in Cumberland, Md., June 2, 3 and 4.

The annual meeting of the **Mine Inspectors' Institute of the U. S. A.** will be held in Pittsburgh, Penn., June 9, 10, 11 and 12, with headquarters at the Seventh Avenue Hotel.

The annual meeting of the **International Railway Fuel Association** will be held in Chicago, Ill., June 18, 19, 20 and 21, with headquarters at the Hotel La Salle, La Salle and Madison Sts.

Discussion By Readers

Overcasts and Stoppings in Mines

Referring to my article on Overcasts and Stoppings in Mines, COAL AGE, May 2, p. 718, I desire to state that when the walls of overcasts are more than 10 ft. 6 in. apart, it is well that the rails resting on the tops of the walls should be hitched into the coal ribs, to aid in resisting the thrust due to the weight of the roof of the overcast. The same result may be obtained by bracing the tops of the walls for 20 or 30 days.

A. W. HESSE, Asst. Chief Engineer,
The Consolidation Coal Co.

Fairmont, W. Va.

The Certificate Law

Letter No. 28—Referring to the interesting discussion on The Certificate Law, permit me to ask: Why not adopt the German system of education for mine officials, under which any mine worker between the ages of 16 and 35 years can go to the mine schools or "*Bergschulen*" and, after two years of study, if he passes successfully the third and last examination, he is given a graded certificate, which is good all over the Empire and in all countries on the Continent. Men who have passed the examination secure positions readily, as the demand and supply of certificated men are properly regulated. The men have the opportunity to show their ability; they are first placed among tried officials and thus given an opportunity to gain more knowledge; and as soon as they show themselves qualified they are given districts in the large mines.

The mines in the German Empire are divided into districts underground. Some have four while others have forty, while every "*steiger*" or deputy takes care of from forty to eighty miners and workers. He is with them for six hours every work day, giving instructions and taking observations with lamps and otherwise to see that the timbering, trackwork and excavations are properly performed in accordance with the law and regulations. This system is very satisfactory. The miner and the foreman have a fraternal feeling, one toward another, as the work is classed as craft or trade. The result is a system and it is profitable to the operator and the miner alike; and considering the size of the underground workings, they are as safe as human ingenuity and science can make them.

Compare this with what we have in the United States? From my observations in Pennsylvania, the Southwest, and in Colorado, for over 30 years, I find that every state has separate mining laws and regulations. In some states the candidate for the position of mine inspector must submit to an election at the polls; while, in other states, the governor appoints those officials. The examining boards often ask applicants questions they could not answer themselves without a reference book. As a result, many mine inspectors and mine foremen hold responsible positions, who would be more useful drilling holes and shoveling coal than trying to operate a coal mine.

Under this system, the mine foreman is held responsible for everything and has no protection for himself; he is paid less than the average miner, does twice the amount of work, worries and many a time loses his well earned rest at night. At the end of the month, the superintendent gives him a gentle (?) hint to reduce expenses and increase his output, but does not tell him how to do so, because he does not know how himself. He has hired the foreman to do this, while he draws the pay that the foreman should have.

HERMAN GEDOSH,
Civil and Mining Engineer.

Poteau, Okla.

The Air Factor in Mine Explosions

James Ashworth asks, COAL AGE, May 2, p. 741, where I can find any evidence of a "counter-current" in three experiments he mentions and in which an extraordinary or abnormal force was developed. I have no data regarding the experiments, No. 263 of the Eskmeals series and No. 287 of the Liévin series; consequently, I cannot express an opinion in reference to these two cases. I have, however, the data relating to Experiment No. 25 of the Altofts series and will say that although the record furnished affords no means of showing the probable presence of such a counter-current, neither is there anything in the record to show that a counter-current did not exist as an influential factor in creating the extraordinary explosive force developed.

Mr. Ashworth expresses the opinion that, in the above named experiments, "the speed of the explosive wave must have been far too great to allow of the operation of a reverse impulse such as I suggested in COAL AGE, Apr. 11, p. 603. In this connection, it is worthy of note that Experiment No. 13 of the Altofts series, which resulted in violence about equal to that produced in Experiment No. 25, shows that the existence of even a rather abnormal destructive force does not prevent the operation of a powerful reverse impulse. In the latter experiment No. 25, several steel sections at the gallery entrance were blown away. In Experiment No. 13 the steel gallery for a length of 30 ft. was blown up at a point 160 ft. inby from the entrance. In neither case was it possible to determine the pressure developed at these respective points; but it must have been exceedingly high in Experiment No. 13, because in Experiment No. 24 a pressure of 255 lb. per sq.in. was recorded at a point 294 ft. inby from the gallery entrance, and this was not sufficient to break the steel shell.

Now, notwithstanding the presence of extreme violence there were both direct and circumstantial evidence of the existence of a powerful reverse impulse, in Experiment

No. 13; as we are told, there was a back-suction that produced a pressure of 4 lb., while the conditions reported as existing in the gallery after the explosion, show that the force of the reverse impulse must have caused a pressure far in excess of that recorded.

Mr. Ashworth directs my attention, particularly, to the fact that, in one of these experiments, a ventilating current was present, while, in the other, there was no ventilating current; but in each case a violent explosion resulted. It must be remembered that the magnitude of a dust explosion, other conditions being the same, depends on the amount of dust ignited and the degree of heat developed at its starting point; and, again, the heat developed is largely modified by the method of ignition. There are several methods and combinations of methods by which the initial energy may be materially increased. The method used in Experiment No. 263 apparently proved very effective in this respect; but it is entirely too artificial and useful only in an experimental way. It can have no application in reference to explosions as they occur under ordinary mining conditions.

In Experiment No. 25, the initial energy of the blast was evidently much increased by the effects of the strong air current moving at the rate of more than 20 ft. per sec., and in opposition to the flame projected from the cannon. That this is a fair conclusion is shown by the following statement made by Taffanel: "Ignition was always greater when the shot was opposed to the direction of the air, or, relatively, toward the intake."

The existence of the reverse impulse during the progress of explosions has been shown, by experiments performed in the United States, England and Germany. It is obvious that such a reverse impulse must produce a strong inby movement of the air. Now, if, according to Taffanel, a comparatively feeble air current, traveling in opposition to the flame of a shot, has such a decided influence in increasing the ignition of the dust, it may be properly assumed that the vastly more powerful air blast, traveling in opposition to the explosion's flame, must be an important, if not *the controlling factor,* in propagating explosive combustion. In Experiment No. 21 of the Altofts series, two distinct explosions were observed at the downcast end of the gallery. Is there a more logical explanation of this phenomenon than to say that this was due to the action of such a "reverse impulse" or "counter-current," whereby fresh air and fuel were supplied to the hot and burning gases further inby, which produced again the explosive combustion of the dust?

Mr. Ashworth has a wide knowledge of mine explosions and the data concerning them, and I am, therefore, pleased to note his statement that he "does not recall a single case of mine explosion where the explosive combustion of suspended dust occurred under conditions restricting the power of the reverse impulse to induce a strong draft of dust-laden air moving in an opposite direction to that of the flame." If explosions under such restrictions have occurred, their extent and destructive force were probably very small, for recent experiments, in Germany, have brought out the fact that the effect of the explosion is much smaller in a gallery with the outlet closed, than in one with the outlet open. On the other hand, I am sure, Mr. Ashworth will have no difficulty in recalling many exceedingly disastrous explosions, both with respect to the number of lives lost and the destruction of property, that have occurred in mines where the presence of more than the usual number of openings to the surface and numerous underground passages connecting the mine workings afforded exceptionally good facilities for the propagation of explosive combustion, by giving ample opportunity for the creation of "reverse impulses" of great force.

JOHN VERNER,
Former State Mine Inspector.

Chariton, Iowa.

The Mine Foreman

Letter No. 4—I cannot let the article by Mine Foreman (W. Va.), COAL AGE, Apr. 18, p. 658, pass without protest. This letter seems to me to be misleading and its writer inconsistent. He asserts, in substance, that a competent mine foreman in West Virginia needs "protection from some source;" and adds "The state mining law gives him no protection but makes him responsible for the safe operation of the mine, requiring many things of him, in his official capacity, that he has no power to perform."

After reading and rereading the mining laws of this state, I cannot find anything in them that bears out such a statement. Section 15 of that law provides that "The operator or agent shall employ a competent and practical inside overseer to be called mine foreman." The law then enumerates his duties as mine foreman, and states, finally:

> The mine foreman shall notify the operator or agent of the mine of his inability to comply with any of the requirements of this section, and it shall then become the duty of any operator or agent to at once attend to the matter complained of by the mine foreman, etc.

Following this, the law prescribes a penalty for the failure of the operator or agent to comply with these requirements.

What further protection could a mine foreman wish than that provided by this section of the mining law? Under its provision, by a single word of his, he is able to shift the responsibility for the performance of any or all of his duties onto the operator or agent. In every case where the act requires the mine foreman to attend to certain duties, in his official capacity, it provides the means. I conclude that Mine Foreman is not acquainted with the mining law of his state or interprets it in a different way from what is intended.

In answer to his statement that the operation of the mine is, in almost every case, in the hands of the superintendent or manager, who regards him as a mere "timekeeper" and yet blames him for any accident or mishap that may occur about the mine, I would ask: What competent mine foreman of West Virginia would stand for such treatment as is described in this and succeeding paragraphs of the letter? I have been a mine foreman, myself, in this and other states, for the past eight years, and fully realize the responsibilities and trials of that position; they are legion. Far be it from me to discount the claims of the average mine foreman for consideration. He certainly is entitled to all the help he can receive from the state mining law, the superintendent or manager and the company. I must, however, reiterate my belief that no competent mine foreman needs to work or will continue to work long for a superintendent who treats him in the manner Mine Foreman would

have us believe they are treated in almost every case in West Virginia.

Every mine foreman soon finds that he is responsible for the safety of every man in the mine; and I fail to see how exception can be taken to this fact, which is the very purpose for which the position of foreman is created, according to the first paragraph of Sec. 15 of the Mining Law, which reads:

> In order to better secure the proper ventilation of every coal mine and promote the health and safety of persons employed therein, the operator or agent shall employ a competent and practical inside overseer to be called mine foreman, etc.

In regard to the mine foreman being blamed for financial loss, arising from the carrying out of plans made in the office or by the superintendent, which cannot be put into practice without loss; to my knowledge, there are no mines in this state where the mine foreman has not a voice in reference to the manner of conducting the work and the best methods to be employed. In my opinion, the time is past when a superintendent or manager can go on making blunders and piling up costs against the better judgment of a competent foreman and make him shoulder the blame. In practically every case, the blame will revert to the responsible party.

I do not hesitate to say that, in West Virginia, there are some of the best regulated, most uptodate mines in the world, in charge of men who are the equal, in point of intelligent mine management, to any holding similar positions elsewhere. Granting this to be the fact, does Mine Foreman wish us to believe that the position he holds is an undesirable and humiliating one, in general, in the mines of West Virginia? Or, I may ask, in view of these facts, can we accept the assertion that the superintendents and managers who are capable of producing results such as are produced in West Virginia mines, would be capable of making the errors mentioned and laying the blame on the foreman? We must be fair and form our judgment upon the results attained.

My conclusion is that if any mine foreman, in an isolated place, finds himself surrounded by such conditions as are described in this letter as the common lot of every competent mine foreman in West Virginia, either he is a man not worthy of the name or position; or he is in the wrong place, in which case I would advise him to *"Beat it and beat it quick."* Judging from my own experience as mine foreman and superintendent, it would be hard to find two mine foremen in charge of mines in one district who are forced to work under conditions such as are here described.

SAMUEL M. MCMAHON, Supt.,
West Virginia-Pittsburgh Coal Co., Mine No. 4.
Wellsburg, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Pressure Due to Box Regulator—The primary effect of the regulator is to increase the pressure on its intake side, by obstructing the flow of air in the airway or split that it controls. This increase of ventilating pressure is necessary to accomplish the desired increase of circulation in another airway, which remains open or unobstructed and which, for that reason, is called the **"free split."**

The increase of pressure is the pressure due to the regulator ;and is equal to the difference between the natural pressure of the free split and that of the split in which the regulator is placed, calculated for the required distribution of air. For example, in the illustration previously given, the natural pressure required to circulate 30,000 cu.ft. of air in Split C was 13.89 lb. per sq.ft., while that required to circulate 20,000 cu.ft. in Split A was only 2.17 lb. per sq.ft. The pressure due to the regulator in Split A is, therefore,

$$13.89 - 2.17 = 11.72 \text{ lb. per sq.ft.}$$

Velocity of Air Passing Regulator—The velocity of the air flowing through the regulator is determined by the difference of pressure on its two sides or the pressure due to the regulator. This velocity is calculated from the well known formula

$$v = \sqrt{2gh}$$

In the case of a regulator, the pressure head is equal to the pressure (pr) due to the regulator, divided by the weight of 1 cu.ft. of air ($w = 0.0766$ lb.); and taking $2g = 2 \times 32.16 = 64.32$ ft. per sec., the theoretical velocity of the air due to this pressure is

$$v = \sqrt{\frac{64.32\ p_r}{0.0766}} = say\ 29\sqrt{p_r}$$

By this formula, the theoretical velocity corresponding to the pressure due to the regulator in Split A, referred to above, is

$$v = 29\sqrt{11.72} = 99.28 \text{ ft. per sec.}$$

Quantity Passing Regulator—Owing to the vena contracta, at the opening in a box regulator, the effective area of the opening is only 0.62 of the actual area A; and the quantity (Q), in cubic feet per minute, passing through the opening, is

$$Q = 60\ (0.62\ A\ v) = 37.2\ A\ v$$

Or, substituting the value of v, as given above,

$$Q = 37.2 \times 29\ A\sqrt{p_r} = 1078\ A\sqrt{p_r}$$

Or, since $p = 5.2$ w.g.

$$Q = 1078\ A\sqrt{5.2\ w.g.} = 2460\ A\sqrt{w.g.}$$

Area of Opening, Box Regulator—The area of the opening required to pass any given quantity of air, in splitting, is found by solving the last formulas given above, with respect to A, as follows:

$$A = \frac{Q}{2640\sqrt{w.g.}} = \frac{0.0004\ Q}{\sqrt{w.g.}}$$

The Coal Age Pocket Book

Example—Calculate the size of opening in each of the regulators in Splits A, B and D, in the illustration previously given where the required circulation was as follows:

	Required Circulation	Natural Pressure	
Split A,	20,000 cu.ft.;	2.17 lb. per sq.ft.	Regulator
Split B,	40,000 cu.ft.;	11.55 lb. per sq.ft.	Regulator
Split C,	30,000 cu.ft.;	13.89 lb. per sq.ft.	Free split
Split D,	10,000 cu.ft.;	2.98 lb. per sq.ft.	Regulator

Solution—The first step is to find the pressure due to the regulator and reduce that to water gage, in each case. The pressure due to the regulator is found by subtracting the natural pressure for the given split from that of the free split, which is always the one having the greatest natural pressure. Thus,

	Pressure Due to Regulator	Water Gage
Split A,	13.89 — 2.17 = 11.72 lb. per sq.ft.;	11.72 ÷ 5.2 = 2.25 in.
Split B,	13.89 — 11.55 = 2.34 lb. per sq.ft.;	2.34 ÷ 5.2 = 0.45 in.
Split D,	13.89 — 2.98 = 10.91 lb. per sq.ft.;	10.91 ÷ 5.2 = 2.10 in.

Substituting these values for the water gage due to regulator in the formula for finding the area of opening,

Split A, $$A_a = \frac{0.0004\ Q}{\sqrt{w.g.}} = \frac{0.0004 \times 20{,}000}{\sqrt{2.25}} = 5.33 \text{ sq.ft.}$$

Split B, $$A_b = \frac{0.0004 \times 40{,}000}{\sqrt{0.45}} = 23.85 \text{ sq.ft.}$$

Split D, $$A_d = \frac{0.0004 \times 10{,}000}{\sqrt{2.10}} = 2.76 \text{ sq.ft.}$$

Use of the Door Regulator—In the use of the door regulator, the same general formulas apply, except that in estimating the quantity of air that will pass the regulator, for a given gage or pressure; or the area of opening necessary to pass a given quantity under such gage, no allowance should be made for vena contracta, which gives the following:

Quantity of air passing through an area of opening A, under a water gage w.g.,

$$Q = 3960\ A\sqrt{w.g.}$$

Area of opening required to pass a quantity of air Q, under a water gage w.g.,

$$A = \frac{0.00025\ Q}{\sqrt{w.g.}}$$

Example—What must be the width of opening of a regulator door where the height of the entry is 5 ft. in the clear, in order to pass 40,000 cu.ft. per min., if the natural pressure for the required circulation produces a water gage of 1.25 in. for this split and 1.75 in. for the free split?

Solution—The difference of pressure, in this case, is equivalent to a water gage of 1.75 — 1.25 = 0.50 in.; hence,

$$A = \frac{0.00025 \times 40{,}000}{\sqrt{0.50}} = 14.14 \text{ sq.ft.}$$

Width of opening, 14.14 ÷ 5 = 2.83 ft., or 2 ft. 10 in.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—If, when you were half through with the examination of a mine, you discovered that a door had been left open, how would you proceed?

Ans.—If the door stood open for any length of time, dangerous condition of the atmosphere in that section of the mine may be expected. To close this door at once would be to throw a large quantity of gas out into the return airway. Before doing this, the precaution should be taken to safeguard the return air current and any other sections of the mine that may be affected by the closing of the door. The fireboss should make certain that no one will enter the return current after the door is closed. Having done this, he should proceed with caution.

It would be better to partially close the door, at first; and, following the intake current, proceed to examine the first chambers in this section of the mine. Every chamber and every void place or cavity in the roof should be carefully examined for gas, and where necessary, brattices should be erected to clear away any accumulation of gas in these places. Finally, close the door completely and continue the examination. The entire section must thus be carefully inspected to make sure that there are no accumulations of gas left behind. No open light should be taken into this section of the mine while the examination is being made, as a slight fall of roof might drive the gas back and cause disaster. If the condition of this section of the mine is found to be dangerous, no men should be permitted to enter the mine or work in other sections until the danger has been removed.

Ques.—Name six essential features of a safety lamp for testing purposes.

Ans.—A lamp to be used solely for the purpose of testing for gas should possess the following requirements:

1. The lamp should be simple in construction and consist of as few parts as possible.

2. The lamp should have a free upward circulation of air in the combustion chamber. This is necessary to avoid any tendency of the flame to smoke and to insure the same condition of the atmosphere within the combustion chamber as exists outside and surrounding the lamp.

3. To insure sufficient protection against strong air currents, a testing lamp should be provided with a suitable shield; and, to further protect the upper portion of the lamp chimney from the transmission of flame, all testing lamps should be provided with a double-gauze chimney, and all openings below the flame should likewise be protected with double gauze.

4. To insure uniform results in testing, it is preferable to burn a nonvolatile oil in the lamp. Sperm or cottonseed oil gives the best results. A volatile oil, as naphtha or alcohol, gives a slightly increasing flame cap as the lamp heats in gas, owing to the freer volatilization of the oil.

5. The gauze of the lamp should be of standard mesh (784 openings per sq.in.); and the diameter and height of the chimney should be such as to give a sufficient volume within the combustion chamber of the lamp to insure safety. The volume of the combustion chamber should neither be too large nor too small, to overcome the effect of possible slight explosions within the lamp, which occasionally occur when a bonneted lamp is exposed to sharp gas.

6. The lamp should be thoroughly clean and free from obstructions of any kind that would prevent the free circulation of the air and gases passing in and out of the lamp.

Ques.—A sinking bucket is 4 ft. 6 in. deep, 3 ft. 3 in. in diameter at the top and 2 ft. 9 in. at the bottom. What is the cubical contents of the bucket, and what weight of water will it hold?

Ans.—The diameter of the bucket being greater at the top than at the bottom, the cubical contents is calculated in the same manner as the frustum of a cone. Thus

$$vol. = \frac{0.7854\ h}{3}\ \frac{(D^3 - d^3)}{(D - d)}$$

$$= \frac{0.7854 \times 4.5}{3}\ \frac{(3.25^3 - 2.75^3)}{(3.25 - 2.75)} = 31.88\ cu.ft.$$

Taking the weight of 1 cu.ft. of water as 62.5 lb., the total weight of water this bucket will hold is $31.88 \times 62.5 = 1992.5$ lb.

Ques.—A drift is driven, with a dip of 3¾ in. to the yard, a distance of 455 yd., into a hill; the sidehill rises 5¾ in. to the yard. What would be the depth of a vertical shaft sunk to reach the end of the drift, and how far up the hill would the shaft be required to be located?

Ans.—The question does not state whether the inclination is given in inches per yard of *horizontal* measurement or per yard of *inclined* measurement. The calculation is simplest, assuming that all measurements are horizontal; but the results will be somewhat different if it is assumed that the inclination is per yard measured on the incline.

Assuming horizontal measurement, the dip being 3¾ in. and the rise 5¾ in. per yd. of horizontal distance, the increase of depth from the surface to the seam is $3\frac{3}{4} + 5\frac{3}{4} = 9\frac{1}{2}$ in. per yd. The total depth of the shaft, in this case, is $9\frac{1}{2} \times 455 \div 12 = 360.2$ ft. The horizontal distance from the mouth of the drift to the location of the shaft is then $455 \times 3 = 1365$ ft. The corresponding measurement up the hillside would be 1382.3 ft.

If, however, it is assumed that the inclination is given, *per yard measured on the incline*, it is necessary to calculate both the angle of inclination of the dip and the angle of inclination of the rise, the former being 5° 59′ and the latter 9° 11′. In this case, the depth of the shaft would be found to be 361.7 ft., and the distance measured up the side of the hill, 1375.2+ ft.

Coal and Coke News

Harrisburg, Penn.

In order that the Federal Government provide mine employees with more life saving implements the Mines and Mining Committee at a meeting held on May 4, decided to recommend a bill which provides for 10 additional mine rescue stations and 15 mine rescue cars, the distribution and location to be made be Dr. Holmes, the chief of the Federal Bureau of Mines.

A member of the committee and Dr. Holmes have held several informal conferences relative to this bill, and while no definite arrangement has been made as to the location of these cars and stations, yet it is the belief that at least one, possibly two more cars, will be located in both the anthracite and bituminous coal regions of this state.

It was also decided at the meeting of the Mines and Mining Committee to recommend a bill which will provide for the appointment of a commission, composed of five experts, to codify the mine laws of the country.

It is said the purpose of the commission shall be to gather together the best laws in all states, prepare the same and present them to Congress as a tentative code. Before reaching a final decision, however, the commission will hold public hearings in all the principal mining centers, invite and receive suggestions and opinions bearing upon or relating to existing mining laws, and it may consider the laws and experience of other countries with respect to the disposition and development of mines and mining. It is proposed to have the commission hold a session in Wilkes-Barre, in the anthracite region and at Pittsburgh in the bituminous region. It is stated that the laws must be codified and submitted one year from the date of the passage of the bill. The sum of $25,000 is to be appropriated for expenses.

Answers to Government's Suit Filed

The Lehigh Valley Coal Co., the New York & Middle Coal Field Railroad & Coal Co. and Coxe Bros., & Co., Inc., have filed their answers as defendants in the government's equity suit under the Sherman law for dissolution of an alleged combination acting in restraint of trade.

The Lehigh Valley Coal Sales Co.'s answer has already been filed. The answers deny the charges of restraint of trade made in the government's petition.

The Lehigh Valley Coal Co. in its answer denies that it is engaged in interstate commerce, claiming that it sells its entire product to collieries. Of its holdings in coal lands in Pennsylvania 24,746 acres out of 54,299 acres are located upon the Lehigh Valley R.R. tracks, the coal company of that name admits, but it denies that these properties were acquired under the influence or guidance of the railroad. Its holdings are 19 per cent. of all coal lands upon the railroad's lines, it says, and its total product about one-fifth in amount of the total coal shipments on that railroad. Five of its directors are also directors of Coxe Brothers & Co., Inc., the company further admits.

Contracts made with many other coal operators along the Lehigh Valley R.R.'s lines are admitted to exist, but the main inducement in making them, it is asserted, was to obtain a higher standard of preparation of coal. Direct or indirect fixing of percentage paid under these contracts under published rates of transportation, prejudicial to independent operators shipping upon their own account is denied in the answer.

The company has never paid a dividend, and some years it has lost money the answer says. Prior to 1902 it borrowed from the railroad and on Mar. 1, 1912, it paid 4 per cent. interest on an indebtedness aggregating $10,350,000. But the subsequent retirement of certificates of indebtedness by payments in cash and the railroad's debentures were not transactions to cover rebating, nor was the interest paid unusually low, it is claimed. Denial is also made that money was received through the resale to it of the railroads stock in companies owning coal properties.

Flushing Provides Surface Support

Expressing satisfaction that the plan as put into effect nearly three years ago is the best that can possibly be devised, the Delaware, Lackawanna & Western R.R. Co. does not intend indorsing the plan of the People's Coal Co. made to the Scranton Surface Protective Association for the protection of the surface over its workings.

Frank P. Christian, president of the Peoples Coal Co., has made an offer to safeguard the surface in the business section of West Scranton, if the association withdraws several suits against his company. The Christian offer had the endorsement of many prominent engineers, and an amicable court action is to be started so that the offer may be embodied in a decree.

It is estimated by the Lackawanna people that the plans put into effect by the company about three years ago for the protection of the surface and the repairing of property damaged by mine disturbances have resulted in an expenditure of $1,325,000 by the company. Of this sum a total of $1,200,000 went for flushing the workings, and the remaining $125,000 was expended in the repair of properties damaged by mine disturbances.

It is thought that the worst damage resulting from disturbances in the workings of the Lackawanna company has been done, and that Scranton will not have any repetition of the mine cave damage done over the company's workings in South Scranton. The caves in South Scranton, North Scranton and the twenty-second precinct, were in areas marked in the start by outcroppings of the surface veins, and as the mine workings extended further along the vein a larger stratum of rock that served as a solid protection to the surface was encountered.

The Lackawanna company's plan provides for the flushing of the under-ground workings, the leaving of pillars in places where there are valuable properties on the surface, the repair of which might over-balance the gain made in the mining of the pillars and the repairing of properties damaged by settlings.

It is estimated by the Lackawanna people that 125,000 tons of material are flushed into the workings every month at a cost of $3.24 a ton, or $40,000 a month. This would total $480,000 for a year. Since an agitation about two and a half years ago in South Scranton for the solution of the mine cave problem the Lackawanna company has expended $125,000 in this work.

The flushing process provides for the utilization of rock, slate and other material remaining on the ground or coming from the coal when it is being prepared into market size. The material is broken into fine pieces and mixed with the ashes coming from the boiler plants at the collieries, being flushed by gravity into the veins where the elevation is 100 feet or more below the surface. Also there is much hand-packing of the chambers done, and in many instances pillars, sufficient to support the surface are left in place. This latter plan is followed in congested parts of the city where a cave might result in a property damage that would be so great as to offset the profits to be made in the mining of the pillars.

PENNSYLVANIA

Anthracite

Drifton—The Lehigh Valley Coal Co. has resumed operations on its property below Coxe's Addition, formerly the old Tigers' Park. No work has been done in the stripping for over two months, and a number of new hands have been taken on.

Avoca—On May 8, the earth gave way south of the Laurel Line R.R. tracks, making a depression resembling a submerged ampitheater. The water main burst and the rush of the stream into the mine workings could be heard for some distance. Although the ground was falling away all day it did not reach the houses near by nor did it work any closer to the Laurel Line station. The laborers called were handicapped on account of the steady working of the cave and could make little headway.

Summit Hill—Men working in chute No. 22 in the slope of the No. 4 colliery of the Lehigh Coal & Navigation Co., had driven a hole and discharged a blast on May 4, when an explosion of gas followed. The hole had blown into a pocket of gas, which originated by the close proximity of the Summit Hill mine fire, which has been burning for years. Eight men were overcome by the fumes, but with the aid of pulmotors they were brought around. The mine caught fire and a force of fire fighters were employed in an endeavor to subdue the flames.

Hazleton—The Hazle colliery of the Lehigh Valley Coal Co., which was closed down when the men struck to force a dozen delinquent members of the United Mine Workers into the union, has resumed operations again. As soon as the strike occurred the company ordered a shutdown, which lasted 10 days.

Tamaqua—More than 4000 members of District No. 7, United Mine Workers of America, attended a mass meeting here on May 3, and $1000 was donated to the cause of the Western miners. It is expected sub district No. 1 of Tanaqua and the Panther Creek Valley will contribute $5000 or more in a short time.

Norristown—The Lehigh Coal & Navigation Co., the Lytle Coal Co., and the Philadelphia & Reading Coal & Iron Co. were each sued for $7500 damages on May 7 by Annie R. Anderson, a farm owner in lower Providence township, for alleged injuries to her land, pasturage, growing crops and water rights. Mrs. Anderson in her statement asserts that the defendants, in operating their mines, discharge into the Schuylkill River large quantities of coal dirt, mining refuse, culm and muck, and when the river is high, this is carried onto her farm, doing damage to the soil and crops.

Shenandoah—A breaker, owned and operated by the William Nicewinter Coal Co. collapsed on May 4, because of a mine cave. The men and boys employed in the building had just enough warning to allow them to jump through the numerous windows or crawl through the topway, or head plane. Many were bruised, but none seriously injured.

McAdoo—The Grand Jury of Schuylkill County on May 5 returned an indictment against the Lehigh & Wilkes-Barre Coal Co. on a charge of violating the law passed by the recent legislature, known as the "Lenker Docking Law," which requires the keeping of a record of the number of cars of coal mined at the company's chutes. This is the first time on record where a corporation has been criminally indicted on such a charge. The alleged offense occurred at McAdoo, and the officials of the colliery who are the only officers of the Lehigh & Wilkes-Barre Coal Co., in Schuylkill County, will be the defendants. Alexander Bonus, a miner, is the prosecutor.

Springfield—Fires on mountains surrounding this place are approaching numerous collieries of the Philadelphia & Reading and Mineral R.R. & Mining Co. Large numbers of workmen on May 4 started fighting the flames, which have destroyed a large amount of valuable timber.

Bituminous

Smithfield—The tipple at one of the mines of the Republic Iron & Steel Co. collapsed several days ago. No cause is given by the management for the accident. The damage was slight and will soon be repaired. Three men were hurt by being caught by falling timbers.

Fairchance—Options are being secured on the Freeport vein of coal all through this section. It is said that all the territory from Fairchance to Point Marion will be canvassed, and that it is expected to get from 20,000 to 25,000 acres. A. M. Frederick, Sr., of Fairchance, is securing the options. It is understood that papers have already been signed for about 16,000 acres. The price named in the options is $50 per acre. The Freeport vein is from 4 to 6 ft. thick. The coal is high in sulphur and has to be crushed and washed before it will make good coke.

Uniontown—Sheriff Martin A. Kiefer, of Fayette County, amicably settled the strike at the Herbert plant of the Connellsville Central Coke Co. recently. He explained that the trouble was due to a misunderstanding and the men agreed to return to work. The plant was practically shut down with the exception of the boiler room, which was kept in operation by the clerks of the office who volunteered to act as firemen. In this way, the pumps were kept running, and the mine kept free from water.

Punxsutawney—After over a month's idleness, the Clearfield Bituminous Coal Corporations mines at Rossiter, started work May 7. Work was also resumed at the Yatesboro, Lucerne and Jacksonville mines of the Rochester & Pittsburgh Coal & Iron Co.

Braddock—A resumption in coal mining operations in this district upon a large scale is contemplated by all the leading coal mining companies. Inquiries for coal from consumers who had stocked up in anticipation of a strike after Apr. 1 have begun. It is also expected that lake coal will be moving by the middle of the month, which will still further increase activity.

Clearfield—By a large majority the 30,000 miners in this field have voted to accept the 1912 scale of wages, which the operators have agreed to, and this scale will under the vote continue in force until Apr. 1, 1916. There will be no strike in this field, therefore, on the question of wages, although for a time this was regarded as inevitable.

WEST VIRGINIA

Charleston—According to estimates made by the Public Service Commission, based on the reports of the Eccles disaster now available, the state will pay to dependents of miners killed there during the coming year about $2200 per month from the workmen's compensation fund. Each of the 85 widows will receive $20 a month, with $5 additional for each child under 15 years old. Besides this the state will pay the funeral expenses of the men killed, making a substantial lump sum to be disbursed from the fund at once. It is stated that the fund is ample to meet this rather severe test, however, and that there will be and has been no delay in meeting the demands made upon it.

Members of the local unions of the United Mine Workers in the Kanawha district must either return to work pending negotiations for another wage agreement between the coal operators and miners or surrender their charters as members of the national organization. Under these conditions many of the men are returning to work.

Bluefield—The Federal Court convened on May 6 found Sam Tabor and William Thomas not guilty of peonage charges and similar charges preferred against W. J. Pritchard and the Thomas Coal & Coke Co. were dismissed. The government agents who worked the case up claimed to hold absolute proof of the defendants detaining four men who were brought to the W. H. Thomas Coal & Coke Co. works on transportation and were there detained because of their refusal to work out the amount of this indebtedness. The decision is held to signify in a general sense that men cannot avail themselves of such transportation facilities to get over the road and then beat the company bringing them in.

Eckman—Thieves recently entered the offices of the Pulaski Coal & Iron Co., unlocked the safe, and escaped with over $300. From what could be learned of the robbery, it appears that this money had been in the post office, and there being no safe in this building, it was removed to the offices of the Puaski Coal & Iron Co., and placed in the safe. No arrests have yet been made.

Wheeling—The Whitaker-Glessner mines resumed work May 7, the management having signed the run of mine scale in which the pick mining is 71.37 cents and the machine scale 49.64 cents.

Parkersburg—The Big Creek Development Co., has filed against the local internal revenue agent a suit for $20,000 damages, in order to test the 1 per cent Federal tax on corporate incomes.

ALABAMA

Indio—The suit between the holders of $69,000 worth of the De Soto Coal Mining and Development Co.'s bonds and R. A. Porter, trustee, is being heard before the referee in bankruptcy. The original bond issue was for $75,000, of which $6000 has been redeemed.

KENTUCKY

Louisville—Last week saw representatives of the mine owners of the Western Kentucky field and representatives of their employees meeting at Louisville in another futile effort to reach an agreement as to their differences over the wage question. After several days of negotiations the conference was adjourned to give time for each side to confer on suggested compromises. Some 32 mining companies and 6000 employees are directly concerned in the settlement of the dispute, with probably as many more mining companies not affiliated with the operator's organization but which nevertheless are practically bound by whatever agreement is reached.

OHIO

Martins Ferry—The first reports of anything bordering on violence in connection with the strike of Ohio miners were received in Bridgeport, when it was reported to the police by railroad men that bricks and stones had been hurled through the cab windows of locomotives hauling West Virginia coal to the Lakes while the train was passing through Crescent. No railroad men were hurt, but it is expected steps will be taken to protect the men and the trains in the future.

Expectations are entertained in this sub-district that settlements will be made in the Hocking and one or two other districts in Ohio within a few weeks. This is expected to improve the chances for a local settlement. Once the mines in other fields are working, it is believed that it may have some effect on the operators in this locality, although it is realized that West Virginia coal is being quoted in Cleveland at a price lower than eastern Ohio coal can be placed on the cars without considering the freight.

Coshocton—Work has been started by Charles E. Wells and others to reopen the old Black Diamond mine, located at Hardscrabble, near Coshocton. The mine was in operation 40 years ago but was later abandoned. A portion of the entry had caved in.

INDIANA

Indianapolis—The International Executive Board of the United Mine Workers of America adjourned May 8 after being in session for several days discussing the condition of miners, especially those in Colorado, Ohio, and West Virginia. The Board issued a statement advising against a general strike, but affirming in strong terms its support for the striking miners of Colorado.

Terre Haute—Approval of the report of the sub-scale committee by the joint convention of miners and operators on May 7 averted a threatened strike in Indiana, and provided for a contract for two years. Concessions were made by both miners and operators.

Petersburg—Fire destroyed the tipple at the Winslow coal mines near here recently. It is supposed that the origin was accidental. These mines have not been operated for some time and the property was recently sold to the Ingle Coal Co., which owns and operates the mines at Ayreshire.

Sullivan—The Stockton school township, of Greene County, has brought suit against the Vandalia Coal Co. for $9000 damages for trespass and damage to real estate alleging that the company mined the coal from under a school building, and damaged the building and property.

Brazil—An accident in the Lost Creek Mine of the Vandalia Coal Co. near here, recently put 300 miners out of work for a few days. The cage was hoisted before a car of coal had been securely placed upon it, and part of the timbers of the shaft were torn out and the cage practically demolished.

ILLINOIS

Canton—The Simmons coal mine, north of Canton, opened May 4, with a full force of men.

Springfield—Judgment against the Auburn & Alton Coal Co. for $234.87, in favor of the Commercial Electric & Supply Co. was recently entered by Judge Creighton in the Circuit Court. The defendant failed to answer a bill asking for a payment on a running account.

Farmington—The Nickle Plate coal mine which was to start work recently, was examined the day before that set for the beginning of operation and found to be full of black damp. When the men and mules left the mine on Mar 31, the fans were stopped, and the gas began to accumulate. It is believed that a fall of roof has obstructed the circulation of the air.

Edwardsville—The City Coal Co., of Edwardsville, has turned its lease on Mine No. 3 over to the owners, the Edwardsville Coal Co., which is considering converting the property into a large coal yard. The mine has been operated for 35 years.

ARKANSAS

Fort Smith—A representative of an English syndicate is reported to have established headquarters at Fort Smith, and secured options on thousands of acres of coal lands in Arkansas and eastern Oklahoma. The plan of the syndicate, said to be capitalized at $10,000,000, is to develop the land, marketing its coal largely at the Panama canal.

Bates—The Packard Coal & Coke Co. has closed down its mine, as the result of a disagreement with the miners.

Russellville—The Southern Anthracite Coal Co.'s mine at Russellville resumed operation May 6, after having been closed for a few days, following an inspection by Thomas Shaw, state mine inspector. Mr. Shaw objects to the system of driving entries in the mine, and by agreement it was decided to allow the Circuit Court to settle this question. This mine employs about 400 men.

KANSAS

Pittsburg—Two score operators and representatives of railroads held their semi-annual meeting at Pittsburg, Kan., recently to discuss the handling of cars during the coming summer and fall. The operators and railroad men meet twice a year for the purpose of planning expeditious handling of coal.

OKLAHOMA

Bartlesville—The decline in the oil market has renewed interest in the development of coal and other minerals found in Washington County, and it is probable that by fall, work will be well under way and that shipments will be made. A rich deposit of coal has been discovered in the northern part of the county, and a large number of leases on land have been executed. It is believed that actual development will start in a short time.

PERSONALS

Martin Clark, of McAllister, Okla., has announced himself as a candidate for nomination for the office of chief mine inspector subject to the approval of the August Democratic primary.

B. E. Purser recently appointed general superintendent of the mines of the Woodward Co., it is reported will have complete supervision of all the mines in both ore and coal divisions.

W. H. Soper, of Winchester, Ky., has been made general manager of the Wolf Valley Coal Co. This is the property recently sold by Hon & Tomlinson, of Winchester, to the Wolf Valley Company.

John J. Shannon has accepted an important position with the Woodward Iron Co., his title being assistant to the vice-president. He will have charge of the furnace operation at Woodward and Vanderbilt plants.

Hywel Davies, business manager of the Kentucky State University, formerly a coal operator in Kentucky, has left for Colorado where, as one of the mediators in the mining dispute in that state, he will seek to discover a solution of the industrial trouble.

R. H. Gillespie, of Vinita, Okla., and Andrew Voyles, of Woodley, Okla., have secured leases on 10,000 acres of coal lands near Bluejacket, Okla., following the discovery of promising coal deposits. A five-foot coal bed was found near Bluejacket at a depth of 341 feet.

G. W. Hill, general manager of the Virginia-Kentucky Fuel Co., of Cincinnati, who has been suffering for several weeks with an illness resulting from overwork, has gone to French Lick, Ind., to take a course of treatment and to rest up, in the hope of regaining his health shortly.

Ivor Thomas, a prominent hotel man of Boswell, Penn., has purchased a 200-acre tract of coal between Boswell and Ralphton, and will open a mine within a short time, other openings to be made as business may warrant. It is the intention to ship 1000 tons of coal daily to the eastern market.

A. J. Baggs, sales representative and W. H. Bines, mechanical engineer, have severed their connections with the Watt Mining Car Wheel Co., of Barnesville, Ohio, and will engage in the same line of business at Huntington, W. Va. Mr. Baggs has completed 20 years, and Mr. Bines 14 years of service with the Watt Co.

W. H. Cunningham, secretary of the Kentucky Coal Mine Owners Association, has established in his office a sort of clearing house for information on the new Kentucky Workmen's Compensation law. Mr. Cunningham has announced that he will be glad to supply not only mine operators but all other employers of labor with any information on the subject that is available.

John A. Bell has been elected the president and a director of the Carnegie Coal Co., of Pittsburgh, succeeding R. P. Burgan. Mr. Bell is best known as a successful banker in Pittsburgh and western Pennsylvania, but he has had much to do with the development of the coal industry in the Pittsburgh district. R. P. Burgan who he succeeds is retiring from business after many years of activity. He will make a trip abroad this summer, spending some time at Cornwall, England, where he was born.

Frank D. Rash, vice-president and general manager of the St. Bernard Mining Co. in the Western Kentucky field with headquarters at Earlington, has been elected first vice president of the Kentucky Manufacturers & Shippers Association. In that capacity he is taking a prominent part in the efforts of that organization to find a solution of the present fire insurance tangle in Kentucky, foreign companies having withdrawn after the passage by the last Legislature of a law incresing the powers of the State Rating Board.

OBITUARY

John W. Tully, a mine foreman in the Sugar Camp mine, Caperton, W. Va., and one of the most popular miners in the New River field, was electrocuted when he came in contact with an overhead wire while standing on a piece of sheet iron engaged in repairing a mine motor. He was 38 years old.

William H. Cochran, 56 years of age, a well known coke and coal operator, died recently at Dawson, Penn., following several weeks' illness from carbuncle and erysipelas. His death occurred almost 71 years to a day after his father, James Cochran, disposed of the first coke ever sold for money. Mr. Cochran was a part owner in the Washington Coal & Coke Co., and also had coal holdings in West Virginia, being a promotor of the Cosmopolitan Coal Co., of Braxton. He was well and favorably known throughout Fayette County, and has spent practically all his life in and near Dawson. He is survived by his wife, four children, and three brothers.

CONSTRUCTION NEWS

Pineville, Ky.—The Pioneer Coal Co. will soon begin the erection of a large commissary in its camp at Kettle Island. The company will also put up a number of new miners' homes.

Flat Rock, Ky.—The Kentucky Coal & Iron Co., which recently purchased the Coger mines near here, is preparing to install modern machinery, including electric cutters and motors. The power house is now in course of construction.

Penny, Ky.—The Penny Coal Co. is proceeding with the construction of a mining camp and plant to have a monthly capacity of from 35,000 to 40,000 tons. John G. Smith is manager.

Webb, Ohio—Improvements costing in the neighborhood of a quarter of a million dollars have been completed at the Webb Mine, at Webb, formerly called Lashley Station, in the southern part of the county. The mine is now ready to start operations as soon as the mines of the state resume work.

Columbus, Ohio—It is learned from a reliable source that the Hocking Valley Ry. Co. is planning to double-track its line from Columbus to Toledo as soon as the financing can be done. The improvement is to be made, it is said, to take care of the added traffic when the Chesapeake & Ohio connects with the Hocking Valley at Portsmouth.

New Orleans, La.—If a project now being considered by New Orleans capitalists materializes immense coal yards will be established along the New Basin Canal, and the barges of the Alabama & New Orleans Transportation Co. will be enabled to discharge cargoes of coal direct from the Warrior River fields of Alabama in the heart of New Orleans.

Grafton, W. Va.—It is understood that the Austen Coal & Coke Co. will shortly rebuild its tipple and plant, which was burned down a few weeks ago with an estimated loss of $25,000. It is said that preliminary work has already been started and that active preparations to rebuild the entire plant are now under way. It is believed that the new plant will be somewhat larger than the old one.

Chattanooga, Tenn.—The Durham Coal & Iron Co. expect soon to begin the construction of the proposed coke-oven plant, which was recently decided upon. The company's engineers are preparing a plan and specifications, and a site will soon be chosen. The company has decided to undertake this construction work with its own engineers in charge. Approximately one million dollars will be invested, the ovens being built in blocks of 30 and 60, with a view to future additions.

Columbus, Ohio—The announcement is made that within a few weeks ground will be broken for a 40,000-hp. power plant to be erected at Floodwood, midway between Nelsonville and Athens, Ohio for the purpose of supplying coal mines in the Hocking Valley with electrical current. The project is backed by English capitalists and the construction will be under the charge of F. C. Elliott, of Chicago. Herman Hamper, formerly of Columbus, will be engineer in charge of construction.

Winchester, Ky.—In the way of railroad building into coal lands, work is progressing rapidly in the construction of the Winchester-Irvine extension of the Louisville & Nashville to Dry Fork, at which point the steel for a bridge is being delivered. It is expected that the bridge will be in condition for traffic in a few weeks, when construction beyond that point will be begun and track laying pushed through to upper Howard's Creek, where another bridge will be necessary. Gangs operating from the other end will meet the Winchester crew at Red River, where a large bridge is to be erected. Much coal land will be opened up by this road, and more than six miles of new sidetracks have been built in the southeastern section of this city to handle the increased volume of traffic that will result from the new line.

NEW INCORPORATIONS

Ashland, Ky.—The Buffalo Creek Coal Co., with a capital of $50,000, has been incorporated by J. W. M. Stewart, K. M. Fitzgerald and L. S. Wilson.

Harlan, Ky.—The Kentucky-Harlan Fuel Co., with an authorized capital stock of $80,000, has filed articles of incorporation. The incorporators, each of whom holds three shares of stock, are Homer C. McLellan, F. D. Keithly, and Charles Oestrich.

Harrisburg, Penn.—Charters were issued on May 4, for the Grazier Coal & Coke Co., and the Grazier Coal Mining Co. These concerns are capitalized at $200,000. It is expected that in the near future an output of 1000 tons per day will be secured from the mines of these companies at Foustwell, where the operations of the Somerset and Cambria Coal Co. have been purchased by the newly chartered organizations, which are also purchasing additional lands in that section.

INDUSTRIAL NEWS

Columbus, Ohio—A company is being organized in Columbus, Ohio, to make concrete posts suitable for mine supports. The concrete comes in blocks with concave surfaces on both ends.

Steubenville, Ohio—Because of the breaking of a shaft, on the towboat "Cruiser" on the Ohio River recently, four coal barges were crushed and a large amount of coal was thrown into the river.

Springfield, Ill.—The Chicago & Alton R.R. has put on a night shift to handle the apparatus used in picking up stored coal in North Springfield. All of this coal will be removed from storage by June 1.

Wellston, Ohio—The W. H. Warner Coal Co. is planning the purchase of a new mine on the Hocking Valley R.R. and is also arranging to sell the entire output of the Wellston Coal Co.'s mine at Wellston.

Philadelphia, Penn.—The April anthracite shipments totaled 6,072,164 tons against 5,966,189 tons in April of 1913. For the four months ended Apr. 30 shipments were 20,534,050 against 22,886,065 for the same period of the previous year.

Chicago, Ill.—The freight tariff proposed by the Chicago, Burlington & Quincy and the Rock Island railroads advancing rates on coke from Chicago and other Illinois points to St. Paul was suspended recently by the Interstate Commerce Commission until Aug. 30.

Williston, N. D.—Uncle Sam not only owns a railroad in Idaho, but also owns and operates a coal mine in North Dakota, near Williston. The coal is mined to supply fuel for a power plant, which furnishes electricity for a pumping station at a nearby irrigation plant.

Pittsburgh, Penn.—Five towboats of the Monongahela River Consolidated Coal & Coke Co.'s fleet left the Pittsburgh harbor May 7, with a combined tow of 65 towboats, 25 barges, and one freight barge, aggregating 1,720,000 bu. of Pittsburgh coal. This is said to be the largest shipment for one day in recent years.

Estevan, Sask.—The experiments by the Government of Saskatchewan in the carbonizing of the soft coals which are found in the province are being conducted in this village. The result of the tests so far made has proved highly satisfactory, and it is expected that the carbonized coal will shortly be placed on the market at about $5 per ton. It is claimed that by the carbonizing process, the heat value of the fuel is brought up to the standard of Pennsylvania anthracite. Briquettes will also be manufactured under the new process.

Chicago, Ill.—The Gun-crete Co. has opened its new offices in the McCormick Building, Chicago. This firm specializes in cement-gun work for engineering, industrial and mining structures, and has at its disposal a large amount of the most modern cement-gun euipment, and an efficient working organization. Carl Weber, president of this firm, is one of the best known concrete engineers in America, being the inventor of the reinforced-concrete chimney, of which thousands have been built in this and foreign countries. He has been connected with cement-gun operation for some time, and is considered to be one of the leading experts in this line of work.

Coal Trade Reviews

General Review

Steam grades of anthracite beginning to crowd the storage bins, but domestics still continue in fair demand. Bituminous coal absorbed very slowly, curtailment on contracts being the rule and consumers very critical as to quality. Heavy concessions on prompt business.

The domestic grades of hard coal are about normal for this period of the year, but the steam sizes are beginning to crowd the storage bins, and individuals are offering substantial discounts to keep these grades moving. Shipments are going forward to the distributing center somewhat more freely, and the agencies are beginning to quietly look around for orders. The demand generally is centering on stove coal which size is bringing a premium all along the line. With large stocks of anthracite in the Northwest the Lake opening is the slowest in the history of the trade. From the generally adverse conditions it is probable that curtailed mining will have to be practised before the summer is over.

Bituminous stocks are large in every direction, while contract consumers are holding producers down to minimum deliveries, and each week sees the business becoming lighter. The month's suspension in mining failed to create the anticipated gap in the supply, and there is no impetus of any kind in the trade, while consumers are becoming very critical regarding quality. Buyers refuse to be interested under any consideration, while shipments are absorbed very slowly, and then only at low figures. In fact the trade seems to be settling down to the lowest point for a number of years.

Surplus stocks in the Pittsburgh district have not been liquidated, and the demand is considerably off; railroad consumption is light, and manufacturing much below normal. Prices are firm on contracts, but heavy cuts are offered on spot business, although such business is so light that it is of little consequence; lake shipments amount to practically nothing, and production is at 40 per cent. capacity. There is some West Virginia coal moving into Ohio, but it is in poor demand, as consumers still seem to be heavily stocked. The return of the miners in the Kanawha district eliminated the possibility of obtaining relief through a general suspension in that district. Negotiations for another conference on the Ohio wage scale are now being arranged for. The quotations at Hampton Roads are being maintained on export business, but there are persistent rumors of concessions being made on coastwise shipments to New England. The past week witnessed a heavy dumping, and the accumulation at some piers is below normal.

The renewal of the wage scale on the same basis as the old one in Indiana is the feature of the Middle-western situation; this has relieved whatever apprehension there was regarding a shortage, and both production and buying have eased off still further. There is practically no demand for domestic coal, dealers showing no disposition to undertake the customary summer stocking, because of the adverse financial situation. A few contracts are being closed up, and it is expected that some of the large railroads may be in the market shortly.

EASTERN MARKET

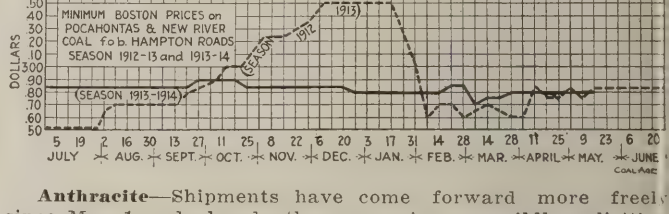
BOSTON

The lightest week of the season thus far. Consumers who failed to contract early, buy now from hand to mouth. Market cargoes absorbed very slowly. Marine freights unfavorable to Pennsylvania coals. Georges Creek mines under short time. Anthracite shippers seeking orders.

Bituminous—No improvement can be reported in the generally dull situation. The week past has been perhaps the very lightest of the season so far; almost no new business has been taken on and large consumers are holding down their shippers to minimum deliveries. Practically all the buyers now who did not make purchases early are buying only from hand to mouth, confident they will be able to make more advantageous arrangements in mid-summer.

There is no change in prices on Pocahontas and New River, although what few sales are made are on a delivered rather than an f.o.b. basis. Cargoes destined for inland distribution are absorbed slowly and then only at low figures. Stocks are large in every direction.

Marine freights from Philadelphia prevail rather higher than from Hampton Roads and this condition makes hard going for the Pennsylvania grades that sell only 5@10c. less f.o.b. than Pocahontas and New River. Consumers are extremely critical in such a season and the Pennsylvania coals are likely to lose some of the tonnage they gained last year and the year before. All-rail, the demand is only a shade better. Georges Creek shippers are succeeding in placing their current output which is somewhat curtailed. The New River shippers have made some inroads on Georges Creek tonnage this year and the aggregate is likely to be considerable.



Anthracite—Shipments have come forward more freely since May 1 and already the companies are mildly soliciting new orders. Stove size is short at all the loading ports and consignees are now being restricted to a third and in some cases a fourth of a cargo in conjunction with other sizes. The weather is warm and the only retail business is with trade that is willing to fill up for next season.

Bituminous prices at wholesale are about as follows:

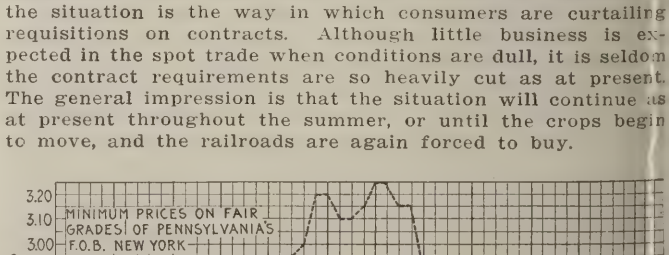
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.95@1.50	$1.20@1.60	$1.67@1.77	
Philadelphia*.....	2.20@2.75	2.45@2.85	2.92@3.02	
New York*.....	2.50@3.05	2.75@3.15	3.22@3.32	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	.....	$2.80@2.85
Boston†.....	.....	.....	.....	3.55@3.78
Providence†.....	.....	.....	.....	3.50@3.73

* F.o.b. †On cars.

NEW YORK

Heavy curtailment on bituminous contracts. Trade settling down into a dull summer. Anthracite steam grades weak, but domestics approximately natural for this season. Curtailment in mining in sight.

Bituminous—The curtailment in the movement of soft coal has become so general that there scarcely seems to be any business negotiated at all. There is no demand in any direction, and market observers are slowly becoming convinced that the trade is settling down into one of the worst summer seasons for many years. One of the most serious features of the situation is the way in which consumers are curtailing requisitions on contracts. Although little business is expected in the spot trade when conditions are dull, it is seldom the contract requirements are so heavily cut as at present. The general impression is that the situation will continue as at present throughout the summer, or until the crops begin to move, and the railroads are again forced to buy.



Prices, as a rule, are holding remarkably well, considering prevailing conditions. Odd tonnages of demurrage coal are, of course, being forced on the market at heavy sacrifices, one sale being reported down to $1.80 at tidewater. But aside from such abnormal business, the circular quotations are still generally held as follows: West Virginia steam, $2.50@2.60;

fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—It is reported at some points that hard coal is also feeling the effects of the general retrenchment in industrial circles, particularly in the steam grades, but it is generally felt that the market is approximately normal for this period of the year. The demand is still centering on stove coal, which is about the only grade commanding a general premium all along the line, individuals readily obtaining 10c. per ton above the regular circular here. Egg coal is in steady demand, although occasionally selling off to avoid demurrage. In Manhattan, chestnut is absolutely flat, and impossible to move, but Brooklyn dealers are taking some in order to get an allotment of stove coal with it; in an ordinary straight transaction involving chestnut alone, it is difficult to move at 20c. off the circular. With a good demand in the West, it is difficult to understand why so much of that grade is being sent into this market.

Pea coal is selling down to between 20 and 30c. off the circular, where individuals are forced into the market to avoid demurrage. The depressed situation ruling on pea and chestnut at tidewater is due to the sharp falling off in the line trade. Low-grade No. 1 buckwheat has sold as low as 30c. off the circular; high grades are still in fair demand, but are selling off 15c. The high-grade barleys are down to 10c. off the circular, with the lower grades as much as 40c. off.

Indications generally point to a poor summer business in anthracite. It seems probable that it may even be necessary to practice some curtailment in mining, and even then the outlook is not any too cheerful. Quotations are now ruling at the following rather low level:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.70	$4.70	$4.65	$4.65
Egg	4.95	4.90@4.95	4.90	4.80@4.90
Stove	4.95	4.95@5.05	4.90	4.90@5.00
Chestnut	5.20	5.00@5.20	5.15	4.95@5.15
Pea	3.55	3.30@3.55	3.45@3.50	3.20@3.45
Buckwheat	2.80	2.75@2.80	2.50@2.75	2.15@2.75
Rice	2.30	2.30@2.40	2.00@2.25	1.75@2.25
Barley	1.80	1.70@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Anthracite outlook favorable for May. Mining still at full capacity. Steam sizes flat and considerable going into stock. Bituminous market dull, with prospects poor. Prices and demand at low ebb.

Anthracite—With the first half of May gone, the prospects look favorable for good business until its close, on the steam sizes, which are already crowding the storage bins of the large operating companies. This is no unusual feature, as spring and summer always finds these sizes in excess, and while the individuals create a market by making concessions, the large companies with storage facilities stack their superfluous product in order to take care of the heavy demand on contracts during the fall and winter.

Broken, egg, stove and chestnut are moving off as rapidly as produced, but there seems to be a feeling in the trade that the close of May will see a period of inactivity which is likely to extend throughout the summer months. As a matter of fact, the Northwestern market is supposed to absorb the surplus during the summer months, but the open weather that prevailed during most of the winter, left considerable coal on hand. This spells curtailed mining, although there are no indications as yet, that this will be necessary in the immediate future.

Bituminous—The heavy stocks many consumers had at their plants, are becoming depleted, but there still seems to be nothing that adds any backbone to the market, and the trade generally are not looking for any material change in the near future. The agreement with the miners of the central Pennsylvania district is not likely to open up many operations until there is a better market. The suspension of over a month by many operators does not seem to have made any gap in the apparent supply, and the predicted impetus to the trade has not materialized. The changes in prices over last week have been fractional. Good grades of Pennsylvania coals can be purchased at $1.35@1.55, and the cheaper grades at 35@50c. less.

BALTIMORE

Highly unsatisfactory conditions in the bituminous trade. Anthracite only fairly active, but in much better shape than soft coal.

That the present state of affairs in the bituminous coals leave much to be desired is an undisputed fact. The trade is regarded as the worst spring business for several years back. Not only has demand fallen off, but prices have continued to slump in all save the specialized coals that are practically all taken on contracts.

Considerable coal on consignment at tidewater points has resulted in a sharp breaking of prices in many instances. The worst slump seems to have occurred on the West Virginia gas coals. Slack has been a particularly weak grade, and sold in some cases down to 45c. Offerings are free in every direction and many would not be surprised to see a still further break. Run-of-mine at 75c. and three-quarter at 85c. were easily obtainable. Pennsylvania grades have been offered during the week as low as 90c. Best grades have been generally covered by contract, and any surpluses are held firmly around $1.35.

One encouraging feature just now lies in the export trade. All of the piers were busy the past week loading for European, South American and West Indian ports.

While the anthracite trade is much better than soft coal, there is still no great snap to it either. Steam sizes are in only fair demand, and a good many household consumers have been delaying their spring orders. Deliveries can be made up to the end of the present month on the lowest rate of the season.

A few contracts are being signed up gradually for the coming season, the prices being based on the same scale of wages as paid the past two years in the Illinois field. At the present the retail prices on bituminous coals are: Standard, $2.50; Mt. Olive, $2.75; Carterville, $3.12½. These prices will likely prevail until the first of August.

CENTRAL STATES

PITTSBURGH

Production down to 40% with demand light in all directions. Quotations heavily cut on prompt business, but firm on contracts.

Bituminous—There has been no improvement in the situation. Domestic demand is almost absent, while manufacturing consumption is far below normal, and has been decreasing further in the past week or two; railroad consumption is also light. The stocks accumulated some time ago are not all liquidated yet. Production in the Pittsburgh district is at not over 40% of capacity, or unchanged from last week. The suspension of mining in Ohio does not seem to have thrown any trade at all to this district. While some coal is being shipped in the lake trade the amount is altogether inconsequential.

Producers are holding firmly to regular prices when it comes to making contracts, for with production as light as it is now they have a full realization of the fact that cost of production may be particularly high, and they are possibly less prone to cut prices on contracts than they would be if approximately full operations were assured for the twelvemonth. For spot lots there are deeply cut prices in occasional instances, but the total volume of business is too small to make the prices of importance. Regular quotations are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.80, per ton at mine, Pittsburgh district.

Connellsville Coke—The market is almost absolutely stagnant. No furnaces contemplate going into blast, while some of those in blast are going out. April saw a net decrease of 18 in the number of furnaces in blast in the country as a whole, and this month there has been a further decrease. The few consumers who were uncovered for May have not contracted, but are buying prompt coke occasionally. One consumer who had a contract for 20,000 tons for April, at $2, has arranged to have shipments continued at the figure indefinitely, but does not contract definitely to take a full month's tonnage. The market is quotable generally as follows: Prompt furnace, $1.85@1.90; contract furnace (nominal), $2; prompt and contract foundry, $2.35@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 2 at 305,610 tons, a decrease of 8147 tons, and shipments at 299,439 tons, a decrease of 10,770 tons. The best average ever maintained for a period of three months was about 425,000 tons a week, so that the movement is now 70% of the record

BUFFALO

Still no improvement in the trade. Some mines resuming work. Stocks begin to run low. Lake shipments much smaller than last season and will likely continue so. Coke quiet.

Bituminous—There are three new features of the trade now, none of which, however, have had any improved effect. The stocks in consumers' hands are running down and soon not only a good many private concerns, but the railroads also, will be back into the market, although they will buy spar-

ingly and will not want to pay fair prices at first. Eventually it will simply be a matter of the volume of business. If that starts up fairly well there will be a sale for coal, but if not it will be a dragging market right along.

A second feature is that there will be more or less of a general resumption of mining this week, and there will soon be more coal on the market. But it is given out by the leading operators that they are not going to mine coal unless they can sell it on orders. The third feature is that there is now enough three-quarter being made to increase the supply of slack. The lake trade, which demands so much three-quarter, is not active, but it is moving a certain amount of coal and as a consequence slack is piling up here and the prices are off.

In fact, the bituminous trade is not very hopeful, since if the mines return to anything like a full output there is going to be a surplus produced again. The quotations on bituminous are much the same as formerly as to price, there still being sales at the regular circular, $2.80 for Pittsburg lump, $2.70 for three-quarter, $2.55 for mine-run, and $2.15 (a reduction of 10c.) for slack. Allegheny slack is about on a par with Pittsburg, but sizes are 15 to 25c. lower.

Coke—There is no improvement in coke. Pig iron sells slowly and is moving still closer in the Canadian market than here. No particular improvement is looked for right away.

Anthracite—The hard-coal movement is light for this time of year, as there is so much in the Northwest unsold. Lake shipments are bound to be quiet for some time. If there is a disposition to sell early in the season the docks will free themselves, but otherwise the business will drag. Just now the small upper-lake ports are buying in order to take advantage of the lower prices. The large ports are bound to carry heavy stocks right along. Shipments by lake for the week were only 50,000 tons.

TORONTO

Domestic grades of anthracite steady with steam sizes dragging.

The market for domestic grades of anthracite is steady and a little more active since the usual spring reduction of prices. Steam coal is quiet owing to dullness in the manufacturing industries with a downward tendency in prices. Quotations are as follows: Retail anthracite, egg, stove and nut, $7.50; grate, $7.25; pea, $6.25. Bituminous, steam, $5.25; screenings, $4.35; domestic lump, $6; cannel, $7.50. Wholesale, f.o.b. cars, ¾ lump $3.60, screenings, $2.75.

TOLEDO

Demand light in all departments, but an improvement expected in the steam grades shortly. Some inquiries and an occasional order noted. Lake movement under way.

The coal trade in Toledo continues quiet, but most of the local dealers are optimistic over the future. The call for both domestic and steam coal is below normal, but it is believed that the demand for the steam grades will increase later on. Most of the factories laid in heavy stocks prior to the strike and many still have good supplies left. The railroads are beginning to run low, however, and inquiries from this source are becoming numerous with an occasional sale.

Large freighters are loading right along at the Toledo docks and a large amount of coal is carried here in the yards, especially those of the T. & O. C. Quick trips have been made by some of the lake freighters. The "E. L. Wallace" has made two round trips and the "Harry Yates," which cleared a short time ago for the Canadian Soo arrived back last Wednesday to take on another cargo. Of the seven big freighters which wintered at Bay View Park, four have loaded and gone on their first trip.

COLUMBUS

National officers of the miners refuse to call a strike in Ohio. Hocking Valley operators to meet with the miners shortly, and the situation is clarifying rapidly. Stocks are still large and demand continues light.

The principal events during the past week were the failure of the national officers of the United Mine Workers to ratify the strike, as voted for by the Ohio miners, and the move for a conference of operators and miners in the Hocking Valley. In other words, the situation is more clear and the stress is gradually passing away.

E. A. Cole, president of the Sunday Creek Co., and also president of the Hocking Valley Operators' Association, sent a letter to John Moore, of the state organization, asking for another conference. So far arrangements for the conference have not been made, but it is expected they will be in the near future. This is the first step in this state to settle the wage question by subdistricts, and the move is being watched with interest. The miners have no authority to agree to a lower scale, but it is probable that a referendum vote may be ordered in case the delegates so recommend.

Apparently stocks among steam users are sufficient for a month or more, and the domestic trade is also quiet. Some West Virginia coal is being shipped in, but it is selling at a rather low figure. The small sizes are somewhat stronger and prices are higher. There is some demand for the better grades of domestic coal and dealers are having a fair business for this time of the year. Dealers stocks are sufficient for some time to come.

Some West Virginia coal is being shipped to the lakes, although the prospects for an active lake trade are not bright. There is still considerable coal on the docks of the upper lake ports, according to reports.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.3
¾-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.2
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.2
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.1
Nut, pea and slack	0.90@ 0.85		0.85@ 0.80	0.75@ 0.7
Coarse slack	0.80@ 0.75	0.90@ 0.85	0.75@ 0.70	0.65@ 0.6

CLEVELAND

Lake traffic tending to maintain the coal markets in northern Ohio. Youghiogheny gas grades selling on a par with Fairmount gas. Lake vessels scarce because of the dullness in the lake freight market.

The pressure to move coal has held the market down all week and no improvement is anticipated for at least another three or four weeks. Youghiogheny slack was sold on the spot market as low as $1.70 and Fairmount gas mine-run has been traded for Youghiogheny gas on the basis of 20c difference in favor of the mine-run.

There is no demand. The market is so slow that practically no consignment coal has been coming in. Pocahontas operators are holding firmly to the May circular, but are not accepting any new business for prepared sizes. Pocahontas slack has been sold as low as 85c., the mines, and it is reported even lower. The circular price is $1.25.

In the Lake Trade shipments from West Virginia are much larger than the demand or dock space justify. There is no market strong enough to warrant shipping consignment coal and lake ports are full. Shippers are having trouble getting boats because the iron ore and grain traffic is so light the vessels are without and eastbound freight. Lake Michigan shippers have an advantage as boats can at least break even coming back light from there. To the slow docks on Lake Michigan, however, a premnum of 5c. a ton has been paid for boats to run light for coal.

Shipment prices for available coals are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.05		$2.00@$2.05
Lump, 1½-in.		$2.35	
Lump, ¾-in.		2.25	
Mine run	2.60	2.10	1.85@ 1.90
Egg	3.05		
Nut		2.00	
Slack	2.20	1.70	1.70@ 1.90

CINCINNATI

The market continues sluggish, with practically no change since last week. Lack of activity in industrial lines has affected the steam market, which is now as bad as domestic grades, making the whole situation unprecedentedly dull.

With no signs of a revival and with the domestic market extremely quiet, save in the demand for Pocahontas smokeless, the present situation here is about as bad as it could be. A week ago the prospect of more or less serious labor trouble in the Kanawha district of West Virginia offered a reasonable prospect of a stronger market, but before it had a chance to manifest itself the men returned to work. Notwithstanding the short period of idleness, and the more prolonged shutdown in the Ohio field, the market refuses to respond.

The practical impossibility of securing boats for lake shipments has not changed for the better. It is undoubtedly true that the usual lake markets are to a large extent affected by the same dullness which is noted here and elsewhere, so that there is by no means a pressing demand for coal.

Occasional buyers are in the market for steam coal at fair prices, one or two sales of eastern Kentucky nut and slack being reported last week at 80c. There is nothing like a real movement at this or any other figures, however. Mine-run coal seems to be about the best fuel to send to this market at present.

DETROIT

Contract movement sharply curtailed. West Virginia coal taking the place of the Ohio product where required.

Bituminous—The local market is lifeless, operators sti

having large stocks and not appearing to be the least worried over the restricted output. As a result of the curtailed shipments, slack prices are strengthening up slightly, but West Virginia steam lump and mine-run are offering considerable off the circular. Shipments on contract are heavily curtailed. Considerable of the West Virginia grades are coming in so that the effect of the complete shutdown in Ohio is not being felt. Much of the coal ordinarily going into the lake trade is being dumped into the Detroit market. Contract arrangements for Ohio coal are being delayed, pending the adjustment of the wage scale.

Anthracite—Hard coal is coming in in abundant supply, many of the dealers receiving their full requisitions, contrary to the ordinary rule. The outlook for May is also encouraging.

HAMPTON ROADS

Some improvement in Hampton Roads situation. Dumpings for week show up well. Government taking cargoes for vessels in Mexico and for station at Cavite.

Shipments of coal from Hampton Roads during the week past have shown some improvement. Two naval colliers and one sailing vessel have loaded for Key West and the vessels now in Mexico, and in addition there have been two cargoes shipped by the government to the coaling station at Cavite, P. I.; large coastwise and foreign cargoes have also moved, and, with the number of bunkers which have been taken care of, the dumpings should show up well. The accumulation of coal has been cut down to below normal at some of the piers.

During the early part of the week the Virginian Ry. piers were working to almost their full capacity. During ten hours on May 4 they dumped 303 cars into barges, sailing vessels and steamers, and the same night over 250 cars were dumped, making more than 550 cars, or about 27,500 tons in 24 hr.

The price of coal for export is practically the same as it has been for some months, and while circular figures on coastwise business are still being quoted, it is rumored that some cargoes for New England have been sold at somewhat below these.

Foreign shipments have moved to Dakar, Havana, Port Spain, Naples, Canal Zone, Montevideo and Kingston.

On May 1 retail dealers put in effect summer prices on the various grades of domestic coals. These prices are about 50c. a ton below the winter schedule except on Pocahontas and New River run-of-mine, which remain the same practically all the year round.

LOUISVILLE

Operations generally good, but market shows no improvement. Prices continue unchanged.

Though operations continue on an extensive scale, as compared with other bituminous mining districts, the market in general has showed no signs of improvement. The western Kentucky field is practically at a standstill. The local retail reduction of 25c. a ton, though it has resulted in a considerable volume of orders from domestic consumers, has had no appreciable effect on the general situation.

Steam sizes are plentiful both east and west and are in small demand. Though the reports of the railways seem to indicate that business generally is better than last year, it must be remembered that the railroad's operations a year ago were greatly curtailed by the floods.

Prices run about the same as a week ago, ranging from 50c. a ton for the pea and slack in the West, to from 60 to 75c. for Eastern nut. Of these grades the western Kentucky pea and slack, only, is stiff. The block coals of the Eastern field continue at from $1.30@1.85, the latter for the fancy grades.

SOUTHERN AND MIDDLE-WESTERN

CHICAGO

Slight increase in steam-coal trade. Anthracite quiet. Most contracts for smokeless coal now closed. The demand for Illinois grades is confined to screenings only. Coke market dull.

There is practically no demand for domestic coal and little fuel is being bought for storage because of unfavorable financial conditions. There is also little demand for anthracite coal, dealers showing no disposition to purchase for future. Buying for storage appears to be restricted to the all-rail trade only, and as a result operators are sending smaller shipments. There are two or three companies which have cut their prices to around a dollar. Lump and egg is selling at $1.60 as the market price, but this is only because little of these coals is being produced.

Illinois coals are not very active, screenings being the only kind for which there is any demand at all, and even these are lower by 10c. a ton. It is expected that the large railroads will begin to appear in the market soon. Inch and a half screenings are selling for 90@95c. per ton, while the better grade two-inch coal is selling for 95c.@$1. Conditions in the coke market are dull.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.77	1.95@2.05	1.67	

Coke—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

INDIANAPOLIS

New wage agreement for the next two years signed up on practically the same basis as the expiring one. Operations increased in spots but still generally at only half capacity.

The most interesting development in the Indiana coal situation is the signing up of a new wage contract for two years. The miners gained a point in their demand for the delivery of the powder to working places and they conceded a point to the operators in assessing fines for the mining of dirty coal, while the wage scale continues the same. Trade conditions have shown little change. Some operators have put additional mines at work but as a general thing, only about half the mines are working.

ST. LOUIS

A further slump in domestic coals about equalizes an advance in the steam grades. Contracts being closed on the same basis as last year. Labor situation being cleared up.

During the past few days there has been a good demand for steam sizes, perhaps better than at any time since the mines suspended operations, but as the price advanced on these grades, the quotations on the domestic and larger sizes went down, so that it is an even break; that is, on a mine-run basis the coal is bringing about the cost of production, or perhaps slightly better. This pertains chiefly to the standard field. In the Carterville and Franklin County field there is little tonnage being produced, and that for the most part, on contract business.

In a retail way, locally, there is nothing doing in bituminous coals, but the tonnage of anthracite, being booked for early delivery, is exceptionally good. The smokeless market is slow, and indications at this time are that anthracite and coke will eventually crowd out, to a great extent, the smokeless tonnage.

KANSAS CITY

Market dull but indications are better for the summer and late fall. Light demand for domestic grades.

The situation in Kansas City has undergone little change except possibly a brisker booking of futures. The retailers are inclined to show more confidence in the fall and late summer trade because of exceptionally bright crop prospects in the Southwest. Immediate business is only fair, though steam lines have shown improvement enough to cause more optimism among operators. The lack of demand for lump has continued to give operators something to puzzle over, however, making the situation rather unsatisfactory in that respect.

FOREIGN MARKETS

GREAT BRITAIN

Apr. 29—There is a brisk demand for prompt coal of which there does not appear to be much available, and prices are rising. Some buyers now seem disposed to negotiate their requirements for ahead loading. Quotations are approximately as follows:

Best Welsh steam	$4.68	Best Monmouthshires	$4.20
Best seconds	4.56	Seconds	4.08
Seconds	4.20	Best Cardiff smalls	2.82
Best dry coals	4.32	Seconds	2.64

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry, $4.80@5.52; furnace, $4.08@4.56.

COAL FREIGHT DECISIONS

I. C. C. Nos. 5572; 5651; 5584—Campbells Creek Coal Co. vs. Ann Arbor R.R. Co. (No. 5572), H. C. Dickinson vs. Ann Arbor R.R. Co. (No. 5651), Compbells Creek R.R. Co., vs. Ann Arbor R.R. Co. (No. 5584).

1. Defendants' application of the main-line rates to points on the Kanawha & West Virginia and the Coal & Coke railroads while denying them to complainants constitutes undue and unreasonable prejudice and disadvantage to complainants, which should be corrected either by canceling the main-line rates to points on the lines mentioned or by establishing the main-line rates as joint rates with the Campbell's Creek Railroad.

2. No such undue prejudice may be predicated upon the application of the main-line rates to points on branches of the defendant Kanawha & Michigan Railroad.

3. The portion of section 1 which makes it the duty of every carrier subject to the act to furnish cars must be read into that portion of section 1 which deals with the matter of switching connections between common carriers and lateral branch lines. Huerfano Coal Co. v. C. & S. E. R.R. Co., 28 I. C. C., 502.

4. Defendants' contention that it would be impossible to hold the Campbell's Creek Railroad a common carrier without finding it guilty of a violation of the commodities clause, assuming defendants' construction of the law is correct, is not sustained by the facts.

PRODUCTION AND TRANSPORTATION STATISTICS

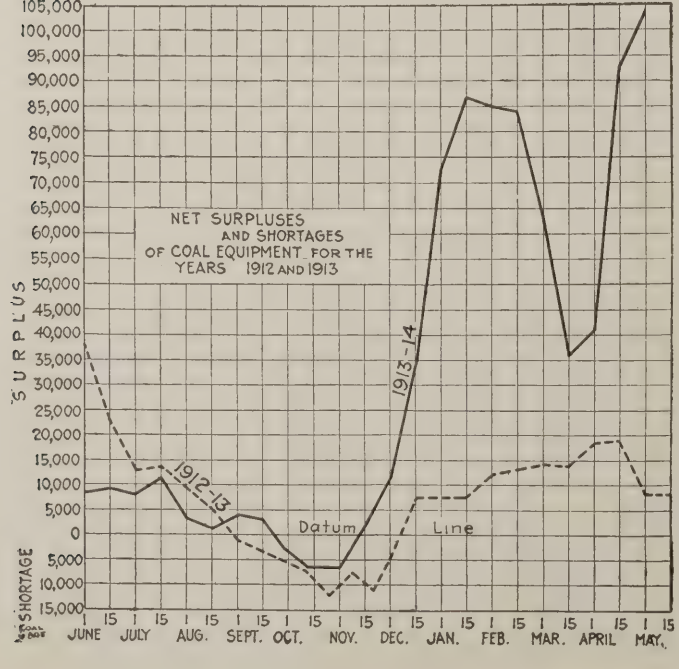
THE CAR SITUATION

American Ry. Association reports surplus and shortages of coal equipment for two weeks ended Apr. 15, as follows:

	Surplus	Shortage	Net*
New England Lines	1,620	0	**1,620**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	16,536	0	**16,536**
Ohio; Indiana; Michigan; Western Pennsylvania	42,205	0	**42,205**
West Virginia, Virginia, North & South Carolina	4,820	0	**4,820**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	14,039	0	**14,029**
Iowa, Illinois, Wis., Minn.; North & South Dakota	11,675	19	**11,656**
Montana, Wyoming, Nebraska	1,373	0	**1,373**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	3,653	10	**3,643**
Texas, Louisiana, New Mexico	572	0	**582**
Oregon, Idaho, California, Arizona	3,906	0	**3,900**
Canadian Lines	0	0	**6**
Total	100,399	29	**100 370**

	Jan. 1	Jan. 15	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1	Apr. 1
Surplus	72,535	87,149	85,489	84,775	64,822	39,133	41,055	41,055
Shortage	57	789	102	239	1,394	3,282	615	615
Net*	**72,478**	**86,360**	**85,387**	**84,536**	**63,428**	**35,851**	**40,440**	**40,440**

*Bold face type indicates a surplus.



ANTHRACITE SHIPMENTS

Anthracite shipments for April and the first four months of the current year as compared with last year were as follows:

	April		4 Months	
	1914	1913	1914	1913
Phila. & Reading	1,185,930	1,180,115	3,884,153	4,579,408
Lehigh Valley	1,160,742	1,149,896	3,579,875	4,216,678
Cent. R.R. N.J.	748,162	738,579	2,766,684	2,978,872
Del. Lack. & West.	894,513	861,078	2,755,042	3,078,995
Del. & Hudson	615,573	561,700	2,090,979	2,344,688
Pennsylvania	619,159	585,472	2,166,567	2,082,297
Erie	648,426	672,386	2,548,960	2,745,928
Ont. & Western	199,649	216,963	741,790	859,199
Total	6,072,164	5,966,189	20,534,050	22,886,065

COAL MOVEMENT

The following is a statement of the fuel movement of various kinds for the past four months, in short tons, except where otherwise noted:

	January	February	March	April
Anth. shipments[4]	5,175,732	4,121,451	5,164,703	6,072,164
Penn. R.R.[3]	5,885,953	6,081,171	6,853,996	
B. & O. R.R.[2]	3,192,789	2,650,623	3,530,136	
C. & O. Ry.[1]	1,596,704	1,095,082		
N. & W. Ry.	1,679,836	1,666,475	2,112,118	
Va. Ry.	407,109	259,756	336,952	

[1]Bituminous coal only. [2]Coal and coke. [3]Bituminous, anthracite and coke. [4]In long tons.

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February and March of the current year in short tons:

	February	March
Pocahontas Field	942,477	1,161,793
Tug River District	204,074	246,490
Thacker District	198,228	274,786
Kenova District	71,401	88,616
Clinch Valley District	152,769	153,704
Other N. & W., Territory	3,694	2,741
Total N. & W. Fields	1,572,643	1,928,130
Williamson & Pond Creek R.R.	26,314	43,867
All other railroads	67,518	140,123
Grand total	1,666,475	2,112,118

The following is the destination of shipments for March and the first three months in short tons:

	February		Two Months	
Coal	1913	1914	1913	1914
Tidewater, foreign	120,288	158,247	387,294	428,672
Tidewater, coastwise	327,631	342,530	973,751	991,863
Domestic	1,303,239	1,611,341	4,333,531	4,323,872
Coke				
Tidewater, foreign	70		10,034	1,5
Domestic	147,660	103,070	438,794	317,699
Total	1,898,888	2,215,188	6,143,404	6,062,09

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending May 9:

Stocks	Week's Range High	Low	Last	Year's Range High	Low
American Coal Products	84½	84½	84½	86¼	82
American Coal Products Pref.	102	102	102	106	102
Colorado Fuel & Iron	27½	26⅞	27	34½	24
Colorado Fuel & Iron Pref.	....	....	140	140	140
Consolidation Coal of Maryland	....	....	102¼	....	....
Island Creek Coal Com.	50½	47½	49½	....	....
Island Creek Coal Pref.	86	85	86	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20⅝	20¼	20½	23½	17⅞
Pittsburgh Coal Pref.	89½	87⅛	88⅞	93½	84
Pond Creek	18⅜	17	17⅛	....	....
Reading	165⅞	163	164¾	172½	158¼
Reading 1st Pref.	88¼	88¼	88¼	89	87½
Reading 2nd Pref.	89	88¾	89	93	87½
Virginia Iron, Coal & Coke	..	..	45	52	40

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s.f.g. 5s	90¼	..	99¾	91¾	91½	99
Colo. F. & I. gen. 6s	105	..	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	74	Sale	73	74	73	82
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89½	90¼	90½	90½	89	90½
Gr. Riv. Coal & C. 1st g 6s	89	..	99⅛	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	..	102⅜	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	89½	..	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	86½	87½	88	Apr. '14	84	88½
Tenn. Coal gen. 5s	78	80	77	Apr. '14	77	82
Birm. Div. 1st consol. 6s	103½	Sale	103½	102	97½	103½
Tenn. Div. 1st g 6s	101½	103	102	Apr. '14	101½	103
Cah. C. M. Co. 1st g 6s	101½	103	102	Mar. '14	101	102½
Utah Fuel 1st g 5s	101	..	101½	Mar. '14	101½	101½
Victor Fuel 1st s f 5s	..	84	73	Apr. '14	73	73
Va. I. Coal & Coke 1st g 5s	90	Sale	90	90	90	95

No Important Dividends were announced during the week.

Index of Coal Literature

We will furnish a copy of any article (if in print) for the price quoted. Where no price is quoted, the cost will be nominal. Inasmuch as the papers must be ordered from the publishers, there will be some delay for foreign papers. Remittance must be sent with order.

ACCIDENTS AND THEIR PREVENTION

100—Monthly Statement of Coal-Mine Fatalities in the United States, February, 1914. Albert H. Fay. Bureau of Mines; 8 pp.

101—Monthly Statement of Coal-Mine Fatalities in the United States, January, 1914. Albert H. Fay. Bureau of Mines; 6 pp.

BLASTING, EXPLOSIVES

102—Blasting Gelatine: Some Notes and Theories. (Abstract of Paper by W. A. Hargreaves read before the Soc. of Chem. Indus.) Iron Coal Tr. Rev., Apr. 24, 1914; 1⅓ pp. 40c.

103—Flame Phenomena Observed on Firing Permitted Explosives in the Mortar. E. Lemaire. (Translated from Ann. d. M. de Belgique.) Coll. Guard., Apr. 17, 1914; 1⅝ pp. 40c.

104—Priming the Shot. Coll. Engr., May, 1914; ¾ p., illus. 35c.

105—The Use of Fuse and Detonators in Wet Blasting Operations. Clarence Hall. Eng. Mag., May, 1914; 4¾ pp., illus. 35c.

BRIQUETTES

106—Fuel Briquetting in 1913. Edward W. Parker. U. S. Geol. Sur., 1914; 5¼ pp.

COAL DUST

107—A New Method of Treating Coal Dust. Iron Coal Tr. Rev., Apr. 10, 1914; ⅝ p., illus. 40c.

108—Coal Dust Experiments at Tirpentwys Colliery. Coll. Guard., Apr. 3, 1914; 1¼ pp., illus. 40c.

COKE

109—Notes on the Utilization of Coke-Oven and Blast-Furnace Gas for Power Purposes. Heinrich J. Freyn. Bull. A. I. M. E., April, 1914; 28¼ pp. 40c.

110—Reflection on Temperatures of Distillation, and Their Influence on Byproducts—III. G. P. Lewis. Gas Wld., Apr. 11, 1914; 2 pp., illus. 40c.

111—The Automatic Control of Byproduct Coke-Oven Plants—V. (This installment deals with pyrometers.) A. Thau. Gas Wld., Apr. 4, 1914; 2¾ pp., illus. 40c.

112—The Automatic Control of Byproduct Coke-Oven Plants—VI. (This article of the series deals with meters.) A. Thau. Gas Wld., May 2, 1914; 3½ pp., illus. 40c.

COMPRESSED AIR

113—Compressed-Air Transportation in British Coal Mines. Alex Sahlin. Iron Coal Tr. Rev., Apr. 17, 1914; 1½ pp., illus. 40c.

114—Multi-Stage Air Compressors for Diesel Engines Coll. Guard., Apr. 17, 1914; 1 p., illus. 40c.

DRAINAGE, PUMPING, ETC.

115—A Self-Cleaning Screen for Pump Intake. J. E. Johnson, Jr. Eng. & Min. Jour., Apr. 18, 1914; 2 pp., illus. 25c.

116—Pump Motors for Mining Work. Iron Coal Tr. Rev., May 1, 1914; ½ p., illus. 40c.

117—Rotary Pump and Hydraulic Variable-Speed Transmission. Amer. Mach., May 7, 1914; 3 pp., illus. 25c.

118—Safety Application of the Swing-Gate Valve. O. C Schmidt. Coll. Engr., May, 1914; 2 pp., illus. 35c.

119—Water Pumping at Anthracite Mines. Coal & Coke Op., Apr. 23, 1914; 1⅓ pp. 20c.

ELECTRICITY

120—Automatic Controllers for Mining Work. (Paper read by G. W. Humphrey before the Assn. of Min. Elec. Engrs.; So. Wales Branch.) Iron Coal Tr. Rev., Apr. 24, 1914; 2 pp., illus. 40c.

121—Electric Ignition of Methane-Air Mixtures. Iron Coal Tr. Rev., May 1, 1914; 1¼ pp., illus. 40c.

122—Tests on a Kapp Vibrator. (The use of this machine improves the operating qualities of a motor not only by correcting the power factor, but also by considerably increasing its overload capacity and maximum torque.) Coll. Guard., Apr. 9, 1914; ½ p., illus. 40c.

123—Transmission of Electricity Underground. (Paper by Alex. Anderson read before a joint meeting of the Yorkshire Branches of the Assn. of Min. Elec. Engrs. and Natl. Assn. of Coll. Mgrs.) Iron Coal Tr. Rev., Apr. 3, 1914; 1⅓ pp. 40c.

124—The Safety of Underground Installations. C. M. Means. Bull. A. I. M. E., April, 1914; 3¼ pp. 20c.

EXPLOSIONS

125—Automatic Distribution of Stone Dust by the Air Current. (Discussion of paper by H. W. G. Halbaum on above subject at meeting of No. of England Inst. of Min. & Mech. Engrs.) Iron Coal Tr. Rev., Apr. 10, 1914; 1 p. 40c.

126—Ravenswood Explosion. Samuel Dean. Coll. Engr., May, 1914; 2 pp., illus. 35c.

127—Reports on the Senghenydd Explosion. Coll. Guard., May 1, 1914; 6½ pp., illus. 40c.

128—The Analysis of Combustible Gases by Explosion. E. Hauser. (Trans. from Achives des Sciences.) Coll. Guard., Apr. 3, 1914; ⅜ p. 40c.

FUEL TESTING

129—Resins in Paleozoic Plants and in Coals of High Rank. David White. U. S. Geol. Sur., Prof. Paper 85-E; 18½ pp., illus.

130—Tar-Forming Temperatures of American Coals. O. C. Berry. Univ. of Wis., Bull. 635; 67 pp., illus. 35c.

GENERAL

131—Are the Prices Charged for Anthracite Exorbitant? Black Diamond, May 2, 1914; 1¼ pp. 20c.

132—Availability of the Cement Gun for Mine Work. Coal Age, Apr. 25, 1914; 3½ pp., illus. 10c.

133—A Statistical Review of the German Coal-Mining Industry. Iron Coal Tr. Rev., Apr. 24, 1914; 1¼ pp. 40c.

134—Education of Mine Employees. H. H. Stock. Univ. of Ill., Bull. No. 1; 116 pp., illus.

135—Inside Facts About Anthracite Coal Production. Black Diamond, Apr. 11, 1914; 1¼ pp., illus. 20c.

136—Notes on the East Kent Coal Field. E. Kilburn Scott. Iron Coal Tr. Rev., Apr. 3, 1914; 1 p., illus. 40c.

137—Negro Labor in Kentucky Mines. G. D. Crain, Jr. Coal Tr. Bull., May 1, 1914; 2¼ pp. 25c.

138—Notes on Australian Coal Mining. Matt Brodie and P. T. Milligan. Mine & Quarry, April, 1914; 5¼ pp., illus.

139—Operations of the Standard Coal Co. Will C. Higgins. Min. Rev., Apr. 30, 1914; 6¾ pp., illus. 25c.

140—Opening Nova Scotia Coal Mines. (Paper read before the Canadian Soc. of Civil Engrs., January, 1914.) C. M. Odell. Coll. Engr., May, 1914; 4 pp., illus. 35c.

141—Retort for Burning Coal Samples. Power, May 12, 1914; ½ p., illus. 15c.

142—Review of the Mining Industry in Queensland During the Year 1913. (Report by the Under Secretary for Mines.) Queensland Govt. Min. Jour., March, 1914; 16 pp., 2 tables. 40c.

143—The Operations of the Stillwater Coal Mining Co., Tippecanoe, Ohio. Coal & Coke Op., May 7, 1914; 3½ pp., illus. 20c.

144—The World's Coal Production and Consumption. Iron Coal Tr. Rev., Apr. 3, 1914; 1¼ pp. 40c.

145—The Physiological Characteristics of Acetylene with Respect to Its Use in Mining. (Paper by Dr. E. E. Smith read at meeting of Intl. Acetylene Assn.) School of Mines Quart., January, 1914; 11 pp. 60c.

146—The Fuels Used in Texas. Wm. B. Phillips and S. H. Worrel, Univ. of Texas. Bull. 307; 247 pp., illus.

GEOLOGY

147—The Coal Resources and General Geology of the Pound Quadrangle in Virginia. Charles Butts. Va. Geol. Sur., Bull. 19; 57 pp., illus.

148—The Pocket Coal Field of Lee County, Va. W. R. Peck. Coal Age, May 9, 1914; 3 pp., illus. 10c.

HOISTING AND HAULAGE

149—Automatic Safety Mine Car Cagers. E. G. Banta. Coal Age, Apr. 25, 1914; 1 p., illus. 10c.

150—Benzine Locomotives. A. J. Baijot. (Translated from Ann. d. M. de Belgique.) Coll. Engr., May, 1914; 6½ pp., illus. 35c.

151—Electric Mine Hoists. F. A. Lockwood. Sibley Jour. of Eng., April, 1914; 7 pp., illus. 35c.

152—Gasoline Locomotives in a Pennsylvania Mine. Coal Age, Apr. 18, 1914; 1½ pp., illus. 10c.

153—Interpole Motors for Mine Locomotives. A. R. Anderson. Coal Age, May 9, 1914; 3¼ pp., illus. 10c.

154—The Electrical Driving of Winding Engines and Rolling Mills. (Continued from Apr. 1 issue.) C. A. Ablett and H. M. Lyons. Can. Min. Jour., Apr. 15, 1914; 6 pp., illus. 25c.

LEGAL REFERENCES

155—Amount Recoverable for Personal Injury or Deatn. A. L. H. Street. Coal Age, May 9, 1914; 1 p. 10c.

156—New Mining Law in Kentucky. Coal Age, Apr. 25, 1914; ½ p. 10c.

157—Why the Mining Laws Should Be Revised. Horace V. Winchell. Bull. A. I. M. E., April, 1914; 19½ pp. 40c.

MINING COSTS

158—Cost Sheets—Their Uses and Their Limitations. J. B. de Hart. Coal Age, Apr. 18, 1914; ¾ p. 10c.

MINE FIRES

159—Fire Fighting Arrangements at Mount Morgan, Australia. B. Magnus. Eng. & Min. Jour., May 9, 1914; 2 pp., illus. 25c.

MINE GASES, TESTING

160—Electric Mine Gas Detectors. Sydney F. Walker. Coll. Engr., May, 1914; 2¼ pp., illus. 35c.

161—Methods of Gas Estimation in Mines. (Paper by Thomas Bryson read before the Scottish Federated Inst. of Min. Students.) Iron Coal Tr. Rev., Apr. 17, 1914; 1⅓ pp., illus. 40c.

162—Modifications of Dr. Haldane's Apparatus for Estimating Firedamp. J. R. Crum. Iron Coal Tr. Rev., Apr. 24, 1914; ½ p., illus. 40c.

PREPARATION

163—An Automatic Continuous Coal Drier. A. J. Sayers. Coal Age, May 2, 1914; ¾ p. 10c.

164—A Preparation Plant in a River Tipple. Coal Age, May 2, 1914; 1½ pp., illus. 10c.

165—A New Rotary Coal-Washing Jig. E. A. James. Coal Age, May 2, 1914; 1 p., illus. 10c.

166—A German Coal-Screening Plant. Coal Age, May 2, 1913; 1½ pp., illus. 10c.

167—A Modern Coal-Mining Plant. R. G. Read. Coal Age, Apr. 18, 1914; 2 pp., illus. 10c.

168—A Typical Welsh Colliery. Coal Age, May 9, 1914; 2½ pp., illus. 10c.

169—Coal-Washing Efficiency Calculations. G. R. Delamater. Coal Age, May 2, 1914; 5¾ pp., illus. 10c.

170—High-Class Equipment of Modern Plant of Pond Creek Coal Co. Wm. Z. Price. Coll. Engr., May, 1914; 2⅓ pp., illus. 35c.

171—How Impurities Are Taken Out of Anthracite Coal. Black Diamond, Apr. 25, 1914; 1⅓ pp., illus. 20c.

172—Modern Coal- and Coke-Handling Machinery. (Paper by J. E. Lister read before the March meeting of the Sheffield Univ. Gas and Coke-Oven Students' Assn.) Gas Wld., Apr. 4, 1914; ½ p. 40c.

RESCUE, SAFETY APPARATUS

173—Training of Rescue Brigades at the North Staffordshire Coal Owners' Central Rescue Station at Berry Hill Colliery. (Paper read by G. H. Greatbatch at the meeting of the No. Staffs. Inst. of Min. & Mech. Engrs.) Coll. Guard., Apr. 9, 1914; 1⅓ pp. 40c.

174—Self-Rescuing Apparatus. Coll. Engr., April, 1914; ⅔ p., illus. 35c.

SHAFTS, SHAFT SINKING

175—Deepening a Shaft by a Rise Method. (Paper by H. B. Pilkington read before the Manchester Geol. & Min. Soc.) Coll. Guard., Apr. 9, 1914; ¾ p. 40c.

176—Proof of the Western Boundary Fault at Holly Bank Colliery. (Paper read before the So. Staffs. and Warwickshire Inst. of Min. Engrs.) Iron Coal Tr. Rev., Apr. 24, 1914; 1¾ pp. 40c.

177—Sinking Through Eleven Fathoms of Difficult Surface at Shettleston Colliery. (Paper by J. Wilson read before the Scottish Federated Inst. of Min. Students.) Iron Coal Tr. Rev., Apr. 3, 1914; 1 p., illus. 40c.

178—Shaft Sinking in the Central Albertan Coal Field. E. I. Roberts, Bull. Can. Min. Inst., February, 1914; 12 pp., illus.

179—Sinking and Equipment of Blairhall Colliery, Fife. (Paper by A. M. Russell read before meeting of Min. Inst. of Scotland.) Iron Coal Tr. Rev., Apr. 17, 1914; ½ p. 40c.

POWER, STEAM ENGINES AND BOILERS

180—Anthracite Colliery Boiler Plants. (Describes how, by the use of modern boilers equipped with proper auxiliaries, the cost of steam at boiler plants may be reduced 60 per cent.) J. F. McMahon. Coal Age, Apr. 25, 1914; 4¼ pp., illus. 10c.

181—Burning Pulverized Coal and Oil Mixed. Alex. Traudt. Iron Age, Apr. 23, 1914; 1¼ pp., illus. 30c.

182—Purchasing Boilers—I. J. E. Terman. Power, May 5, 1914; 2 pp., 15c.

183—The Application of Central-Station Power to Coal-Mining Work. Thos. R. Hay. Penn. State Min. Quart., April, 1914; 15 pp. 35c.

184—The Utilization of Exhaust Steam for Collieries, Ironworks, Etc., and the Cost of Electric Current Generated. (Paper read by W. C. Mountain before the No. of England Inst. of Min. & Mech. Engrs.) Coll. Guard., Apr. 9, 1914; 1 p. 40c.

185—Transmission of Power by Manila Rope. Reginald Trautschold. Power, May 12, 1914; 4 pp., illus. 15c.

186—Unmarketable Coal Used for Generating Electricity. Elec. Wld., May 9, 1914; 5½ pp., illus. 20c.

187—Working Up a Boiler Test. F. R. Low. Power, Apr. 28, 1914; 3½ pp. 15c.

SIGNALING

188—A New Signal Apparatus. Francis P. Mann. Eng. & Min. Jour., Apr. 18, 1914; 1½ pp., illus. 25c.

189—The "Tangent" System of Visual Signaling. Iron Coal Tr. Rev., Apr. 24, 1914; 1¼ pp., illus. 40c.

190—Wood's Signal Indicator. Iron Coal Tr. Rev., May 1, 1914; ½ p., illus. 40c.

TRANSPORTATION

191—Largest Coal-Handling Plant in the World. Iron Age, May 7, 1914; 2½ pp., illus. 30c.

192—Marketing Conditions at New Orleans. Paul Wooton. Coal Age, Apr. 18, 1914; 1¾ pp., illus. 10c.

193—Transportation of Coal Over the Virginian and C. C. & O. R.R. Ry. Age. Gaz., 7½ pp., illus. 25c.

TIMBERING, PACKING, ETC.

194—Overcasts and Stoppings in Mines. A. W. Hesse. Coal Age, May 2, 1914; 1½ pp., illus.

195—The Injection of Cement Grout Into Water-Bearing Fissures. Francis Ronaldson. Bull. A. I. M. E., January, 1914; 3 pp.

VENTILATION

196—Bristol's Pneumatic Type Recording Tachometer. Coll. Engrs., April, 1914; ¾ p., illus. 35c.

197—Safety Air Doors for Coal Mines. (Paper read by James Ashworth before the Manchester Geol. & Min. Soc.) Coll. Guard., Apr. 9, 1914; ⅓ p. 40c.

WORKING OF MINERALS

199—Coal-Mining Practice in District VIII (Danville). S. O. Andres. Ill. Coal Min. Investigations. State Geol. Sur., Bull. 2; 40 pp., illus.

200—Longwall in Seams Liable to Spontaneous Combustion. J. E. Spicer. Coal Age, Apr. 25, 1914; 1 p., illus. 10c.

201—Methods of Working, Ventilation and Transportation in Bituminous Coal Mining. (Lecture delivered by Thos. A. Mather before the Min. Soc.) Penn. State Min. Quart., April, 1914; 10 pp. 35c.

202—Machine Mining in Room Pillars. J. C. Edwards. Coll. Engr., May, 1914; 3⅔ pp., illus. 35c.

203—Problems Encountered in Kentucky Coal Mining. (Abstract of paper by N. G. Alford read before the Ky. Min. Inst., Dec. 8, 1913.) Coal Age, Apr. 25, 1914; 2½ pp., illus. 10c.

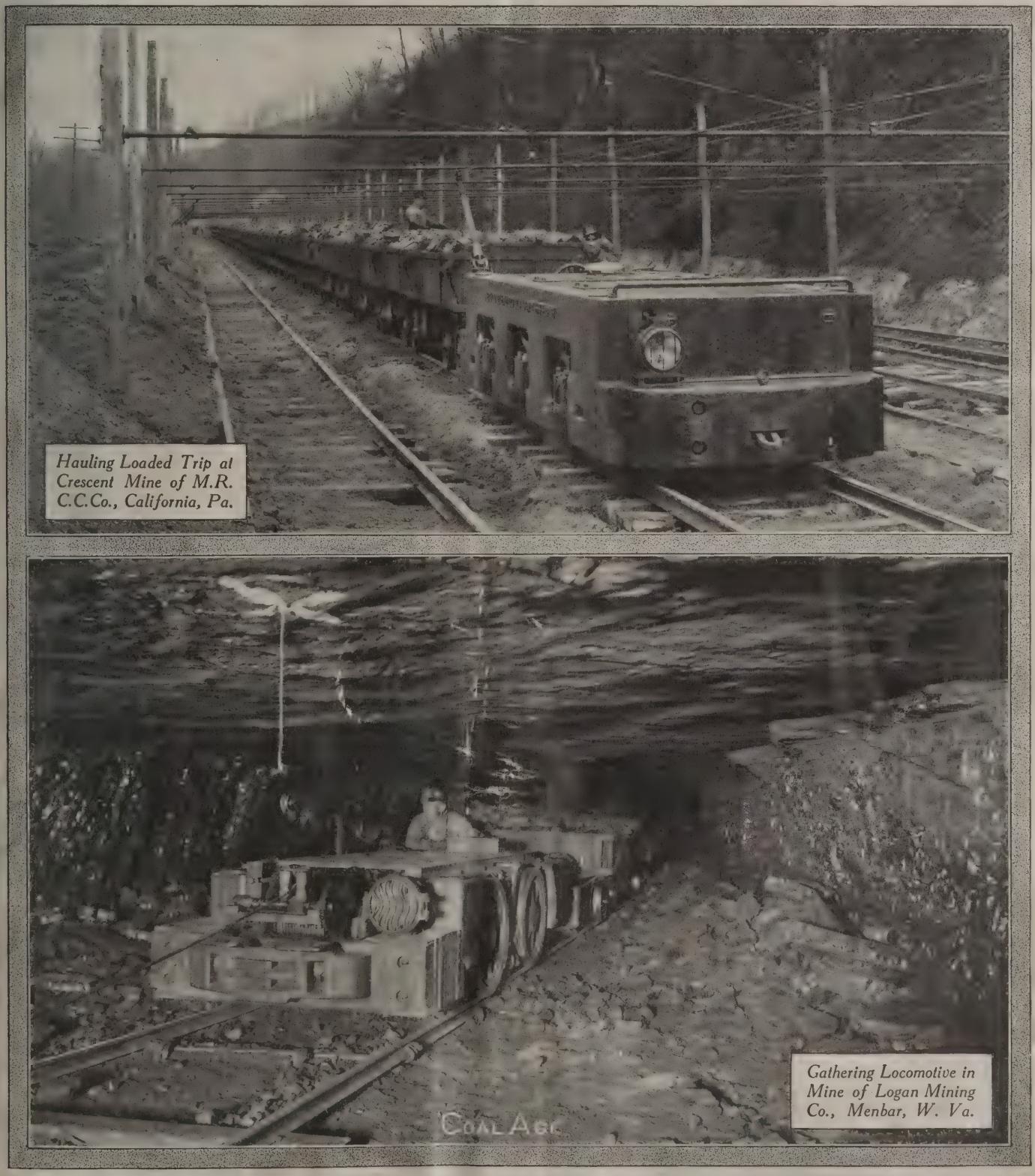
COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 21
Issued Every Saturday
Hill Publishing Company

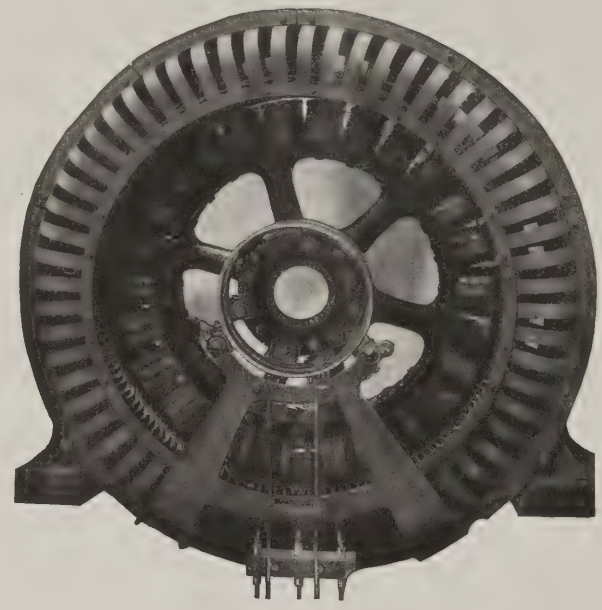
NEW YORK, MAY 23, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Hauling Loaded Trip at Crescent Mine of M.R. C.C.Co., California, Pa.

Gathering Locomotive in Mine of Logan Mining Co., Menbar, W. Va.



This is an end view of a Westinghouse Electric Synchronous Motor. It is interesting to mining men because these motors provide

The Most Satisfactory Drive for Air Compressors

They can be direct-connected to the compressor and hence **cost less to install** than belted drives and require less floor space. Belt maintenance expense and transmission losses are eliminated.

The first cost is about the same as for other types of drive for compressors of 1000 cubic feet per minute capacity. For larger sizes, it is less.

The efficiency is higher than that of any other type of drive and the high power factor at which these motors can be run improves the operating characteristics of the entire circuit.

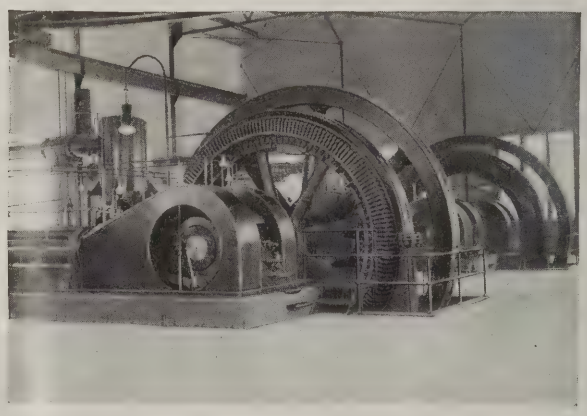
The great reliability of these motors is proved beyond all question by successful installations in all parts of the country.

Send for full description of these motors.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Bluefield, W.Va.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chicago, Ill.
Cincinnati, O.
Cleveland, O.
Columbus, O.
*Dallas, Tex.
Dayton, O.
Denver, Colo.
Detroit, Mich.
*El Paso, Tex.
*Houston, Tex.
Indianapolis, Ind.
Joplin, Mo.
Kansas City, Mo.
Louisville, Ky.
Los Angeles, Calif.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Rochester, N. Y.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
Spokane, Wash.
Syracuse, N. Y.
Tacoma, Wash.
Toledo, O.
Washington, D. C.

*W. E. & M. Co. of Texas.



9600 H.P. (total) Westinghouse Motors Driving Air Compressors at Anaconda Copper Mine.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MAY 23, 1914 NUMBER 21

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Pages* 833-834

The Colorado Strike and the Press. A résumé of events in the trouble zone. It is suggested that the press of the country at large has been unfair in its treatment of the situation, suppressing such important facts as those brought out by the investigation of the military committee. COAL AGE, Vol. 5.

*ELECTRICITY IN COAL MINING—II: *Pages* 835-836

This is the second article of the series on this subject. The distinction between alternating and direct current is here made, and the explanation given of how Ohm's law must be varied to meet the conditions of impedance. David R. Shearer. COAL AGE, Vol. 5.

CARBIDE LAMPS FREED FROM SUSPICION: *Page* 836

IS HOOKWORM RIFE IN WEST VIRGINIA: *Page* 837

*NOTES ON AUSTRALIAN COAL MINING: *Pages* 838-840

Description of some government-owned mines in Australia. Modern equipment is used throughout. The unusually irregular character of the coal has caused serious difficulties in mining although the introduction of machines has greatly reduced costs. Frequent rolls in the bottom make it necessary to operate the machine in benches. Matt Brodie and P. T. Milligan. COAL AGE, Vol. 5.

CONSTRUCTION AND OPERATION OF MINE SUBSTATION: *Pages* 841-842

Substations, when possible, should be located on the surface, because if located underground, there is danger from fire, dampness weakens insulation and causes corrosion of metallic parts. Underground substations are more costly to construct than those located on the surface as the mine roof is weak and should be arched or built of heavy concrete, the station being made fireproof throughout. H. Booker. COAL AGE, Vol. 5.

SURVEYING METHODS OF THE MADISON COAL CORPORATION: *Pages* 843-845

Typical surveying practice in the Middle West. Some important notes regarding the relative accuracy required under varying conditions are given. Both inside and outside methods are described, together with office computations and map work. G. E. Lyman. COAL AGE, Vol. 5.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 863

COAL AND COKE NEWS: *Pages* 864-867

RECENT LEGAL DECISIONS: *Page* 845

*THE EXPLOSION AT ECCLES, W. VA.: *Pages* 846-850

A well conducted mine with men both in charge and at work having a more than usual sense of responsibility blows up at Eccles, Raleigh County, W. Va., killing 180 men. The company operating was strict in its discipline and careful in its management. Operating changes are described which will make the mines safer in the future. R. Dawson Hall. COAL AGE, Vol. 5.

THE COLORADO STRIKE: *Pages* 851-852

A brief account of the disarmament in Colorado, the court-martial of Major P. J. Hamrock, the arrest of the Hecla rioters, the voting on the million-dollar appropriation for the payment of the militia and the plans for the reconstruction of the Ludlow camp. COAL AGE, Vol. 5.

EDITORIALS: *Pages* 853-854

The Pioneer Sentiment—When Should Rescue Work Be Abandoned—Why Some Operators Fail—A Trust in Virtue—The World's Coal.

SOCIOLOGICAL DEPARTMENT: *Pages* 855-858

*The Membership of the American Mine Safety Association—*Meeting of the Kentucky Mining Institute.

DISCUSSION BY READERS: *Pages* 859-861

*Explaining an Extraordinary Experience—Safety or Refuse Chambers in Mines. Letter No. 4—The Mine Foreman. Letters Nos. 5 and 6.

*STUDY COURSE IN COAL MINING: *Page* 861

INQUIRIES OF GENERAL INTEREST: *Page* 862

Effect of Short-Circuiting Air on Speed of Fan—A Checking System for Coal Loaded by Miners.

COAL TRADE REVIEWS: *Pages* 868-872

ADVERTISING INDEX: *Page* 24

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

You Readers Should Know This

The Weekly Ad-Talk Page

Big efforts are being made; important steps are being taken by technical-paper publishers to make sure that you get the very best, cleanest, most honest, most valuable papers that can possibly be made.

The latest move in this direction was made the other evening by the New York Trade Press Association when it adopted the following standards of practice:

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups;" to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply all advertisers with full information regarding character and extent of circulation, including detailed circulation statements subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

These are the accepted "Ten Commandments" of your paper.

They help to show why it is that you readers can place so much dependability on the reading and the advertising pages of your paper today.

COAL AGE

Vol. 5 NEW YORK, MAY 23, 1914 No. 21

The Colorado Strike and the Press

The venality of the public press has rarely been more clearly exhibited than in its treatment of the Colorado strike. We do not refer to its editorial utterances because it is hard for a paper which is not published for the capitalist to side openly with him, for while he and his sympathizers purchase single copies of the newspapers, his enemies and contemners, being many, purchase perhaps twenty. The press is content to follow its readers and refuses to lead.

But surely while hiding its personal feelings in the editorial columns in the hope of extending circulation, the press should have been willing to enter on the less dangerous policy of publishing the report of the military committee. Had it been a contemptible, driveling defense of the militia, it might have been condemned for partisanship; had it been a dry, uninteresting report, it might have been passed over as of no moment, but its fairness stamps it as a document not to be disputed, and its treatment and subject mark it as a news item not to be despised.

We shall however speak solely of its fairness and not of its dramatic interest. It declares that the militiamen should be court-martialed, that Lieutenant Linderfelt, while an experienced soldier, was an inexperienced sociologist, wholly tactless in his treatment of both mine guards and strikers, that he struck Tikas over the head with the stock of his gun so severely as to break that weapon, that the same man Tikas and two others while attempting escape were shot down most probably by the militia.

The commission also declares that the militia fired on some of the foremost tents in the colony, and that the Ludlow camp was burned and looted by the parties which invaded it. It condemns the operators for introducing "ignorant, lawless and savage South European peasants," though how it can be a crime to hire men which the nation permits to enter at its ports we cannot see. The report also refuses to enter into the relative merits of the controversy between operators and miners.

In fact if the report is in any way *ex parte*, its authors may be credited as having been so upright that they leaned backward in their desire to avoid even the slightest suggestion that their report was dictated by either the militia or the operators. Major Edward J. Boughton, the head of the commission, is a lawyer of high standing, and his findings stamp him as just and impartial.

However, out of all the findings of his committee, only the most unfavorable of the statements we have mentioned have been published by the Eastern press. Others which we quoted last week have been entirely ignored. Had they been printed they would have created an entirely different view from that now current.

The attack on the militia did not start till the soldiers had impatiently watched the riflemen of the colony take up a position of advantage in a railroad cut. The enlisted men bitterly resented the forbearance of their leaders which permitted the gunmen of the camp to pass unmolested across an unprotected area to a position of such strength, and to open battle at their convenience. But those leaders had determined to wait till the strikers attacked and it was only when these men driven from the cut returned to the colony that the fire was directed toward it and then only at the first line of tents.

The burning of the colony, the clubbing of Tikas, the firing on the escaping men followed

only after Martin, one of the militiamen, had been found brutally mutilated and the fight had been waged for many hours. The single non-combatant killed by a bullet was the boy Snyder, and his own father is said to have declared that the child met his death at the hands of strikers and not of the militia.

Tikas was struck by Linderfelt in an altercation and shot at a distance as he was escaping to the colony. Yet his death and that of the other prisoners should certainly be investigated, and it appears unlikely that Linderfelt's violence to Tikas can be completely exonerated.

The military commission declares that many of the bullets of the strikers were made poisonous by the insertion of verdigris. Blood poisoning invariably follows wounds made with such projectiles. The report denies that any of the persons attacking the colony used explosive bullets. It states that the cupronickle jacketed bullets used in the present Springfield rifle make a noise in passing through the air resembling that of an explosion and can easily lead inexperienced spectators to think that the bullets are of the explosive type.

Are we not justified in regarding the bloodshed in Colorado as an aftermath of the Balkan and Italo-Turkish wars? Disbanded soldiers are always dangerous and the Ludlow camp was largely populated with such men. The report says:

> The colony numbered hundreds of people of whom only a few families were American. The rest consisted for the most part of Greeks, Montenegrins, Bulgars, Servians, Italians, Mexicans, Tyrolese, Croatians, Austrians, Savoyards and other aliens from the southern countries of Europe. We are credibly informed that within the colony 22 different tongues were spoken.

There are natives of all countries and races on whom every reliance can be placed, but in view of the stories of the murders, maimings and outrages, almost beyond belief, which followed the Balkan war and caused the appointment of an international board of inquiry, we feel it is but just to give the defenders of American people and American property a fair and unbiased hearing when warring with such races, to suppress nothing which is in their favor and to extenuate nothing which their enemies have done.

If the press on all occasions takes the view that our native-born are always and unalterably wrong, we make our history a lie and our future a misgiving. True; there has been some misdoing on the part of the mine guards and militia; fire has been met in part by fire, such men as were available for defense were hired and some have not always been as well disciplined as the best of regulars. But on the whole we cannot find reason for any general censure of the organization faced as they were by such conscienceless foes.

Sometimes they thought when men came from a camp with arms in their hands and began to fire on them from trenches that they were really in the presence of war and fully justified in using their weapons in actual defense and attack as well as in drill and target practice.

It is not those men who should bear the main brunt of our condemnation, but these aliens who have brought us a new glimpse of the Middle Ages and have disgraced our orderly civilization by their unwonted crimes.

So prone are we today to expect of soldiers a high standard of humanity, whereas we demand little or nothing from the immigrants who come to us from southern Europe, that even we, in preparing this editorial, have given undue prominence to the weaknesses of the former parties and passed over, as to be anticipated, the violence and savagery of the latter.

Who were armed without justification? Who delivered the attack? Who fired the first shot? Who drew the fire toward the shelter pits in which other men in the camp had concealed their women and children? Who refused to rescue these victims? Who mutilated Martin, Hockensmith and Chavez? Who used poisoned bullets, tied Heno to the floor and set the house afire? Who avenged themselves on the helpless mules of the operators? Who stretched wires to trip the horses of the militia when there was no fighting in progress? Who destroyed nine mine plants? Those whose violence has caused the United States army to enter the field.

And now lest these aliens with dripping fingers resent our action, we disarm the coal company guards before compelling the foreigners to surrender their weapons. And we deny to the operators the right to hire men and heap upon them every possible obloquy.

This is the land of the immigrant; truly our neuroticism gives him preference over the native born.

Electricity in Coal Mining

By David R. Shearer*

SYNOPSIS—This is the second article of the series on this subject. The distinction between alternating and direct current is here made and the explanation given of how Ohm's law must be varied to meet the condition of impedance.

An alternating differs from a direct or continuous current in that the voltage and current periodically rise to a maximum value then fall back through zero to a maximum negative value then rise again back to zero, thus repeating indefinitely. The entire period from zero through a positive value, back through zero to a negative value and then to zero again represents what is known as a cycle. The number of cycles occurring during one second and is technically spoken of as the frequency of the system. The most usual frequency is 60 cycles per second or as a cycle is two alternations, 7200 alternations per minute, although for power purposes frequencies are in use as low as 15 cycles and some years ago a lighting frequency as high as 133 was not uncommon.

Represented graphically, a direct current would appear

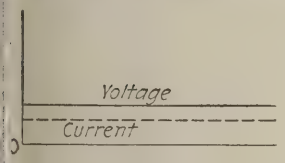


Fig. 1. Direct Current at Constant Load

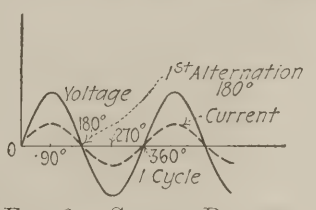


Fig. 2. Single-Phase Alternating Current

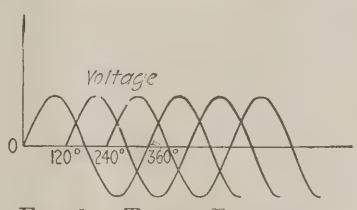


Fig. 3. Three-Phase Alternating Current

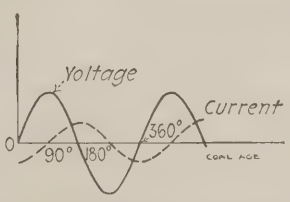


Fig. 4. Current Lagging behind Voltage

as in Fig. 1 when delivering power to a constant load. Alternating current would appear as in Fig. 2 under the same conditions and when the voltage and current are in phase or reach maximum values at the same instant. A curve, such as is shown in this figure, is known as a sinusoid or sine curve.

For more complete understanding of the fundamentals of alternating current, the reader is advised to consult some theoretical work on this subject.

The alternating current represented in Fig. 2 is known as a single phase but if two or more sets of waves are superimposed as in Fig. 3 the current becomes polyphase. The most usual of the polyphase currents is three phase, a voltage wave of which is represented in Fig. 3.

In referring to the voltage and current of an alternating circuit, we do not mean the maximum or peak value of either but the effective or virtual values; that is, a voltage or current equivalent to a direct voltage or current of the same effective values or as an example, if a certain voltage is required to burn a given lamp to a certain value and intensity, we speak of an alternating-current voltage of the same value when it burns the same lamp with the same degree of brilliancy. These values are really the square roots of the mean squares of the ordinates of the current and voltage as outlined graphically.

*Knoxville, Tenn.

The Modification of Ohm's Law

Alternating, like direct current, may be calculated from Ohm's law but this law is altered by the addition of other factors which affect an alternating circuit but not one carrying direct current. Resistance to the flow of a direct current is made up of one factor only, the resistance of the wire forming the circuit, but when we come to consider resistance to an alternating current, we find it composed of two factors, the wire resistance or R that we found in direct-current calculations and in addition another form of resistance known as reactance which is caused by a counter voltage induced by the alternating current itself. This combined effect is known as impedance and is represented by

$$\sqrt{R^2 + r^2}$$

where

r = reactance;

and

R = ohmic resistance.

In direct-current calculations the wattage or power of a circuit was equal to the product of volts by amperes as $I \times E$. This is also true of a single-phase alternating current when the voltage and current are in phase or when they reach a maximum and zero point at the same instant. This will always be the case in an alternating circuit when the load is composed of resistance only, such as incandescent lamps or heating devices depending on ohmic resistance for their operation. However, if the circuit contains reactance, the current wave tends to lag behind the voltage wave as in Fig. 4. In this case, the current is said to be lagging and the power becomes less than the volts multiplied by amperes.

The percentage of true power to apparent power is known as the power factor. Thus, the power factor or

$$PF = \frac{true\ power}{apparent\ power} \text{ or } \frac{wattage}{I \times E}$$

As every circuit contains some reactance, we rarely find the power factor unity or 100 per cent. and if the entire load is inductive, such for instance as induction motors, it frequently drops to 70 per cent. or even to 60 per cent.

The lag in degrees, when a cycle is considered as 360 degrees, is usually represented by the Greek letter ϕ, in which case the power factor may be represented by Cos ϕ.

We find from the foregoing that the power in a single-phase circuit may be calculated as follows:

$$I \times E \times Cos\ \phi$$

In a similar manner, the power in a two-phase circuit and in a three-phase circuit are:

$$\textit{two-phase, wattage} = I \times E \times 2 \times PF$$
$$\textit{three-phase, wattage} = I \times E \times 1.73 \times PF$$

Alternating Current May Be Transformed

Alternating current, unlike direct, may easily be transformed from one voltage to another by means of static transformers and for this reason is used extensively, as the current may be generated at a low voltage and transformed to a much higher one for transmission over long distances, then transformed or stepped down to a working voltage again. The reason for this may be seen readily if we consider Ohm's law, since the wattage or power $I \times E$ remains constant, if we double E we divide I by 2 and have the same amount of power. Now, if we take half of I we may also reduce the capacity or size of our transmission wire by one-half.

From this relation, it may be seen that theoretically, we might transmit thousands of horsepower over a very small wire if the voltage was sufficiently high. In actual practice, an alternating current is usually generated at 2300 volts and is distributed throughout a town at this pressure. Wherever lights or power are needed, a transformer is installed reducing this voltage to either 110 or 220 and correspondingly increasing the current.

When it is necessary to transmit alternating current over long distances, we find that 2300 volts is not sufficiently high to obviate a large amount of drop in the wires. Therefore, it is necessary to raise the voltage to a point somewhere between 13,000 and 160,000, depending on the distance to be covered and the amount of power to be transmitted. Another factor in favor of high voltage is that a given drop in potential when deducted from a low working pressure is much more serious than when taken from a higher voltage. For instance, 10 volts dissipated in a 100-volt circuit is 10 per cent. loss while the same drop in potential in a thousand-volt circuit is only 1 per cent.

From the foregoing sketch of the characteristics of an alternating current, we see many factors in favor of its use and in fact we find alternating current plants making their appearance in mining operations even in the smaller sizes. The special features of this type of plant will be considered in a subsequent article.

Visit of J. Taffanel

J. Taffanel, mining engineer, former French inspector of mines, and now the director of the French mine experiment station at Liévin is the guest of the U. S. Bureau of Mines, and is collaborating with George S. Rice, the chief mining engineer, and others of the staff of the bureau in special tests at the experimental mine near Bruceton, Penn. Mr. Taffanel is known internationally for his original investigations of coal-dust explosions and the means by which they may be prevented.

He arrived in New York from France on Apr. 12, and proceeded immediately to Pittsburgh, where he has been busily engaged in the mine experiments and in studying the records of past tests at the experimental mine. Mr. Taffanel also went with Mr. Rice to Eccles to assist in his investigation. In 1907, on behalf of the French Association of Coal Operators, which had established the Liévin Station as a result of the great Courrières disaster of 1906, he came over to investigate the Monongah disaster. While here he studied on the ground the Darr and Naomi mine explosions. He has also investigated the important British mine disasters of recent years, including those in the Hulton and West Stanley collieries and the recent disaster at the Universal mine, Senghenydd, South Wales.

Besides investigating and testing safety lamps, explosives and mine-rescue apparatus at the Liévin Station, Mr. Taffanel has an organized crew of rescue men ready to assist at any mine disaster in Northern France.

In response to inquiry, Mr. Taffanel said:

I came to this country to study in collaboration with the Bureau of Mines and Mr. Rice some questions concerning the dangers of coal dust and the removal of the risk resulting from its presence.

I began to experiment on this subject in 1907, when the Coal Mine Owners' Association of France decided, some months after the Courrières Disaster, to organize the experimental station at Lievin. I have made up to the present more than 1400 explosions in the experimental gallery and collected many data concerning the relative danger of many coal dusts or coal and stone-dust mixtures. Although the experiments have been made on a big scale, in a gallery 1200 ft. long, the experiments at Liévin do not imitate exactly the mine conditions, and the results must be checked by means of comparative tests in an actual working.

I made such experiments last year, in an abandoned passageway of the Community mine, in France, but was obliged to stop after an explosion which destroyed a part of the passageway. Two months from today I will make tests of the same kind in another abandoned French mine at Montvicq. In the meantime, I was glad to be invited by the Bureau of Mines to follow the experiments in the Bruceton mine, which is perfectly equipped for such experiments.

I find a great profit in studying the important results obtained in this mine by Mr. Rice. Moreover, the experimental comparison of the Liévin and Bruceton results is doubly important, as it gives a confirmation of the Liévin determinations under the real mine conditions. We are able to combine the many data obtained at Liévin with those secured in the Bruceton mine.

Some years ago I designed the first form of arresting barriers, and these have proved, in many tests, to be effective for stopping coal-dust explosions. About a year and a half ago, I began studying new forms of arresting barriers, i.e., tanks or boxes, containing a great quantity of extinguishing materials, water or stone dust, and automatically opened by the air wave preceding the flame. Mr. Rice has followed allel studies and we find much profit in collaborating for the improvement of these devices.

The coal-dust danger forms a difficult problem and one of international interest. All countries which have undertaken to minimize this great danger must unite their efforts for meeting it as effectually and speedily as possible.

Carbide Lamps Freed from Suspicion

Gas and dust was the cause of the explosion which resulted in the death of Frank Hora at the Wheeling Creek (Ohio) mine of the Lorain Coal & Dock Co. at 2 o'clock, Jan. 27, 1914.

It was at first supposed that the residue from carbide lamps had caused the explosion; some of this residue was found in breakthrough 5, about 150 ft. from the center of the explosion. As a preliminary, pending the investigation, a temporary order was issued forbidding the miners of Wheeling Creek mine to use carbide lamps. The local Union passed a resolution demanding a thorough investigation and refused to go to work unless allowed to continue using carbide lamps.

In the meantime, Chief Mine Inspector Davies, Deputy Inspector Gaffney, together with Safety Commissioner of mines, Roan, of the State of Ohio, aided by other deputies, officials and experts were making a most searching in-

vestigation. It was soon demonstrated that as the residue left by the carbide lamps is merely slacked lime, it could therefore not be considered as a cause and it was proved conclusively that even had there been fresh carbide in the breakthrough, it could not have had anything to do with the explosion as the breakthrough was dry.

Carbide will not give off sufficient gas, when exposed to the air, to cause an explosive or even an ignitable mixture unless brought in contact with actual water. The moisture in the air is not sufficient to make enough acetylene to ignite. There can never be an accumulation of gas produced from carbide by moist air for the obvious reason that in order to produce gas, any air which has given up its moisture to produce acetylene must move on and the acetylene goes with it. The careful investigation of the location of the carbide residue showed that as a matter of fact, this residue was shut off from the butt entry in which the explosion occurred by a substantial brattice, the residue being located within 3 ft. of the adjoining butt entry in breakthrough 5, and as before stated with a brattice between it and the butt entry in which the explosion occurred.

Order Forbidding Lamps Was Rescinded

When these facts became apparent, a meeting of the Local Union was called. The order prohibiting the use of acetylene was rescinded by the chief mine inspector, his deputies and the safety commissioner. This action resulted in great relief and satisfaction to all concerned. The investigation into the actual cause of the explosion continued. The work of the Ohio mine inspectors and the safety commissioner was supplemented by an investigation conducted by J. W. Paul of the U. S. Bureau of Mines. It was found that the explosion was caused by an accumulation of methane (firedamp) intensified by dust.

The thoroughness with which the Ohio officials have gone into the matter is indicative of the fact that that state has a very effective mine-inspection department, headed by Chief Inspector Davies. The new Safety Commissioner of Mines, J. M. Roan, was also tireless in his efforts to ascertain the real facts in the case.

Is Hookworm Rife in West Virginia?

As a result of the circulation of a letter from one of the officials of the United States Public Health and Marine Hospital Service to a physician in this state, to the effect that the hookworm disease is prevalent in the southern portion of West Virginia, Governor Hatfield has ordered the bacteriological department of the State University to go to the Pocahontas field and make a rigid investigation. The governor is indignant at the report and declares it is not true.

A little over a month ago, Dr. C. W. Stiles, the zoologist of the Federal Public Health Service wrote a communication, in which he declared that the hookworm was epidemic in the Pocahontas field and that the presence of this disease so generally there was due to the unsanitary conditions of the mining communities.

This matter was brought to the attention of the governor, who declined at first to believe that Doctor Stiles ever wrote any such letter. Later he learned that Doctor Stiles had made a similar report to the officials at Washington. Then he decided to act promptly and he made arrangements for the immediate dispatch of the bacteriologists to McDowell and Mercer Counties.

Declaring that he had practiced medicine in that section of the state for some years, and that he was more or less familiar with sanitary conditions, the governor did not hesitate to say that the report to the Federal Bureau and the statements contained in the Stiles letter were untrue.

But the chief executive did not rely upon his own knowledge. He communicated at once with the leading physicians in the Pocahontas field and asked them for information. The physicians in question and coal operators, with whom the governor had also communicated, began an investigation. A special meeting of the McDowell County Medical Society was called and held at Welch. At this meeting the doctors from the various mining communities of the county reported on conditions in their camps and as a result of these reports resolutions were adopted denouncing the hookworm statements.

In his letter Doctor Stiles said in part:

> I took a trip through the Pocahontas coal-mining region, in West Virginia, on one of the mine-rescue cars sent out by the United States Government. In brief, I found hookworm practically in every place that I visited, but, in general, the clinical appearances were not so marked as in some other portions of the South. The general sanitation of the mining district is very favorable to the development of the hookworm disease.

Some of the physicians worked with Doctor Stiles on his trip through the Pocahontas field. Among them was Dr. C. F. Hicks, superintendent of Miners' Hospital No. 1, at Welch. Doctor Hicks wrote to Governor Hatfield that he had gone through the district with Doctor Stiles. He declared that the Government expert was in the field only two days and that he helped him make tests. Twenty-five tests were made on patients in the hospital the first day and not a single germ of this disease was found. The next day Doctor Stiles visited coal mines in three communities in that section of the state and made a number of tests and found trace of the disease in only one test.

Doctor Hicks declares that Doctor Stiles expressed himself somewhat surprised at not finding traces of the disease and further informed the West Virginian that he believed plenty of the disease was there.

The operators engaged physicians to make reports on the sanitary conditions of the various mining camps and the governor ordered the staff from the State University. The operators have informed the governor that if the disease is there they will do everything in their power to stamp it out. Through their medical staffs the operators keep in close touch with the sanitation of their camps and are careful that the surroundings are healthful.

Governor Hatfield is emphatic in his declaration that the hookworm reports are slanderous to the state and he has ordered the scientists from the university to show just how groundless the reports are. Wherever persons are found to be suffering with the hookworm they will be treated. The governor is confident that only sporadic cases will be found.

By using high boiler settings and by bringing the furnace forward, provision is made for complete combustion before the gases reach the cool surfaces of the boiler. Thus smoke, soot and carbon monoxide are reduced, and more heat obtained. But the larger furnace needs adequate protection against heat radiation and air leakage and inspiration, or as much loss as gain will arise from the improved construction.—Bromley in "Power."

Notes on Australian Coal Mining

By Matt Brodie and P. T. Milligan*

SYNOPSIS—Description of some government-owned mines in Australia. Modern equipment is used throughout. The unusually irregular character of the coal has caused serious difficulties in mining, although the introduction of machines has greatly reduced costs. Frequent rolls in the bottom make it necessary to operate the machine in benches.

At Wonthaggi, Victoria, Australia, the state government owns and operates extensive coal mines, which are under the direct management of the Railways Commission in that state. These mines were opened in 1909 and now rank third among Australian producers of coal. They have supplied nearly the whole of the fuel required by the State Railway for three years past.



Longwall Machine at Work

Note the irregular character of the seam, which is 3 ft. thick at the machine and thins out rapidly to 18 in. on both sides.

The state coal property covers an area of 5100 acres. About one-half of this has been very thoroughly prospected with diamond core drills, and has been shown to bear coal ranging from 2½ ft. to 6 ft. in thickness. The drills employed for this prospecting work were of the diamond core drill pattern, owned by the Victoria State Government, one of them being a class "H" 1000-ft. Sullivan Hydraulic cylinder machine. Since the beginning of this work, nearly 400 bore holes have been put down. During the two years ending June 30, 1913, 27,500 ft. of core borings were taken, in 104 bore holes, with an average depth of 264 feet.

The boring done during the last year proved that a lower seam of coal of workable thickness underlies a considerable area of ground north of the present workings. This discovery has increased the estimate of the quantity of coal, 30 in. thick and over, in the mine area, by some 1,500,000 tons, making a total estimated quantity in the area of 28,000,000 tons. Allowing 20 per cent. for loss in working, and deducting 1,434,000 tons, already extracted, the total still available for production is about 21,000,000 tons. The core borings are being continued to prove the remainder of the ground.

The report of George H. Broome, general manager at Wonthaggi, for the year ending June 30, 1913, has recently been received. It is very complete and a model for such reports. The balance sheet shows a net surplus profit for the year of about $207,000.

Six Hundred and Fifty Acres Developed

The present workings cover an area of about 650 acres, developed by twelve shafts, all of which work the origin-

*Australasia Chambers, Sydney, N. S. W.

ally discovered or upper seam, which is about 235 ft. from the surface. The coal varies from 2½ to 6 ft. in thickness, and is irregular, the entire area being badly broken up by faults. The roof ranges from sandstone to soft shale, and even to material much broken and as soft as mud. The changes occur sharply, making the problem of mining and of sustaining the roof a difficult one.

The output of the mines is hoisted from three shafts, Nos. 5, 9, and 10. There is but one tipple and coal-handling plant; namely, the one at No. 5, which was enlarged during the past year to handle the entire output of the three mines. The coal from the shafts Nos. 9 and 10, some 450 ft. distant, is conveyed above ground to this point by means of an electrically driven endless rope.

The gross tonnage for the year was 462,588 tons. Of this amount, 258,249 tons were screened, 9239 tons unscreened, and 190,163 tons slack coal—a total of 457,651 tons shipped, of which all but 17,000 tons of screened coal was furnished to the State Government Railway. Ten thousand six hundred tons were furnished to various public departments and 171,000 tons of slack coal only were disposed of to the public. The average number of employees during the year was 939, comprising 468 coal miners, 250 other miscellaneous underground employees, and 221 surface men. The mine worked 260 days during the year, on a basis of two shifts.

The average earnings of the miners were $3.23 per day, after deducting the cost of explosives and light. There was but one fatal accident during the year, this being due to a fall of coal at the working face. Underground miners are paid chiefly on a tonnage basis.

Mining Methods

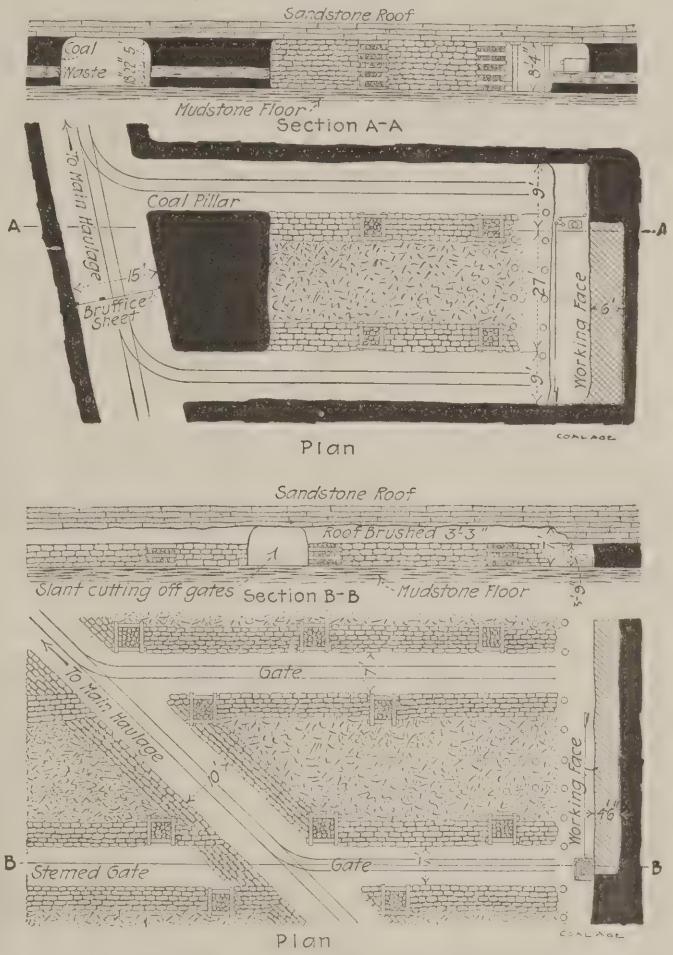
The accompanying illustrations show two typical methods of mining at Wonthaggi, although, as stated, the great irregularity of the seam makes it difficult to adhere to a given system, as the work progresses from one part of the mine area to another. The sketches show the characteristic methods of working at Nos. 9 and 10 shafts. At present, these two shafts are producing about one-half the output of the mine, and practically the whole of this coal is being mined by coal-cutting machines of the Sullivan electric room-and-pillar and longwall patterns. The upper sketch shows the method of working in No. 9 shaft, where the coal is about 6½ ft. high, with a 22-in. dirt band, 18 in. from the floor. As indicated, the method of working is by the "double stall," with stalls or rooms 42 ft. wide, and two gates, or, as they would be called in this country, room necks, with a track in each.

The coal is first mined with a Sullivan room-and-pillar machine, class "CE-7," on the top of the dirt band, the depth of undercut being six feet. The upper five feet of coal is then shot down and filled away or loaded. The dirt band is next lifted and thrown back into the gob; and lastly, the lower 18 in. of coal is raised and loaded out.

In No. 10 shaft working, where the coal is much lower, averaging about 3 ft. 9 in. in thickness, the longwall method is in vogue. A gate or entrance seven feet wide is provided every 33 ft. for handling the machine and loading out the coal, the space between being filled with packing to support the roof.

The broken nature of the seam is shown by the illustration of a Sullivan longwall machine in operation at No. 5 mine. Where the machine is, the coal is three feet high. A few feet away to the right and left, it is but 18 in. thick.

A new opening or slope, known as the McBride Tunnel, is being driven at a gradient of 1 in 5½, for the development of the area lying to the north of the present workings. It is now several hundred feet in from the entrance, and its object is to cut four successive downthrow faults in the present known seam. This will enable the coal to be extracted from four different levels



Sketches Show Two Typical Methods of Mining

in about three-quarters of a mile of tunneling. The objective point of the tunnel is the lower seam of coal mentioned above, in the northern portion of the area.

Surface Plant

The mines are equipped with the most up-to-date machinery, on the surface as well as underground. The total value of the plant is nearly one million dollars. Electric hoists are employed to raise the coal at the three working shafts. Electric power for the hoists, coal-mining machines, rope hauls, pumps, fans, etc., is generated from a central station, which includes a battery of eight boilers fitted with underfeed stokers for burning slack, two generating sets driven by reciprocating engines, and a horizontal turbo-alternator. Current is generated at 5200 volts. The electric power is distributed from this plant to the different mines, where transformers and rotary converters are located, for operating the coal-handling machinery, screen, hoists, tipples, etc.

At the Nos. 9 and 10 shafts a change house and bath rooms were provided for the workmen during the past

year. The building is of wood and corrugated-iron construction, with a concrete floor, and accommodates 400 men. Forty shower baths are provided, with an ample supply of hot and cold water. The workmen's clothes are dried by steam heat. They are attached to hooks, which are handled by chains passing over pulleys on the rafters, so that they may be raised into position for drying.

Mr. Broome's report for 1912 stated, in regard to the Sullivan coal cutters:

"These machines are working satisfactorily on the long-wall faces, where the coal is from 2 ft. 6 in. to three feet in thickness. Under these conditions, they are effecting a saving in cost of about one shilling per ton, compared with hand mining, and in addition to this, recent tests have shown a reduction of ten per cent. in slack, from the machine faces, which at the present selling price means an increase of over 5 pence per ton in the value of the product."

During that year three machines were in use, while the year ended June 30, 1913, eleven Sullivan machines were in operation.

In all, the Wonthaggi mine now owns about 25 Sullivan continuous coal cutters, of which 17 are of the long-wall pattern.

The 1913 report shows that these state-owned mines are hoisting 2200 tons per day of two shifts.

Mount Kembla Colliery

While there are many American coal cutters of the Sullivan continuous-cutting pattern, in use in the various Australian mines, the following mention is of particular interest, because the machines concerned are of the new alternating-current ironclad pattern. Three of these machines are in operation at the Mount Kembla colliery, South Coast, New South Wales, Australia. The average cutting of these machines is about five places per shift, including 5-yd. headings and 8-yd. rooms or bords. An interesting feature of mining at this colliery is that of cutting the coal on canches (benches). This is due to the frequency of rolls of hard stone in the floor of the mine. These rolls are ordinarily quite gradual, and it is customary to drive the rooms along the floor of the trough, causing the crest of the roll to come in a pillar wherever possible. Where the rolls are sharper, varying in height from 18 to 24 in. above the regular level of the floor, the canches are worked ordinarily about 30 in. above the bottom. The total thickness of the seam, it may be stated, is about 6½ to 7 ft. and it is nearly flat.

In order to operate on these canches or benches, the Sullivan ironclad machines are mounted on special trucks, raised to a height of 2 ft. 9 in. above the floor. These are built up by two pieces of 12-in. I-beams, placed horizontally between the wheel-base frame and the truck frame. The canches are carried about the depth of one machine cut, namely, 6½ ft. back from the face, so that when the coal is blasted down after undercutting, most of it remains on the canch, from which it is loaded direct into the mine cars, thereby saving the labor of lifting the coal from the floor to the top of the car. An individual miner can fill as high as 20 tons in a shift, off one of these benches.

Before the continuous-cutting Sullivan machines were installed, American breast machines had been tried and the greater length of these made it necessary to keep the canch or bench much farther back from the face than is now the case; namely, from 15 to 20 ft. It was, therefore, necessary to handle the coal twice; the face shovelers throwing it back to the edge of the canch, from which point it was loaded into the cars.

With the new alternating-current ironclad machine, the cutting speed in this mine averages 16½ in. per minute, and the average load taken is 40 amp. In some parts of the mine, where the rolls are gradual, the machine follows them, and the canch system is not necessary.

The ironclad machine is driven by a 30-hp., 3-phase, 440-volt, 60-cycle, squirrel-cage induction motor, with a star-delta controller for starting. The motor is gas proof. The advantages of using alternating current at this mine are enhanced by the fact that it is 2¼ miles from the tunnel mouth to the working face, so that much higher efficiency is secured in transmission than would be possible with direct current.

Meeting of Anthracite Section of A. I. M. E.

The Pennsylvania Anthracite Section of the American Institute of Mining Engineers held a meeting in the auditorium of the Lehigh & Wilkes-Barre Building, Wilkes-Barre, on Saturday evening, May 9. Douglas Bunting read a paper entitled "Mining under Heavy Wash." Following the reading of this paper, there was a discussion of the subject by Messrs. Hill, Stearns, Norris, Griffith, Engle, Smith, Otto and Foster.

It was the consensus of opinion of all the members present that the problem of mining coal under heavy wash is a matter of much interest to anthracite people, and is a subject that has not been developed in recent years to an extent its importance justifies.

At subsequent meetings of the Anthracite Section, further discussion of Mr. Bunting's paper will take place, and there is no doubt but that such a broad consideration of the problem will furnish the mining industry with much information of a practical and valuable nature.

At this same meeting, John M. Humphrey was to read a paper on "Stripping." Mr. Humphrey's absence through illness, necessitated the postponement of this latter paper.

The Anthracite Section of the A. I. M. E. is proving to be a healthy branch of the parent organization, and it is expected that this newly organized body of coal-mining men will accomplish much work of a beneficial and lasting nature.

Erratum

On p. 773 of our May 9 issue, a photograph was published, under which appeared the following caption: "These Four Strike-Breakers Were Killed the Day after Picture Was Taken." It seems that the photographer on the ground who secured the picture was either misinformed or deliberately misstated the facts in the case. One of the men in the picture, Evan Jones by name, writes us, stating that he is very much alive and that the only one of the four men who was killed was a blacksmith by the name of Newman. Mr. Jones says that he was not a strikebreaker, having been employed by the Rocky Mountain Fuel Co. as their mine examiner.

Construction and Operation of Mine Substations

By H. Booker*

SYNOPSIS—Substations, when possible, should be located on the surface, because if placed underground there is danger from fire, dampness weakens insulation and causes corrosion of metallic parts. Underground substations are more costly to construct than those located on the surface as the mine roof is weak and should be arched or built of heavy concrete, the station being made fireproof throughout.

There is a growing use of electricity in coal mines, especially during the last two or three years, due to the introduction of central-station power which, strange to say, can be sold to a coal mine cheaper than the mine can produce it itself.

The greatest care should be exercised in the introduction of electric power in a coal mine and the best advice should be obtained. Electric power improperly installed and not properly operated and maintained will no doubt prove a hazard and just such conditions are causing apprehension in some localities regarding the use of electric power in mines.

Does Not Pay to Install Poor Machinery

The danger and unsatisfactory service associated with electric power in the past, has been largely due to the short-sighted policy of the coal-mining companies in purchasing cheap equipment unsuited to the service and in employing incompetent labor. A coal mine is the last place where inferior or poorly designed electrical apparatus should be used, as the risk of trouble is too great.

Even with the best designed and adapted equipment the question of operation and maintenance is one which is often sadly neglected. The matter of compensation is often allowed to play too prominent a part, and the wages offered are such that it is impossible to obtain competent men who will take care of the plant and who will realize the importance of maintaining the apparatus in proper condition.

Rigid, systematic and careful tests should be made periodically on all moving parts of electrical equipment to insure proper operation and records kept of these tests for future reference.

Isolated Plants vs. Central Stations

Until quite recently the electric power in use at coal mines was produced by small isolated plants located at each mine. With the large increase in production and the combination of many small mines, the introduction of central plants and the purchase of central-station power is rapidly gaining ground.

The use of power from a central plant, or of purchased power, requires a substation to supply direct current to operate the mine locomotives, cutting machines, underground pumps and lights. A mine substation, in general, consists of one or more motor-generator sets or synchronous converters used to transform high-voltage alternating-current power to direct current at 250 or 500 volts.

The small isolated plant was generally placed near the mine mouth, provided the coal and water supply was convenient. As the capacity of the mine increased and the distance to the working face became greater the power conditions became unsatisfactory. An increase in the capacity of the existing plant often means a large expenditure of time and money, so that the purchase of central-station power and the installation of a substation offers the best solution. The substation can generally be placed at a more advantageous point than the isolated plant because a substation is independent of the supply of coal and water. An increase in power supply at any time can be easily and quickly provided at a low cost.

Substation Requires Little Care

Substations when properly designed and installed require little attention, and the attendant is needed only to reset circuit-breakers and to see that everything is running properly. If power is not wanted the machines can be cut out and all expense for current stopped. Starting up is a simple matter of closing a switch and full power is available immediately.

The combination of purchased power and the substation system of power distribution is most advantageous for coal companies operating single or widely separated mines. The operator transfers his responsibility to those whose business it is to carry it, leaving him free for his business of mining coal, thus relieving him of the worry and care of his power plant, and thereby greatly increasing the efficiency of his coal-mining department. The operator substitutes his power house with its engineers and firemen and its need for good and abundant water, with a small substation that requires only one attendant and no water supply.

Where Substation Should Be Located

The exact location of the substation is often a hard question to decide. Conditions frequently arise where it would be desirable to install the substation underground, but in general, unless absolutely necessary, the substation should be placed on the surface. The preferable location is at the mine mouth when possible, as it can then be attended by a workman who has other duties to perform. In a small mine the tipple foreman can attend to the station, while in a shaft mine the station should be located in the hoist room and kept in operation by the hoist engineer.

In a large mine requiring more than one station, all substations should be located at working centers to save the expense of heavy copper feeders. The substation can often be located near the fan so that the same operator can look after both. When the direct-current feed wires cannot be carried into the mine by one of the openings, boreholes can be used, as it is comparatively simple to maintain a 500-volt cable installed in a borehole.

*General superintendent of mines, Pittsburgh-Buffalo Co., 455 West Main St., Monongahela, Penn.

Note—Article read before the 293d meeting of the American Institute of Electrical Engineers, Pittsburgh, Penn., Apr. 10, 1914, under the auspices of the Committee on the Use of Electricity in Mines.

Keep Substations on Surface

There are many objections to locating the substation underground. Beside the danger from fire there is almost always much dampness underground which not only weakens the insulation, but causes corrosion of unprotected metallic parts. It is practically impossible to make an underground substation free from moisture, and sufficient ventilation is often difficult to obtain. A suitable current of air is important, for the heat losses in the apparatus must be carried away so that the capacity of the machines will not be impaired. That this heat is not negligible will be readily appreciated when it is considered that the loss of one kilowatt per minute is equal to 57 B.t.u., which is equivalent to heating about 3001 cu.ft. of air 1 deg. F. per minute. The total loss in a 200-kw. station will be approximately 15 kw. The heat generated will, however, help to keep the substation dry in conjunction with proper drainage and pumping.

Use Intake Air in Substation

All underground substations should be ventilated with intake air and all high-tension cables should, when possible, be carried to the substation in the intake airway. This may work a hardship, particularly if the mine is operated from a shaft and a blowing fan is used, as it is practically impossible to maintain wires in a shaft of this kind on account of the high air velocity. I know of mines of this type where it is unsafe for a man to attempt to ascend the stairway, much less do any work while the fan is in operation. Often much coal dust and pure sand are picked up by the air currents and play havoc with the bearings and oiling systems.

The cost of construction of an underground substation is considerably greater than that of such a building on the surface. Since there is always danger of the roof giving way, it should be arched or built of heavy reinforced concrete and the whole station made fireproof. For a 200-kw. substation the dimensions should not be less than 24x24 ft. and the height 12 ft.

Low-Tension Cables Are More Easily Maintained

With the substation located underground it is generally necessary to carry a high-tension cable through a bore hole. With the station located on the surface a low-tension cable suffices and it will be no trouble to maintain. A satisfactory method is to use "lead" covered cable attached to a messenger cable about every 30 ft. by wiped joints or suitable clamps, which will not injure the lead. The high-tension cable is difficult to maintain in deep shafts and boreholes.

Actual experience has taught me that it is impossible to get attendants underground to give machinery the same care they will give it on the surface. There is a greater tendency among men to sleep on the night shift in mines, than on the same shift outside. This may be due to the mine atmosphere, which is often contaminated with gas from gob workings.

In the general design and construction of a mine substation, economy of space should be given consideration, but care must be exercised to see that there is plenty of room for making repairs and replacements. A substation may be required to provide service for a few hours per day or practically without a break. As due provision must be made for inspection and repairs, it is evident that in case of continuous operation, attention must be given to the sectionalization of the apparatus and the duplication of the equipment.

As the consumer will naturally want to supervise the operation of his own station, it is evident that any complications in switching equipment and control apparatus should be avoided. The substation should be constructed of fireproof material, and all high-voltage apparatus should be inclosed to secure maximum safety to attendants. Asbestos lumber should be used for partitions and doors. This serves as a protection against shock and is valuable protection in case of fire.

The common faults in electrical installations of this kind are as follows:

Exposure of high- and medium-pressure conductors at the surface and high- and medium-pressure switching gear underground. The frames of high- and medium-pressure apparatus not properly grounded. (All machine frames should be well grounded.) Switches, cables, rheostats, starting boxes, etc., mounted on wood and surrounded by as much wood as possible. (Such defects in method cause first, a shock when somebody comes in contact with an exposed live part; second, fire due to defective joints in cables.) Omission of tubes, where frames of machines and brattices are pierced by cables.

Defects in Organization

The common defects of organization are as follows: The absence of trained electricians. The handling of live wires or apparatus for adjustment or repair when not absolutely necessary. The absence of a definite and distinct rule that unskilled men may handle electrical cables and apparatus only when the power is off.

The use of central-station power will no doubt bring the operating force at the mine in close touch with the central-station operating force which is always ready and willing to advise the coal operator in regard to his installation and operation.

It is to be hoped that improved legislation and a better coöperation between the mining companies and the Bureau of Mines will greatly increase the safety and improve the operating conditions in connection with the use of electricity in mines.

The World's Coal Production

Wm. G. Gray, statistician of the American Iron and Steel Institute, estimates the world's coal production for the years 1911 and 1912 as follows in metric tons, except where otherwise noted:

Countries	1911	1912
United States	†443,188,505	477,202,304
Germany and Luxemburg	234,521,254	255,810,094
Great Britain	†271,891,899	260,416,338
France	39,229,591	41,308,580
Belgium	23,053,540	22,972,740
Austria*	40,414,914	42,934,500
Hungary	9,444,741	9,587,276
Russia	28,007,239	30,641,163
Sweden	311,809	360,291
Spain	3,915,672	no statistics
Italy	557,137	663,812
Canada	‡11,323,388	14,512,829
Transvaal	†3,878,286	
Natal	†2,392,456	
India	†12,715,534	14,706,339
New South Wales	†8,691,604	9,885,815
New Zealand	†2,066,073	2,177,615
Victoria	†659,598	593,155
Tasmania	†57,067	53,560
Western Australia	†249,890	295,079
Queensland	†891,568	902,166
Japan	17,632,710	19,639,755
Formosa	254,921	278,455
Corea	123,668	
Other countries—partly estimated	**22,814,386	22,807,421

*Includes Bosnia and Herzegovina. †Gross tons. ‡Short tons. **Metric and gross tons.

Surveying Methods of the Madison Coal Corporation

By G. E. Lyman*

SYNOPSIS—Typical surveying practice in the Middle West. Some important notes regarding the relative accuracy required under varying conditions are given. Both inside and outside methods are described, together with office computations and map work.

The mining operations of this company are conducted in widely separated coal fields, consisting of about four thousand acres each, it being about two hundred miles between the extreme territories. Each field is worked by one or two mines, and it is accordingly necessary to handle each by itself, it being impracticable, as well as unnecessary, to correlate the surveys of the different fields. Therefore, each has its own set of coördinates, base lines, etc., making each coal field with its own mines, a complete unit to itself.

All the mines are at present working in the No. 6 seam, which, with few exceptions, lies so nearly level that corrections for vertical angles are rarely required, the average grades being considerably under one per cent.

Maintaining a Consistent Standard of Accuracy

These conditions largely determine the methods necessary to attain the degree of accuracy desirable for the work. The fixing of such a standard is an important point, as otherwise a great deal of inconsistency will characterize different parts of the work. Nothing is more incongruous, as well as expensive, than the use of extreme refinement at one stage of the work, only to lose all benefit therefrom by subsequent looser work. If transits are used, reading down to a few seconds, temperature compensated-tapes and spring-tension handles should also be employed. Such refinement, however necessary in long tunnel and extended triangulation operations, and fascinating in itself to the engineer, is entirely out of place in the ordinary daily run of mine work.

In the routine work herein described, it has been the effort to confine errors to one in six thousand, and to keep all operations of the survey relatively consistent for the attainment of such results. Transits with plain verniers reading to single minutes are employed, which by interpolation can be read to the nearest half-minute, if desired. Ordinary traverse work is read to minutes. Tapes are graduated to single feet, and are used in lengths of 100, 200, and occasionally 500 ft. The first and last foot is graduated to tenths, and when necessary to measure to hundredths, a pocket scale can be used. Long distances are measured to tenths, shorter ones to hundredths. Office calculations are uniformly carried to hundredths. Adherence to these standards gives results often far within the permissible margin of error. Probably the only exception to the above routine is in shaft plumbing.

The surface survey consists primarily of a traverse of the land corners, with such supplementary work as necessary to locate streams, roads, railroads, buildings, and the other items which go to make up a complete topographic survey. Some of the surface is so level that sights of a mile may be readily taken, and in such cases a plain traverse survey gives good results. When it is too hilly, triangulation is resorted to.

Surface Monuments, Instrument Work and Chaining

Permanent surface monuments are established, consisting of iron pins set in concrete, and where practicable, three are used, so as to detect any disturbance in their angular relation. It is desirable that one of these permanent stations be set sufficiently close to the shaft to permit of its use in the shaft plumbing. Similar groups of monuments, established in outlying districts of the field, enable surveys to be started from them at will. All permanent monuments are carefully tied in by closed surveys.

All traverse work is run with the continuous vernier, the azimuth being read directly off the plate and recorded in the field book. The bearing is next read by the opposite vernier, and recorded. Then, and not before, the transitman compares the two records as he has written them down, and if they check, he knows the verniers have been correctly read. When moving ahead, the upper motion is never released, and after taking his backsight the transitman again reads his vernier to make certain it has not been disturbed before turning on the station ahead. At intervals the vernier readings are checked against the needle, which would disclose any error of magnitude, although except for this approximate check the needle is never employed. When the above routine is faithfully followed, errors in instrument work will be few and far between.

The measurements are carefully taken between stations along the line given by the transit, and where there is no opportunity of closing the traverse or tying it in to a permanent monument, the distances are checked by rechaining in the opposite direction. It is generally in the measuring that the most errors occur. Young engineers, in their anxiety to become instrumentmen, are prone to overlook the careful and concentrated effort necessary for accurate chaining, and the chainman who realizes the importance of this work, and who is able to handle it accurately and with dispatch, is a jewel of the first water. A single wrong plus, taken by a man with his mind on other things, can easily cause more trouble than he is worth. All distances between stations are recorded as individual measurements, continuous chaining, as in railroad work, never being used.

Underground Work

The transference of the azimuth and coördinates of the surface survey to the underground workings, in the case of shaft mines, such as those under consideration, requires the most careful and painstaking work. Each mine has at least two shafts and the method of single wires in each is adopted as affording the greatest accuracy. An effort will be made in a subsequent article to outline the details of this operation.

*Engineer, Madison Coal Corporation, Glen Carbon, Ill.

The underground survey is carried forward by the same traverse methods as already described for the surface work, making only such variations as necessitated by the changed environment. The stations are all set in 1-in. wooden plugs, driven firmly into holes drilled two or three inches into the roof. Timbers are used only when the nature of the roof makes it unavoidable. The transit is set under the station, the telescope being centered on top for this purpose. Sights of ordinary length are taken on the string of the plumb-bob, and those of greater distance are taken on the point of the bob. Carbide lamps are used, on account of their excellent illumination, all the mines being worked with open lights.

Stations are set in the rock roof where possible, considerable time being taken to so place them, since their permanancy makes it well worth the extra time and trouble. Sights as long as 1600 ft. have been taken underground, but on account of the difficulty of handling them, sights over seven or eight hundred feet are seldom used.

The entry sights, or "pointers," as well as all sights for connections and other special work, are set by the engineers, and where the roof is good, consist of two points, about three feet apart, set in the slate or rock top, from which plumb lines may be suspended for sighting ahead. Where necessary to use entry timbers, three and often four points are set, so any movement may be detected before the entry gets off line.

The uniformity of the seam makes it possible to project the workings far ahead of actual mining. When within a reasonable distance of the place to turn a new entry, the mine manager is given written instructions which enable him to mark off the correct location by measuring the proper distance from the last pair of entry sights. As soon as it is ready, an engineer sets the sights for the new entry to conform to its projected location. These entry sights are tied in to the traverse work and are advanced about every 200 ft. At the proper interval, one point will be converted into a permanent station and again carefully tied in to the preceding traverse. The distance and azimuth are compared with the record of sight extension, and if any discrepancy exists it is at once investigated.

Room Sights and Tie Surveys

At each mine there is one man who is directly charged with the duty of watching the entry sights set by the engineers, seeing that they are kept on the lines designated, and in case of accident affecting the sights he sets temporary ones until they can be reset by the engineer. This man works as an assistant to the mine manager, and with a transit sets the sights for the rooms as fast as they are necked. All rooms being turned at right angles to the entry this is a simple process, and one with which trouble is seldom experienced. He further sees that all places are stopped when driven the required distance, and when finished, measures them up, notes the crosscuts right and left, and places the information on a report which goes monthly to the engineering department. This is used afterward for checking purposes in a manner described further on.

Advantage is taken of every opportunity to close portions of the traverse between different parts of the mine, and thus obtain the only possible mathematical check on the work. In important cases where a closure is highly desirable and it is not deemed wise to connect the workings, satisfactory results are readily obtained by advancing the faces to within 10 or 15 ft. of each other and putting through a 2- or 3-in. drillhole, thus allowing the survey to be closed. A little cement mortar readily closes the hole when it has served its purpose. Large drill holes from the surface, to accommodate pump discharges and other purposes, afford an excellent opportunity of checking the coördination of the top and bottom surveys, while an occasional connection between adjacent mines offers the severest test of all, involving as it does two sets of shaft plumbing.

Levels

Levels are required by the law of Illinois to be shown "at reasonable intervals along the main and cross entries," the elevations being referred to the base of coal at the hoisting shaft. The advantages, however, of having them referred to the bench marks of the United States Geological Survey, and being able to use them in connection with the topographic sheets, are sufficient to warrant two sets of maps, if necessary—one to comply with the letter of the law, and the other for practical working purposes.

In taking the entry levels, the main entries are first carefully chained, continuous notes being kept, entirely distinct from the traverse work. Accurate plusses are taken to all cross-entry switches and to all permanent stations of the traverse survey. As opportunity permits, the distance between permanent stations is figured from these continuous chaining notes and compared with the distances recorded in the traverse book, affording an additional check on the mensuration. In the cross entries the same method is followed, the chaining being picked up from the plus to its switch and carried ahead continuously to the face. The advantage of this lies in the fact that it is thus possible, without any rearrangement of notes, to plat a continuous profile of any haulage road from the main shaft out to the face. A 22-in. wye level is used, and elevations taken every hundred feet, ordinarily, along the top of the rail. Elevations of permanent stations are taken to serve as benchmarks, and advantage taken of all connections to close the work.

Map Extensions and Office Computations

Complete measurements for map extensions are made at intervals varying with the working time of the various mines. This is mostly done independently of the traverse and sight-setting work, generally after the latter have just been extended all around. The entries, as a rule, are held so rigidly to the sights set by the engineers that little more is necessary than to locate the crosscuts and room necks. This is done by measurements from permanent stations of the traverse survey, and at the same time any necessary side measurements are obtained. The rooms are measured, the crosscuts located, pillar widths obtained, and if the room has got off the sights its bearing is obtained by a Brunton pocket transit, care being taken to observe the magnetic bearing of the entry and room from the same point, so as to eliminate errors of local attraction. Any work which may have gone badly out of line is located by a traverse survey, and an effort made to place the responsibility for same where it belongs. Details of ventilation, location of doors, motor partings, pumps, and miscellaneous information of like

character are obtained at the same time, and at more or less frequent intervals the height of the working faces is taken to check the tonnage extraction.

In the office, the traverse notes are transcribed from the field book into the survey record sheets, copy of which is shown herewith. Any distances which may have been measured on a sufficient angle from the horizontal to materially affect results are first reduced to horizontal measurements. Each entry has its separate sheet, and each mine its individual loose-leaf binder. The sines and cosines are first worked up by Gurden's traverse tables and entered on the record. The natural functions of the bearing are then placed on the record, and multiplied by the distance with a Thatcher slide rule, of the large cylindrical type, which will readily handle to two decimal places any distance less than a thousand feet.

The results obtained by these two methods are compared as they stand on the sheet, and any discrepancy checked by another man. When correct, each is given its plus or minus sign, everything north and east being plus, and those south and west, minus. Their algebraic sum then gives the longitude and latitude of each station, or as it is often called the "latitude and departure." The algebraic addition is checked, the sheet O.K'd, and indexed. In the column for remarks, closures are noted, references given to other sheets, and any other information recorded.

Closures of simple underground circuits are frequently made with an error of not less than one in ten to twelve thousand, while surface and underground closures by means of drill holes often come within the eight thousand limit. Connections with adjacent mines, through two sets of shaft plumbing have been made with an error of one in eight thousand.

MADISON COAL CORPORATION

Coördinates of Mine No. 5

Location 13th and 14th North—Main East Date September 20, 1913

Line	Distance	Azimuth	Bearing	Natural Sine	Natural Cosine	Slide Rule L. Sin O	Slide Rule L. Cosin O	Traverse Table L. Sin O	Traverse Table L. Cosin O	Longitude	Latitude	Station	Remarks
392–432	353.90	00° 02′	N00° 02′E	0.00058	1.00000	+0.20	+353.90	+0.20	+353.90	+7139.78	—1364.88	432	Opposite 2nd E - 14th N
432–461	350.80	00° 11′	N00° 11′E	0.00320	0.99999	+1.12	+350.80	+1.12	+350.80	+7140.90	—1014.08	461	Opposite 3rd E - 14th N
461–434	58.30	356° 58′	N 3° 02′W	0.05292	0.99860	—3.09	+ 58.21	—3.09	+ 58.21	+7137.81	— 955.87	434	Opposite 4th E - 14th N
										+7137.60	— 955.82	434	Closure from 12th N - Main East
										0.21	0.05		Error of closure

Map Work

The coördinate maps are made on the best obtainable quality of heavy, cloth-mounted drawing paper, and as a rule are on a scale of 200 ft. equals 1 in. The sheets are laid off in squares two thousand feet each way, properly designated, and the location of each station platted on from the office record sheets. The platting is checked by scaling the distances between stations and comparing with the actual length of the course. All underground survey lines are shown in red, and form the framework around which is drawn the mine workings in black. The work of each fiscal year is given its color, and dated. Should it happen that any place has become inaccessible for measurement when the engineers were making their extensions, reference is had to the mine reports previously mentioned and the place shown in accordance therewith, in dotted lines, to differentiate it from the work of the engineering department. These reports are further checked over in detail against the newly extended maps, and any discrepancies investigated.

Tracings are extended with the coördinate maps, and prints furnished the various officials. Once a year maps are filed in accordance with law with the State Mine Inspector, State Rescue Stations, and the County Recorder. Small scale maps of the different coal fields are made for those officials who would find the larger ones cumbersome, and in making such reductions the pantograph, photography and proportional dividers are employed. Photography is frequently used in place of, or to supplement drawings, with excellent results.

The mine projects are always kept on separate tracings, and prints furnished those who have need for them. These are made on a scale of 200 ft. equals 1 in., the same as the mine maps, and photo reductions are made and attached to the field books of the various mines.

Separate tracings are made and extended yearly to show the outline of the worked out acreage. This tracing is carefully adjusted over the coördinate map, and a line drawn around the faces. The areas are then measured with a planimeter, and entered on the tax-record sheets. These sheets show the worked out and remaining acreages by quarter sections, and furnish the necessary data by which the district superintendents make the yearly returns to the assessors. This method of handling prevents absolutely the possibility of overlapping measurements from year to year, and furnishes a permanent record of the worked out areas.

From the data now available, statements are prepared showing by mines and coal fields the areas mined out and remaining, percentages of extraction, and other information required by the executive departments in preparing their annual statements.

Recent Legal Decisions

Amount Recoverable For Loss of Eyesight—Where a mine pumpman lost his eyesight in an accident attributable to negligence on the part of his employer, $1000 was not excessive recovery. (Kentucky Court of Appeals, Stearns Coal & Lumber Co. vs. Tuggle, 164 Southwestern Reporter 74.)

Liability for Viciousness of Horse—A retail coal dealer, whose delivery horse bit a pedestrian while the latter was passing along a sidewalk, is not liable for the accident, unless the dealer previously had notice of the horse's vicious tendencies. (Massachusetts Supreme Judicial Court, Dix vs. Somerset Coal Co., 104 Northeastern Reporter 433.)

Liability for Injury to Miner in Kansas—Under the Kansas Mine Law, which requires the owner or operator of a coal mine to employ a mine boss to make inspections to promote the safety of employees, an operator is liable for injury to a miner attributable to non-compliance with the law. (Kansas Supreme Court, Baisdrenghein vs. M. K. & T. Ry. Co., 139 Pacific Reporter 428.)

Legal Right of Miners to Strike—Recognizing the right of every employee to quit work when dissatisfied with the conditions under which he is working, where he is not bound by contract for a definite term, without assigning any reason, and recognizing the right of any number of workmen to do collectively what they might do individually, it is held that neither a union of mine workers nor its members are liable in damages to a nonunion miner who is discharged under threat of the union men to quit unless he should be discharged. (Oklahoma Supreme Court, Roddy vs. United Mine Workers of America, 139 Pacific Reporter 126.)

The Explosion at Eccles, W. Va.

By R. Dawson Hall

SYNOPSIS—A well conducted mine with men both in charge and at work having a more than usual sense of responsibility blows up at Eccles, Raleigh County, West Virginia, killing 180 men. The company operating was strict in its discipline and careful in its management. Operating changes are described which will make the mines safer in the future. It is not safe to rely on ventilation and sprinkling in a bituminous-coal mine which generates gas.

The Eccles explosion in the mine of the New River Collieries Co. exhibits clearly the inevitable dangers of mining and should teach important lessons to operators. It should be followed by some drastic legislation and this

Description of Mine

The Eccles Mines are four in number, No. 1, which is no longer working, No. 3, and two mines, which were the seat of the recent explosion, Nos. 5 and 6. No. 5 is operating in the Beckley seam, the landing being 523 ft. from the surface in that shaft. The Sewell seam in the same shaft is 254 ft. below the surface. No. 6 is in the Sewell seam which, at that point, is 275 ft. below the ground. The bottom of the Beckley bed at No. 6 is 534 ft. from the surface landing, but only the airway is extended to this lower seam.

The Beckley seam in No. 5 varies from 9 ft. on the south to about 7 ft. 6 in. on the north and west. It will average in that mine about 8 ft. The roof is of sand-



Shaft No. 5, the Intake, with Shaft No. 6, the Return, in the Distance

should be advocated by the coal-mine owners, no less than by the men. When in ordinary industries one man commits a folly, he is injured or killed. In coal mining, not only he himself is killed, but all his coworkers. There is, therefore, hardly a business except powder making or railroading in which stringent precautions are more absolutely necessary.

The law is wholly inadequate; the Eccles authorities realized this and supplemented it in many ways, and hereafter they intend to be even more careful and it is only just that their competitors in business should be compelled to take precautions assuring equal safety. For excessive caution inconveniences and alarms the workman, and he does not like to work in the mines where he is thus handicapped or where the precautions adopted remind him hourly of the risks of the employment in which he is engaged. He would sooner face those risks unguarded in mines where they are less frankly acknowledged, though not less certainly existent.

stone without pot-holes or draw slate. Sometimes it will break after some exposure from weathering, but on the whole it is a reliable roof. The bottom is of shale.

The Mine Was Kept Moist

It is important perhaps to remember this, for it is evident that aside from the sand scattered by the motors to assist adhesion, there was probably little material of a non-carbonaceous nature to stay the progress of an explosion. The reliance of the management was wholly on the removal of coal dust and its continuous dampening.

In this matter, every precaution was taken. There was a system of piping along all the roadways and connections at every room. Though it was not customary to sprinkle before every shot, the rooms were kept damp by copious spraying with water.

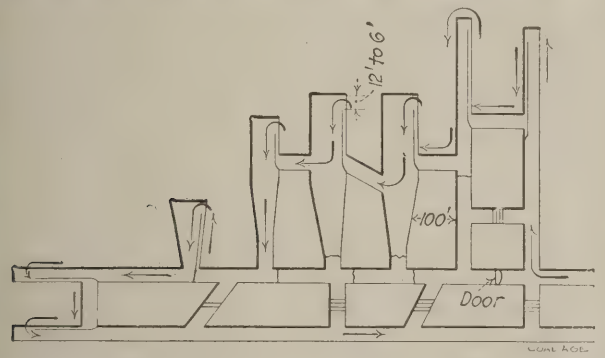
But the management, not satisfied with spraying, turned the exhaust from the fan into the intake and kept

the air damp. The humidity was frequently and carefully measured and averaged 98 per cent. of complete saturation. The roof was at all times dripping with water.

The Ventilating Precautions

The mine made gas freely, but many precautions were taken to prevent a dangerous accumulation. At every place the ventilation was carried within 12 ft. of the working face, not only in entries but in rooms and in crosscuts. When a room was started a fly across the heading baffled the entering air, and a well secured brattice cloth up the roomway conducted the air to the face of the room.

As soon as a room crosscut was driven to the room above, flies were put inby, outby and in the room neck. Thus the air could not enter by the heading, and even



Method of Ventilating by Stoppings, Curtains and Flies

when a fly was lifted in the entry for the passage of a man or a trip, the fly in the room being closed, the air was kept from circulating by any path except that prescribed near the working face. Thus the gas was effectually swept out by the current.

The air was provided by a 22-ft. Jeffrey fan generating about a 1-in. water gage. The two mines were still small and the airways large, so that much air pressure was not needed. I understand that no analyses were made to determine the methane in the return airway, nor were any more refined tests of its gas content made than are afforded by the ordinary safety lamp.

The mine cars are of the end-gate type. They are in excellent condition and reasonably tight for cars so constructed. The end gate is of iron, though the car is of wood. Self-dumping cages are in use.

The Shafts

No. 5 was the intake. The shaft had three compartments, one for air and two for hoisting, the airway being partitioned from the hoistway by tongued and grooved flooring. The same construction detail was followed in shaft No. 6, but the airway alone extended to the level of the Beckley seam and it served as a return instead of an intake.

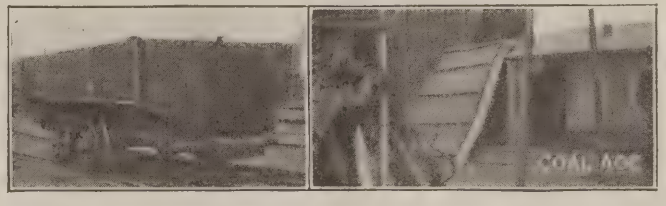
The top of the airway in No. 5 was covered by steel doors to open should an explosion occur and thus protect the fan. These proved effectual, when the explosions occurred; they did not open, it is true, but were blown bodily from their hinges. However, the fan was amply protected.

The map will show how carefully the mine was laid out and driven. The management of other details was just as thorough. All the room crosscuts were closed by stoppings of wood or of brattice cloth. The heading breakthroughs were closed by walls of masonry 4 to 6 ft. thick, except that in a few cases there were brick walls 16 in. in thickness. The masonry walls were of good construction, being plastered all over their faces with lime mortar.

Shooting Arrangements

The pick miners fired their own shots. They were required to use Monobel No. 2 powder and to tamp with clay, which was supplied them. The company engaged two safety inspectors, but it is too much to assume that these men were able to stop entirely the pernicious habit of shooting from the solid or could assure themselves always that clay and not coal slack was used in tamping.

It is nearly always possible for a man who has fired a shot of greater depth than his undermining to slip up after his shot is fired and cut a small undercut near the floor, which will resemble the extreme end of a *bona-fide* undercut, as it is revealed after the coal is shot down. Of course, these inspectors, if faithful in their work,



No. 5 Mine Car
The end gate was of steel and comparatively tight fitting. The cars were of tight construction.

A Shaft Door
This was blown off when the mine exploded. The round hole shows where a pipe was blown through the door.

must have reduced the amount of such solid shooting, but they could not absolutely prevent it nor always detect it after it had been done. The shotfiring of machine-mined coal was done by the company's shotfirers, the holes being both loaded and fired by them.

The haulage and even the gathering were performed mainly by electric motors, using 500-volt direct current. The transmission was all at that voltage, though 2300-volt alternating current was used for the town transmission, the current being transformed for lighting to 110 volts.

No. 5 mine was producing about 1500 tons per day and No. 6, 500. No. 3 mine, which is in the Beckley seam, is producing about 1200 tons.

The Explosions

The first and most violent explosion occurred at about 2 p.m., Apr. 28. It threw out large portions of the partitions in both shafts with a large quantity of mud. One head cager was blown away from the shaft mouth but was not severely hurt. The upper part of a man was thrown up No. 5 shaft and landed on the surface. A boy who was on one of the railroad cars was blown off and fell, breaking his arm. No other men on the surface were injured.

A pipe was driven up through the doors of the airway in shaft No. 5, making quite a neat perforation. Neither of the wooden headframes was in any way injured, but the stairs, of course, in No. 6 mine were blown out. The approach also by Shaft No. 5 was completely cut off by the wreckage caused.

Twelve minutes later another and less violent explosion occurred, which threw out of the shafts material which

had possibly fallen back after the first explosion. Fortunately this event occurred before any rescue work had been attempted and no further explosions occurring there was no addition to the list of dead from such work.

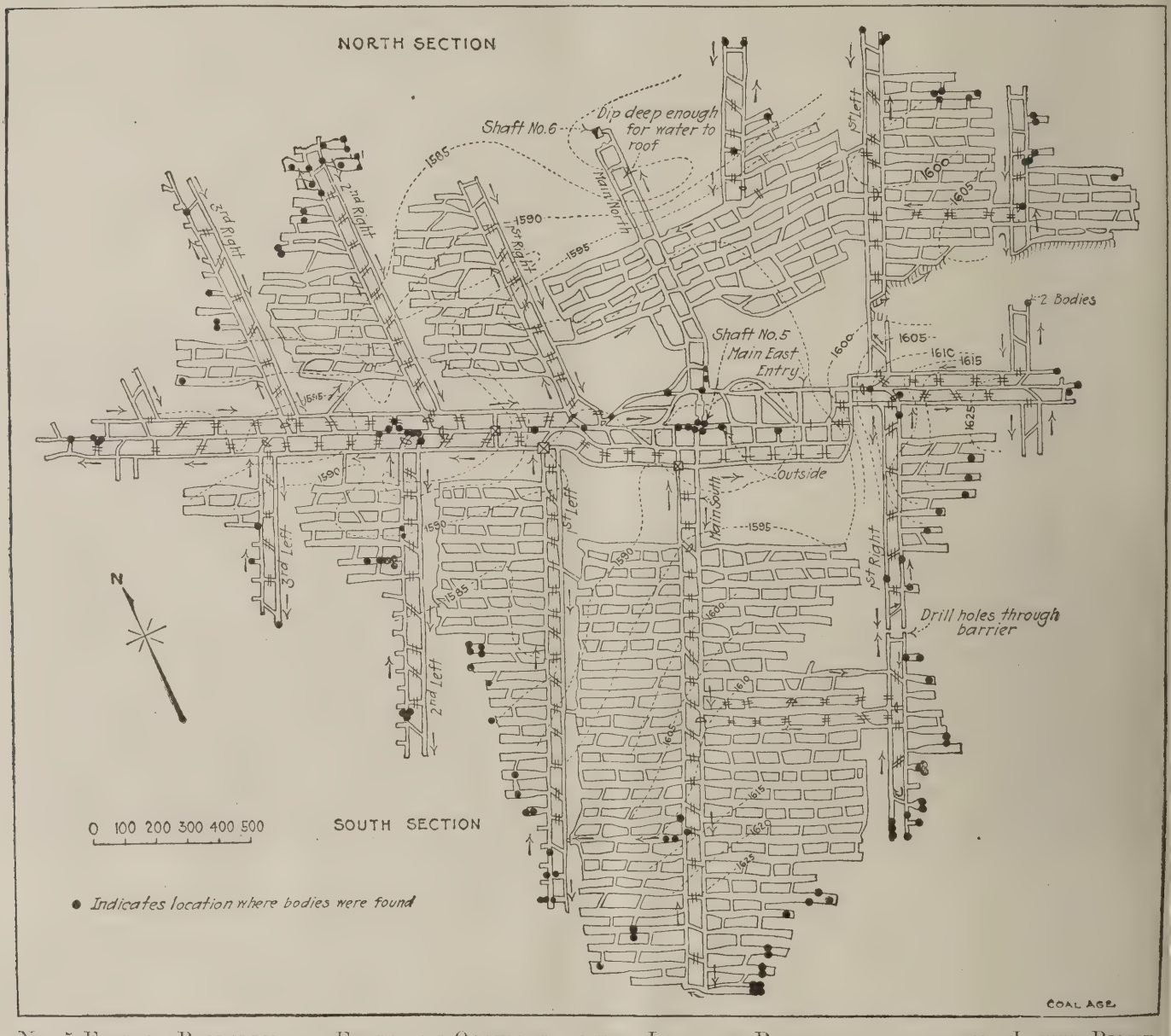
The Fan Is Reversed

The mine officials soon realized that the hope of rescuing any men in No. 5 was wholly in vain, whereas it seemed quite hopeful that the men in No. 6 could largely be saved. After the fan had been stopped and the shaft doors replaced in No. 5 shaft, the fan was reversed so as to prevent driving the air through from No. 5 to No. 6. The result showed that this was wise as all the men but eight were saved in those workings, 67 being rescued.

All the men but thirteen have been found in No. 5; some, it is true, were not immediately killed by the force of the first explosion and some had their faces down in water, which they had sought for self-protection, but none apparently had traveled far and it seems certain that had the direction of the current been maintained, it would only have resulted in the destruction of the men who were saved in No. 6.

Great Care to Ascertain Cause of Explosion

The company has always maintained a careful checking-in system. Every man takes a check off a board on going down and replaces it on his return. The number is also checked by the man in charge of the cage, who counts the number of his passengers on each trip and totals the figures thus obtained. The number loss is, therefore, absolutely certain, though 13 bodies are still buried (May 7) and have not been found.



No. 5 Eccles. Probably the Explosion Occurred in the Locality Represented near the Lower Right Corner of the Map in a High Portion of the Mine

Many of the bodies were not identified because the violence of the explosion stripped them of their clothing and scattered the checks. The engineers of the rescuing force carefully noted where every man was found, how he was lying, his condition, his valuables and all other details. They are especially anxious to ascertain the direction of force. Partly because of there being two explosions and partly because of the complication of the phenomena exhibited in even the most simple of these accidents, there is no sufficient evidence yet (May 7) to show where the accident originated.

Great Violence Exhibited

The violence of the explosion was exhibited almost everywhere. Concrete overcasts with rail reinforcing have been entirely removed and destroyed. The roof has been blown down to a considerable height. This seems to be the cause for the delay in finding the bodies, for it does not seem likely that any of the undiscovered men are far from the places in which they had been working, in fact the mine is too small and new for that to be possible, but nevertheless it is useless to search for them except as a part of the general overhauling the mine will have to receive in being put ready for operation.

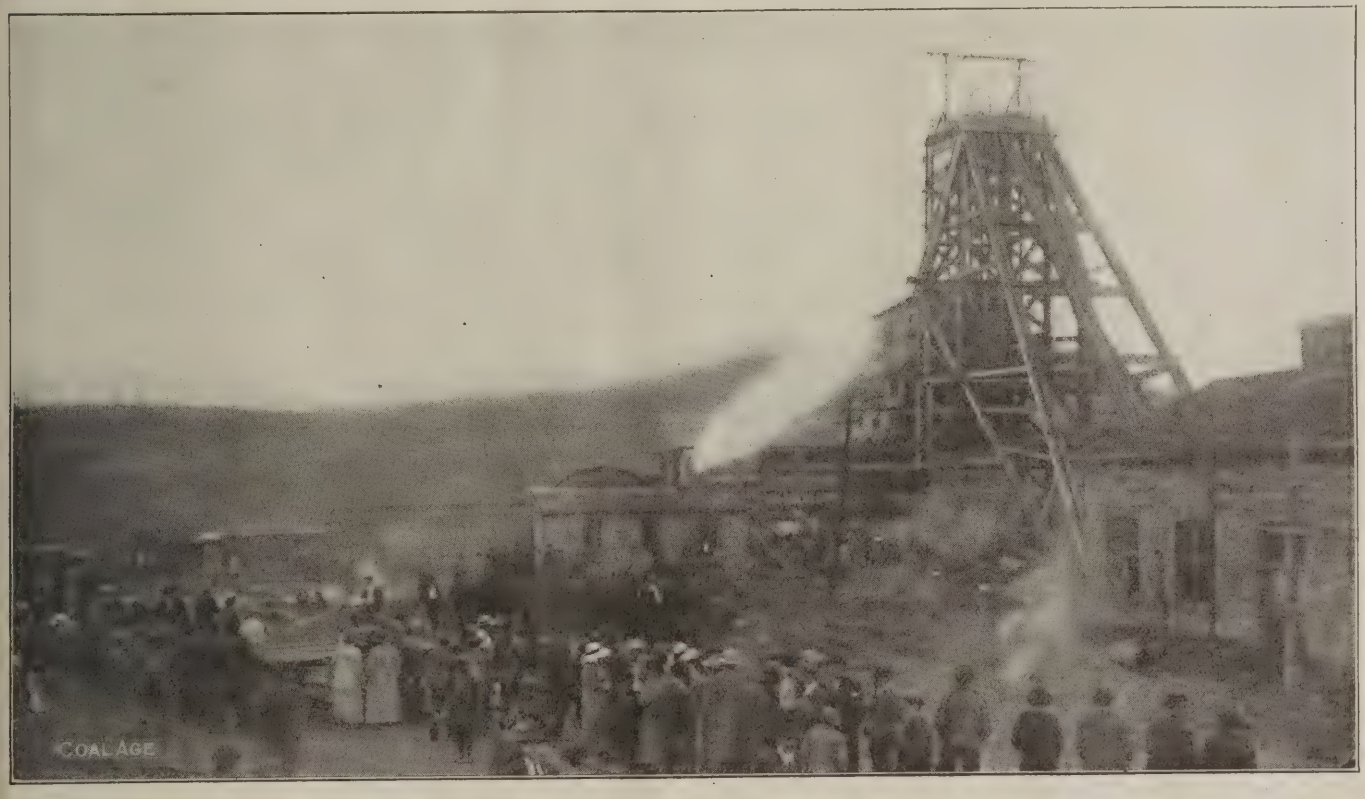
The rescue work was made more difficult by the fact that the pumps were put out of commission by the explosion. When the rescue men reached the foot of No. 5 slope the rails were covered already by 18 in. of water and in one place where the coal dipped between No. 5 and No. 6, the water soon rose so that only the fact that the roof had fallen to a considerable height made it possible to continue recovery work. However, it was soon seen that the clearing of the mine of water by pumps must precede any further work for the recovery of bodies, and proper steps were taken to that end.

The only place where the explosion did not appear to have done much harm was in the Second Left in the South half of the mine, where there were two local dips, in which the water stood about 8 in. deep. This section not only was too wet for the extension of the explosion, but also was possibly protected by the perfect stopping, which the explosion had itself erected by piling a trip of cars near the mouth of the entry.

It will be noted that rooms in the Main South had been driven up and extended to the line of what was known as the First Right in that section of the mine. Headings had been driven back to meet this First Right entry, but were not pushed completely through. The small block of coal remaining had been pierced by drill holes. When the explosion came, these curtains of coal appear to have been blown out.

It may be reasonably objected that there were not enough splits for a gassy mine. One split passed up 2nd, 3rd and 4th Left of the South section, then crossed over and ventilated 4th, 3rd, 2nd and 1st Right in the North section. Another split passed along the nearer half of 1st Right and all the 2nd Right in the South section, and then passed over and ventilated 2nd and 1st Left and another unnamed heading in the North section. In this distance they must have gathered no little gas, even though some of these entries were short, in fact, mere stubs of headings and were producing but little coal.

Fortunately there was at no time any fire in the mine and the rescuers established the ventilation without preliminary skirmishing in helmets for the location of fires. It is only right to note that had a fire started near the shaft, there was no lack of material to feed it.



Shaft No. 5 after the Explosion. The Fan Was Not Injured nor the Surface Works though Much Lumber, Mud and Even a Human Body Were Ejected from the Shaft

The Social Conditions

The mining village of Eccles is one of the newer towns in the West Virginia field and like many of those now building, is far superior to the old. The houses are well built, neatly painted, and the streets are kept clean. Standing on high ground, where the mountains are not forbidding, the general appearance of the camp is strongly in its favor.

The relations between the company and the men are extremely favorable. The town is not far enough from Paint and Cabin Creeks to have failed to feel the disturbing effects of the virtual civil war in that section. Yet only a few days idleness resulted at Eccles. The company has a little emergency hospital, and on the day of the

explosion had just opened a bath-house for its men. There is an air of cleanly hopefulness about the company store and the people, which betokens the excellent character of the management and personnel.

One is, therefore, disposed to feel that at this mine less than at any others should this unfortunate accident have occurred. Neither operators nor miners merited any such unkindly fate and one begins to realize what a problem is to be confronted if accidents are to be ruled out of mines operated by men of less responsibility and filled with men of shiftless, characterless type, such as are often to be found where all the conditions of life are unfavorable.

Safety Provisions

The president, Frank Guiterman, has determined to take three steps to assure greater safety. Shaft No. 3 is already operated as a safety-lamp mine, all the miners and day men being provided with Hirsch electric mine lamps. Miners will no longer be permitted to load or fire their own shots. In that way "solid shots" will be eliminated and the character of the explosive used will be



Eccles, No. 6 Where the Men Escaped

known beyond question as also the nature of the tamping. Moreover, the shooting will be done at night when the mines are nearly empty of men. Lastly, the voltage used in the electrification of the mine will be lowered to 220 volts.

These changes will involve much expense, but there is no question but that they are necessary. The workings will still be electrically operated gaseous mines. While the machines can and may be made explosion-proof, there is still a risk from the locomotives should a door be left open and a heading become charged as a result, with gas in explosive quantity.

An Incident in the Rescue

It is interesting to note that in moving a dead body in a room already so filled with gas that the bearers had to hold their lights low to avoid it, a cadger of carbide rolled out of the dead man's pocket into a pool of water and immediately filled the air with acetylene gas, against which a safety lamp is said not to be a sufficient protection.

Nothing happened, but the rescuers were not satisfied till they were well removed from the place. Provided the cadger head is reasonably water-tight and is closed, no harm could result, but a loose capped cadger under such circumstances might cause a deplorable result. However, cadgers of carbide and a room full of gas rarely occur together. It would not, however, be impossible to start an explosion in that manner, even in a nongaseous mine.

Need for Greater Strictness

It is to be hoped that the chief inspector of mines will err on the side of strictness in classifying mines, so that all which are in the least gassy shall be declared to generate gas in dangerous quantities and shall be required to be operated with the use of safety lamps. There is really no logical reason any more why safety lamps should not be used. They give a better light than ever before, so that the risks from roof falls and other dangers will not be unnecessarily increased by their use. And it is only right to note that not only in West Virginia, but in many other states are excessive risks being taken by the use of open lights in dangerously gaseous mines.

The provision of shotfirers is also to be commended to the chief inspector's attention. So long as shooting is done by all the miners and during working hours, there is great risk of illegitimate charging of holes and solid shooting and an assurance that when an explosion occurs as a result of this cause, nearly every man in the mine will be the victim of that one man's carelessness.

The company readily supplied every detail of information requested and gave every assistance to those who reported the disaster. F. P. Bayles is assistant general manager, M. E. Kent, superintendent of the three Eccles mines and of the Sun colliery, and R. J. Burmeister is chief engineer.

Coroner's Verdict

The verdict of the coroner's jury which was returned Sunday, May 17, after two days of investigation is as follows:

We, the jury, find that John Adams and the 171 other men who were killed in shaft mine No. 5, at Eccles, Raleigh County, W. Va., on Tuesday, Apr. 28, 1914, came to their death by an explosion of gas in the said mine. And we do further find that the eight men who came to their death in shaft mine No. 6 at Eccles, W. Va., on the evening of Tuesday, Apr. 28, 1914, came to their death as a result of an explosion of gas and dust in shaft mine No. 5 at Eccles, W. Va., they having been overcome by afterdamp entering mine No. 6 after the explosion in mine No. 5, the two mines being connected.

The accumulation of gas in mine No. 5, which was the primary cause of the explosion, was due to a short circuit of the air in the southern section of the mine. This gas was ignited by an open lamp and the explosion followed.

We, the jury, furthermore find that this short circuit of air was caused without the knowledge or consent of the company or any of its operating staff, and that the company is in no way to blame for the disaster.

Later Note

S. R. Ritchie, of the company, said that the cause above stated seemed the real origin of the accident. A contractor whose work in two parts of the mine had been rendered difficult by an intervening pillar of coal had blown a hole through it and was found dead not far from the pillar. Probably this pillar was one of the two in the First Right, Southern Section, where headings had been driven both inby and outby to meet.

An air receiver with an accumulation of oily waste is liable to take fire if allowed to get hot. Consequently oil should not be allowed to collect in quantity at the top of the water which is drained from the air. When the water is drawn off, the oil will be deposited on the inner surfaces of the receiver and will be in suitable condition to evaporate and cause an explosion of great violence.

The Colorado Strike

SYNOPSIS—The strikers are not surrendering their guns in sufficient numbers to give assurance of peace should troops be withdrawn. The army forces have done hardly anything to compel disarmament. Several men brought in by the operators since the Ludlow battle to work in the mines have been restrained by United States troops. A court martial is examining Major P. J. Hamrock on charges of arson, murder, manslaughter and larceny. The testimony of the militia in this trial is given in some detail.

The striking mine workers have been somewhat slow to surrender their arms, much to the discomforture of the operators and their employees, who are now disarmed and constantly hear that the U. S. troops will soon be withdrawn.

Confiscation has been long delayed and there has been given an excellent opportunity for the burying of guns. The troops entered the field Apr. 29, and only at 5 o'clock, May 13, did the confiscatory order go into effect. Two whole weeks passed during which the hiding of arms could proceed. It is said the foreigners do not understand American ways and must be handled with gloves. We readily grant them such a lack of understanding and we conceive that they are utterly at a loss to comprehend our dilatoriness in enforcing that most organic law of battle which prescribes disarmament of all persons not forming part of the army of occupation. Surely they draw the conclusion that we fear them and are too weak to attempt confiscation of their arms.

THE STRIKERS ACCUSE OPERATORS OF HIDING ARMS

The strikers have repeatedly declared that the operators are hiding their arms; E. L. Doyle, secretary-treasurer of the United Mine Workers and apparently a man not given to careful statement, is freely circulating such reports. One specific declaration to this effect was made in a local newspaper and the editor was ordered by the military authorities to retract this statement in the pages of his publication.

Colonel Lockett is making careful search for a weapon from the stock of which a rubber fragment was broken during the Forbes fight. On May 15 this gun had not been delivered by the strikers to the military authorities.

The danger to the men working in the mines is considerable in case protection is removed by the United States and it is likely that the nation will have to pay heavy damages to foreign countries should the Greeks and Bulgarians start a marauding expedition on unprotected mine camps. This fact has appealed to Doctor Dumba, the Austro-Hungarian ambassador, so forcefully, that he visited the Secretary of War and urged the retention of the United States troops at the seat of war.

THE U. S. ARMY SHOULD NOT LEAVE

In fact, the sense that the army should not be removed is expressed by nearly all parties and there is everywhere a fear of replacing the Federal forces by the militia. It is true that the militia which numbered, at the best, 1427 men, which was the number on Dec. 8, managed to keep order scarcely less complete than is now maintained by 1700 U. S. soldiers, but this militia was supported by the arms in the hands of the guards employed by the corporations.

But the company men are now disarmed and the feeling is so much more bitter that a larger force is needed, especially as the forces of law and order realizing that the public is backing the disorderly are severely crippled in handling them. To show what a severe task is confronted, we may call attention to the fact that Colonel Lockett requested the governor on May 8 to send militiamen to Glenwood Springs, Oak Creek and Crested Butte in Garfield, Gunnison and Routt Counties, respectively, where conditions were extremely grave. He said that until he had at least 300 more men it would be hazardous to weaken the forces now in charge of the disturbed districts of eastern Colorado.

THE WIDE DISTRIBUTION OF THE DISTURBANCE

The reader should carefully remember how remote these places are. Thus Crested Butte while barely 51 miles from Glenwood Springs is 253 miles by railroad. Oak Creek is only 53 miles from the latter place, but to reach it you must go to Denver, 194 miles, and almost retrace your itinerary for a further 360 miles. With an insurrection of such magnitude it is necessary to be sure that protection is adequate for all the widely separated mining camps.

Those city people who insist on a policeman at every block can hardly understand the needs of a scattered population of peaceful workmen menaced by roving armed forces. There seems to be a degree of question as to the extent to which confiscation is to be carried. Advices state "no search for concealed weapons will be made without further orders from the War Department."

THE COURT MARTIAL

The court martial of Major Patrick J. Hamrock, of the First Regiment of the Colorado National Guard, opened May 13 with Col. W. A. Davis as president and Capt. Edwin A. Smith, acting judge advocate. All the members of the court were present except Capt. Ralph Dorn, who was absent in Routt County on military duty. Maj. H. A. Williams was substituted as a member of the court for Col. George M. Lee. Col. A. C. Sharpe, of the U. S. Army, is attending the sessions as a spectator.

The militia seems ready to assist the court in arriving at the truth. Lieut. K. E. Linderfelt very frankly testified that he had fired into the tents at Ludlow but not until the strikers had opened fire. He said he had prevented his men from shooting when they could have killed 100 men at a volley. He told how Captain Carson had rescued several women and children from the tents.

Lieut. S. J. Lamme, a physician at La Veta, Colo., who acted as aide to Major Hamrock, during the attack of the Ludlow colonists and its repulse, testified that he carried orders from his commander to Captain Edwin S. Carson when that officer arrived with 40 members of Troop A from Trinidad. He stated that he heard Major Hamrock order the machine-gun operators to fire at the pump house and at the rifle pits in the rear of the colony. He did not order them to fire at the tents.

THE LUDLOW CAMPERS FIRED FIRST

Two other officers also in the battle swore that the strikers opened the fight by firing on the militiamen, that the bombs the soldiers fired were used simply as a signal for assistance as the telephone was too slow and uncertain a means of communication. They also declared that Major Hamrock was near the camp when the fire started and that they thought it originated from the upsetting of an oil lamp. In their view the victims died of suffocation, hours before the camp burned.

Lieutenant Benedict of the National Guard declared that the timbers in the shelter pit where the women and children were suffocated or burned were charred to a considerable depth and the wrist and arm of one woman was found removed to a distance from the body. He testified that after he had come up from an arroyo that night he saw men running into the tents and women rushing out crying "Dynamite, dynamite."

Captain Edward F. Carson gave straightforward testimony declaring that the soldiers and civilians looted suits of clothing, miscellaneous garments, umbrellas, jewelry, blankets, grips and satchels full of all kinds of articles. These he said would have been burned had they been allowed to remain. He said it was impossible to obtain discipline, even when he desired to prevent his men from unduly exposing themselves to the fire. Carson further testified that Lieut. Lamme delivered him a message from Major Hamrock ending with the words: "You've got to smoke them out."

Sergeant Patrick Cullom was the man in whose charge were placed Louis Tikas, the leader of the Greek strikers and probably as the Commission states the general of the whole colony, James Tyler and Frank Rebine. He declared that these escaped when the militia suffered a setback due to the firing from the Ludlow settlement. He described their being shot as they crossed the firing line.

It seems that Troop A, which aided in repulsing the attack of the strikers at Ludlow, comprised 130 men of whom all but eight were mine guards and mine clerks. This agrees with the statement of the Military Commission which said that the troop had been so recently recruited that it had not yet selected its officers nor was it supplied with arms or ammunition.

THE UNION FORBIDS MEN TO TESTIFY

So far no testimony has been taken from the inhabitants of the colony. When the Military Commission met, the strike leaders refused to testify because the inquiry was not open. Now they give as a reason for silence that the court-martial

intends to whitewash the militia. John McLennan, district secretary of the United Mine Workers announced that the strikers would not be permitted to testify.

There were some truthful people in Ludlow and apparently the union is afraid of them. J. R. Lawson, who is a member of the National Executive Board of U. M. W. of A. some time ago declared to the press that he did not know positively who fired the first shots. He must have had a somewhat clear idea and did not want to inculpate his followers and so took refuge in a disingenuous ignorance.

He also asserted that Louis Tikas was sent for by Hamrock in order that he might be induced to surrender a non-union man which the strikers had in custody. This was Carindo Tuttoilmando. Now Lawson though he had every reason to deny the presence of this man if he were not there, failed to do so. These facts have given us some confidence in his veracity and probably after some shuffling if he faced the court martial he might tell the truth. The father of the boy Snyder who was shot and several others might likewise be good witnesses. The union leaders have, however, no stomach to meet such an investigation.



Striking Miners at Headquarters of U. M. W. of A., in Trinidad, Colo.

UNION LEADERS INDICTED

John R. Lawson, Colorado member of the executive board of the United Mine Workers, Edward L. Doyle, secretary-treasurer of District No. 15, and W. T. Hickey, secretary of the State Federation of Labor and about 150 men were indicted on May 14 by the local grand jury on charges of conspiracy to murder and attempt to murder in the Hecla mine attack.

WILL NOT PERMIT COAL COMPANY TO BRING IN MEN

The United States troops have been removing several men who have been recently brought in by the companies to work in the mines. Their presence has been provocative to the strikers whose wrath the administration is determined to appease by every possible concession. Twenty-five mine workers who had been brought in by the operators to work in the Oakdale mine of the Oakdale Coal Co., and five men who were going to Primero were stopped by the troops on May 14. On the day before six men employed to work at the Royal mine of the National Fuel Co. were prevented from going to work. From a letter received from an official of one of the coal companies it appears that there will be no objection to individuals entering the state or passing from one part of the state to another to accept work from the coal companies. Only the deliberate importing of men is prohibited.

THE MILLION-DOLLAR BOND

The legislature of Colorado has been divided on the bond issue of $1,000,000 for the payment of the state troops. The Ardourel faction among the Democrats in the House desired to put the burden of the taxation on the well-to-do people in proportion to their wealth and especially on the coal operators who hired the men causing the disturbance. There is said to have been a gentlemen's agreement with the Slattery-Fincher faction to introduce the bond bill with another which would provide for an income tax.

The lack of parliamentary knowledge of the Ardourel faction, who mistook the second reading for the first, at which only the title is read, caused them to permit the bond bill to go to a second reading. The income-tax bill was not passed. The bond measure provides for certificates to run 20 years and to draw 4 per cent. interest, with a sinking fund after 14 years to take up the bonds at maturity.

The whole financing is clearly contrary to public policy. Riot bonds should not be of so long a duration. Of the million dollars, $691,000 are already owing; the state has more serious expenditures to face than before and only $309,000 with which to meet them. The contributions of the Union may be expected to keep up the agitation for a long time as the fund for the strikers is more popular than ever.

Editorials

The Pioneer Sentiment

The pleasures of "roughing it," of returning to the elemental, of getting back to nature, appeal to us all. And roughness, the elements and nature generally produce in every man a degree of virility not to be despised.

Is it not true, however, that those who thus face nature find themselves scarred by the crudity of it all and become fiercer in their hates, less restrained in their ambition and less fettered by their environment.

The pioneer, strong and forceful, has always been a leader in violence. The history of our own West exhibits this fact. The story of the world in general affords plenty of illustrations as to the truth of this dictum.

It is the establishment of civilization, with its comforts and its restraints, which prevents violence and lowers the force of passion.

All this seems a far cry from coal mining. But if the personal element, as a mine superintendent declared recently, is the most important study in coal mining, surely we have a right to refer to the effect a change in material conditions will have on success in operation.

We believe that the operators must endeavor to improve their villages, to remove the rough-and-ready pioneer feeling, with its picturesque indifference to discomfort and its disposition to make each man an independent unit, utterly irresponsive to popular sentiment. Every effort must be made to bring the outstanding characters under the influence of family ties, human association, education and religion. Every endeavor should be made to hire, not mere bone and brawn, but character.

When Should Rescue Work Be Abandoned?

Prof. Redmayne's remarks concerning the unnecessary sacrifice of life in connection with rescue work following a mine explosion, when workers place themselves in great danger in their endeavor to save entombed miners, have met with considerable criticism. It is recalled that in many instances men have been given up for lost, and yet have been ultimately rescued. The circumstances attending the Courrieres disaster in France have not been forgotten, and an instance of another form of disaster, namely the flooding of the Caradog Vale colliery in Great Britain, has been advanced to show that it is not always the highest wisdom to "dogmatize upon theory." In this latter case, even the local mine inspector intimated definitely that all hope of rescuing the few men who were still in the mine had been abandoned.

No one questions the ability or competence of the average mine examiner, but in this case, the inspector's assumption was completely falsified by subsequent events. Curiously enough, one of the entombed men was able to walk out of the mine before it was discovered that any were alive. What, it is asked, would have been the situation if the mine had been closed down? It may easily be conceived, in the event of a disaster, that one of two extremes may readily be taken.

On the one hand, hope may be abandoned at too early a stage, and men be lost who had merely entrenched themselves in some position of temporary security. The other extremity was demonstrated at Cadeby in England, and at many other mines, where the number of rescuers whose lives were sacrificed was in excess of the number of entombed workers.

The problem bristles with difficulties, and each individual holocaust must be accepted generally as its own guide. The circumstances in one case may vary from those in a second instance. There can be no really "safe rule" for guidance in these matters, and when a mistake or error of judgment occurs in any particular accident, the colliery community very likely will be unwilling to accept the excuse that action based on precedent was strictly followed.

It is well to remember that at the Cadeby colliery in England, three mine inspectors were involved in such an error of judgment, and where authorities of such high standing are liable to be deceived—either one way or the other—the ordinary miner may be pardoned for resenting any interference should he still perceive the least ray of hope in continuing his work of rescue. When the folly of proceeding further is clearly evidenced, then, of course, there is sufficient justification for making a determined stand against further possible sacrifice. Until then everything that is possible should be done.

In connection with the discussion of this serious problem, there is one important reflection: It would be unfortunate to induce a state of mind, or point of view, making it possible for the acknowledged bravery of the mining community to go out of fashion. Science may achieve a great deal, but, balanced by sound practical common sense brave men should still perform brave deeds.

Why Some Operators Fail

Operators too often begin their reforms at the wrong end. They select their material without judgment, and grumble and declaim when it does not reach up to their expectations.

The woman who marries a man to reform him is like the operator who hires a miner whom he knows has been in debt needlessly for the last ten or fifteen years. Such a workman is utterly beyond reform.

Every man around a mine should, if possible, be an efficient worker and a money saver. It is hard to thrust out the inefficient with the union to oppose such action; but it is not hard, we believe, to keep him from coming in. Give good living conditions and get a reputation for fair treatment; this will attract good men.

But do not go out and bring in men of unknown character and agree to advance them transportation, tools and a week's living. If the men have not enough money to come to your camp, they are liberal spenders and perhaps drunkards. They are probably inefficient men and not at all to be desired.

Above all, do not do your colonizing by sending out

padrones who will lie to and mislead the men whom they secure. Such exploiters of both capital and labor regard all two-legged creatures as men. No one is so out-at-heels, so lazy, shiftless, drunken, but that he will satisfy them.

And, lastly, do not regard drunkenness as a light offense, or put a saloon in your mining town. Men who drink should be weeded out and no attempt should be made to accommodate them. The sentiment of the public supports the operator in this move and will be with him when he removes the wife beater and the man who neglects his children.

Character must be the watchword. The tonnage may be raised temporarily by disregarding it, but trouble ultimately results. Many a mine runs along with poor human equipment, and when ultimately there is a general smash-up, there is no reason for surprise. If operators selected their machines as they do their men, they could expect no other result than disaster.

A Trust in Virtue

It has been said that industrial corporations have brought criticism on themselves by allowing some of their competitors to engage in questionable practices. It is certain that the public is convinced that there is a trust in morals even more truly than there is in prices. The man on the street regards the morals of one corporation as a fair basis for the indictment of them all.

It is necessary, therefore, that there should be a strong attempt among all right-thinking, right-acting corporations to bring pressure to bear on all those who use their men wrongfully and which do not seek safety in operation. As a body the industry should endeavor to clear away dishonesty and carelessness from its mining operations. In no better way can harmful legislation arising from the indignation of an aroused public be avoided.

Moreover, only by compelling every one in the business to deal with fairness, can upright men continue in a business where competition is as fierce as in coal mining.

In no matter should there be more stringent endeavor than in arranging for fair weight. It is true that coal sometimes loses in weight from drying and again by theft on the railroad, but these losses should be sustained by the operator, not the miner. The miner is surely contributing all that can be demanded of him when he loses what dribbles off the mine cars. Only when there is a violent wreck does the miner get compensation for such losses. The loss of coal at many mines during the careless transportation to the surface is much larger than the corporation suffers during the trip to the scales. Consequently, we think it an extremely questionable practice to try and make the weigh scales of the tipple check the scales of the railroad company by manipulation of the former.

Especially is it wrong to make the whole tonnage sold balance the tonnage for which the miner is paid, overlooking all the tonnage used in power output at the mine. Moreover, it is unfair to take the weight of empty cars in the winter, when they are well sodden, to compute the net weight of the loads, and make no change in the summer when the majority of the cars are dried out.

It is essential to do everything to prevent all such irregularites, even if we have to introduce scales to weigh each empty car on its return from the dump. There are devices now by which such a weighing can be made automatic and which need no watching. By averaging weights of empties one day, the fair tare could be found for the next.

Most of the coal companies are above little tricks in their weighing. Those that are striving to balance evenly their debits to the miners with the credits from the railroads are giving reasonably accurate weight and are satisfying themselves with the thought that the contrivance used is largely to avoid paying for water which the miner did not dig, dirt which he should not have loaded, coal which the children should not have stolen or which the railroad should not have bumped off the car. But some companies seek even a balance in their favor and in any event a scale committee formed of miners' and operators' representatives traveling from mine to mine with an adequate equipment for testing scales would give the men an assurance they would not otherwise have.

There are several ways in which a union of operators, a trust of virtue, could be formed, which would make everyone, operator, miner and public better satisfied. The agreement of the operators is made as a result of their combined effort, but never do these same coal-mine owners join hand in hand to force all the members of their organization to keep the agreement to the letter.

We would suggest that all those operators who believe in safety in their mines to such a degree that they want strict laws to make those safety provisions binding on all, join the American Mine Safety Association and make it a live body and equal to the work it proposes to do.

We would urge that all the associations of operators use their coercion not only on their employees, but on themselves to the end that the agreements made shall be kept to the letter and to so modify those agreements that unsanitary and unsafe conditions in camps and mines may not be possible.

The coal industry is a public necessity Nobody can escape paying for coal or taxes. The mind of the man on the street is obsessed against the coal operator and the tax collector. He cannot escape the coal operator's charges any more than he can transportation dues, and so he rebels against the coal operators as he does against the railroad. Only by conducting the coal business on a higher moral plane than the traffic of the rest of the world can the operator hope to free himself from censure.

The World's Coal

The world's output of coal at the present time is approximately 1,300,000,000 metric tons annually. Of this enormous total the greater part, or about 75 per cent., comes from the United States, Great Britain and Germany. The value of the world's output of coal is about $2,300,000,000. More than 3,000,000 men are now engaged in this great industry.

It is interesting to note that in the United States where we produce more than half a billion tons each year, only 800,000 men are employed, while in Great Britain, where the production is considerably less than 300,000,000 tons annually, more than 1,100,000 men are employed. Even in Germany, where efficiency is supposed to be high, 700,000 men are employed to produce 240,000,000 tons.

It is possible, however, that our high mechanical efficiency, and consequent rush, is partly responsible for the high death rate in American mines.

Sociological Department

The Membership of the American Mine Safety Association

It may not be generally known that the American Mine Safety Association has memberships of various kinds. There are "active members," who are permitted to join because their occupation, affiliation or interest qualifies them to consider the issues and forward the aims for which the association is organized. Of these there were 127 at the last enumeration. The annual dues are $3.

The Incorporated Members

Then there are associate members, which are not persons of flesh and blood, but national institutes, societies and associations, national and state departments and bureaus; and firms and corporations concerned in the mining industry or whose principal object is the reduction of the loss of life and property in mines. The annual dues are $10, except to the Federal Bureau of Mines, which is prohibited by a statute from payment of membership fees or dues in societies or associations. These associate members are entitled to representation by three persons, each of whom is entitled to all the privileges of active members. Of these there were 29 mentioned in the last report. Three manufacturing corporations only have so far entered under this head, the Sullivan Machinery Co., the Mannesmann Light Co. and the E. I. Dupont de Nemours Powder Co. More of such concerns should become members.

There are two mining associations, only one of which is a coal-mining body, the Rocky Mountain Coal Mining Institute, and the Gogebic Range Mining Association. All the other institutes should incorporate in this society. The list of mining companies is larger and includes nearly all the largest concerns, especially those in the anthracite region. There are also several of the smaller corporations. When a company itself is interested it has some right to appeal to its men to belong.

The National Service Corps

The National Service Corps contains 226 members, who pay 50c. dues per annum. Only those can belong who are actively connected with mining or metallurgy and have received sufficient instruction and training or have had such experience as may enable them to act as a member of either a mine-rescue or a first-aid team.

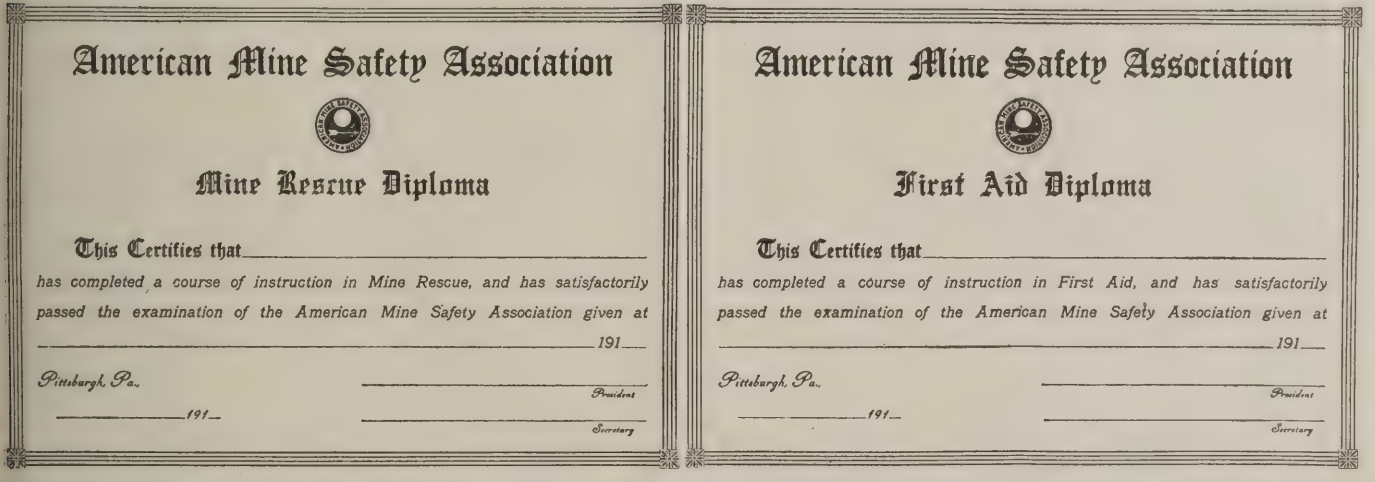
Only those can belong as mine rescuers who hold a certificate of proficiency from the U. S. Bureau of Mines from any of its coöperative stations or from the state mine-rescue departments. But the association retains the power to recognize the certificates of other bodies.

To join the Service Corps as a first-aid man, the applicant must be certified as proficient by the U. S. Bureau of Mines, any of its coöperative stations, the state mine-rescue departments, the American Red Cross, the Army, Navy or similar Hospital Corps or the St. John's Ambulance Corps, or their equivalents, as may be duly authorized by the association.

Instead of such certificates of training, applicants may be admitted upon presentation of sufficient evidence of having been engaged in such organized and scientifically conducted rescue or first-aid work as to warrant their approval by members of the committee: To have won a place in mine-rescue or first-aid contests, field meets, demonstrations or maneuvers and training work in preparation for the same may be accepted as evidence of eligibility for service membership.

The Button Is a Badge of Honor

Thus those who are service members may wear their buttons with a great degree of pride. The regular or active members and the associates do not partake of that distinction, the badge they wear showing their interest and desire to assist and not their ability to perform such acts of mercy. There is no little merit in deserving the button of the service member, for it shows training and education and not merely the contribution of money to the cause.



American Mine Safety Association

Mine Rescue Diploma

This Certifies that _____

has completed a course of instruction in Mine Rescue, and has satisfactorily passed the examination of the American Mine Safety Association given at _____ 191__

Pittsburgh, Pa. _____ President

_____ 191__ _____ Secretary

American Mine Safety Association

First Aid Diploma

This Certifies that _____

has completed a course of instruction in First Aid, and has satisfactorily passed the examination of the American Mine Safety Association given at _____ 191__

Pittsburgh, Pa. _____ President

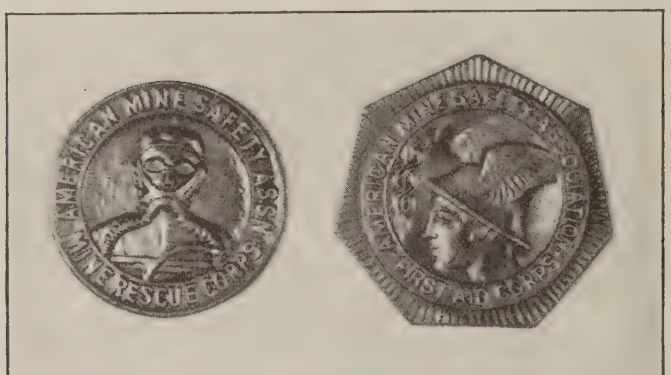
_____ 191__ _____ Secretary

Mine-Rescue and First-Aid Diplomas Issued by the American Mine Safety Association

Of course, the applicant for service membership must fill out an application form, showing his training, experience and practical work in mine rescue, first-aid, or both. This will be checked by the secretary from such records as are available and if it cannot be thus checked it will be forwarded to that member of the service membership who lives nearest the applicant, for his approval or rejection.

Title to Membership Must Be Maintained

Each service corps member will receive a diploma like those shown and will also receive a button like that illus-



Buttons Worn by Service Members

trated above. Each member has to submit a statement each year certified by his mine manager, physician or safety engineer or by an active or associate member of the association, showing he has taken supplemental training during the year.

Any man, therefore, who is duly a member of the service corps, not only has been a first-aid or mine-rescue man, but has, moreover, kept up his training and is fit for service.

We believe there will be several who will qualify this year and will wear this badge of honor. Every first-aid and mine-rescue corps should make it a point to induce its members to join the association.

Meeting of the Kentucky Mining Institute

SYNOPSIS—A well attended institute with a successful first-aid meet. Some observations and criticisms of the work performed by the teams in the latter.

The Kentucky Mining Institute held its summer meeting, May 8 and 9, in Lexington, Ky. The sessions were well attended, and it is evident that its future will be most successful though its earlier history was not so assuring. The session of the first day was held in the Mining Engineering Building of the Kentucky State University. Unfortunately the president, W. L. Moss, was not able to be present on that day, and R. D. Rash, his immediate predecessor in the chair, presided in his stead.

Major R. U. Patterson, Medical Corps, U. S. Army, who is in charge of the First-Aid Department of the American Red Cross, made an address. A buffet lunch was then served in the Buell Armory by the department of domestic science of the University. In the afternoon, C. W. Strickland, mining engineer for the West Kentucky Coal Co., Sturgis, Ky., read an article on "Some Other Difficulties"; E. Drennen, manager of the Elkhorn Division of the Consolidation Coal Co., Jenkins, Ky., a paper on "Mine Motors"; I. P. Tashof, of the State University of Kentucky, an account of "Mine Safety in the Lake Superior Copper District." "The Workmen's Compensation Law" was discussed by W. H. Cunningham, secretary of the Kentucky Mine Owners' Association, Ashland, Ky., and "The New Mining Law," by C. J. Norwood, chief inspector of mines, Lexington, Ky.

The Banquet

At 8:45 p.m., a banquet was held in the dining hall of the Phoenix Hotel. Johnson N. Camden acted as toastmaster, and the grace was delivered by Bishop Burton. John G. Cramer, secretary of the Lexington Commercial Club, delivered an address on "Lexington as a Mining Town." Henry S. Barker, president of the State University, then spoke on the "State University and its Relation to the Mining Industry of Kentucky."

Major R. U. Patterson's remarks related to the present condition of Mexico and the preparation of the Red Cross to meet the situation should further unfortunate developments occur. W. L. Moss, being still absent, F. D. Rash spoke on various topics and Van H. Manning followed with an address on "The National Bureau of Mines." As the hour was late the impromptu remarks scheduled on the program were omitted.

Mining Pictures and Business Session

On the following day exhibits of "Safe Methods of Mining Bituminous Coal at the Mines of the United States Coal & Coke Co., Gary, W. Va., and of "An American in the Making" were made at a local moving-picture theater. A short business session was then held in the ballroom of the hotel.

The discussion of funds which is perennial at most of such institutes took up much time. Like all organizations to which the subscription rate is only $2, there is a shortage in the treasury. Part of this is due to the cost of moving the experimental gallery to Lexington for the meet and part is accountable to expenditures for printing and postage. The operators of western Kentucky contributed liberally toward the expenses of moving the gallery and the eastern Kentucky operators will doubtless do equally well when so requested, so the only deficit remaining will be that for regular expenditures and, as a result of a vote, an assessment of $1 will be levied on members to wipe out this item.

The New Officers

The following were elected officers of the institute: President, H. La Viers, Paintsville, Ky.; secretary-treasurer, I. P. Tashof, State University, Lexington, Ky.; vice-presidents: W. C. Tucker, Benham, Ky.; L. B. Abbott, Jenkins, Ky.; W. S. Wells, Prestonburg, Ky.; J. E. Butler, Stearns, Ky.; B. R. Hutchcraft, Lexington, Ky.; C. W. Taylor, Greenville, Ky.; and T. E. Jenkins, Sturgis, Ky.

In the afternoon the first-aid men and the band met at the Chesapeake & Ohio Ry. station and marched to the athletic field of the University. The students were holding a track meet and the spectators divided their attention between the first-aid events, the track exploits and the explosion gallery.

The contesting teams were as follows:

1. Continental Coal Corporation, team No. 1. 2. Stearns Coal Co., Barthell team. 3. Consolidation Coal Co., Van Lear team. 4. St. Bernard Mning Co., team No. 1. 5. Continental Coal Corporation, team No. 2. 6. W. G. Duncan Coal Co.,

Graham team. 7. Stearns Coal Co., Stearns team. 8. Consolidation Coal Co., Jenkins team No. 1. 9. Continental Coal Corporation, Barker team. 10. Wisconsin Steel Co., Benham team. 11. W. G. Duncan Coal Co., Skibo team, Greenville, Ky. 12. North East Coal Co., Auxier team. 13. W. G. Duncan Coal Co., Luzerne team. 14. Stearns Coal Co., Worley team. 15. Consolidation Coal Co., Jenkins team No. 2. 16. Continental Coal Corporation, team No. 4. 17. Stearns Coal Co., Yamacraw team.

Unconscious But Not Asphyxiated

The first event was for one man only:

Man is found unconscious, having sustained a lacerated wound on the left side of the head (temple) and a like wound about 2x1 in. in diameter on the point of the left shoulder. Treat the case and carry 25 ft.



First-Aid Squads Competing at Institute Meet



Banquet of the Kentucky Mining Institute, Lexington, Kentucky

In the view of the judges, resuscitation was unnecessary in this case. Of course, if the unconsciousness had been the result of electric shock or asphyxiation from bad air, in fact, had he not been breathing, then the pulmotor, the Shaeffer method or some other device, might have been used with advantage. But it is to be noted, the statement is merely that he is *unconscious,* and there seems reason enough for that condition in the lacerated wounds of the temple and shoulder. It is essential that the man receive treatment for both these injuries immediately and not for a condition which the first-aid men have little or no reason to believe exists.

It is waste of time to treat for injuries not received, especially those demanding when indicated such extended treatment as resuscitation. If the man is actually breathing, the unnecessary work of stimulating the lungs would take place while he was rapidly losing blood and strength. It would make the condition of the patient worse rather than better.

Some favored the Sylvester method because that system had been taught them. It did not occur to them that a lacerated wound on the point of the shoulder would be made far more dangerous if the pump-handle motion of the Sylvester method were used on the patient. First-aid men must think. The problems, doctors have taught, will not necessarily be the conditions underground, and if a first-aid man cannot distinguish between the spirit of the instruction and the letter of it, he is a mere automaton and unworthy of a medal.

Where to Arrest Bleeding

The second was a full-team event:

After falling off a car a man is found to have the following injuries: A compound fracture of the lower jaw on the right side with slight bleeding, a deep lacerated wound on the inner side of the left ankle with profuse bright red bleeding. Treat and carry 50 ft. on a stretcher.

Last year both at the Knoxville, Tenn., meet and at that at Pittsburgh, Penn., several men made the mistake of putting the tourniquet too far from the injury when there was profuse bleeding. Let the first-aid man remember that the tourniquet is not a harmless instrument. It has a long record of deaths as well as of life savings. It might be well to quote from the new American Red Cross book:

"In consequence of cutting off the circulation" by the tourniquet "mortification and death of the part may follow. Therefore, tourniquets should never be used except when necessary and they should be removed as soon as possible." In this case, several men put the tourniquet on the artery of the thigh. The circulation was thus destroyed throughout the limb. There was no need whatever to press the artery so far away from the injury.

Event No. 3 was for two men:

Coal has fallen on a miner. When reached he is found to be unconscious and has received the following visible injuries: Left ear torn off and the ends of the fingers of right hand crushed off, all wounds bleeding profusely. Treat and carry 50 ft. without a stretcher.

In this event also some first-aid men put the tourniquet on the upper arm instead of near the injury. The artery of the arm is divided at the wrist, as shown in the illustration, but by using two pads, this difficulty can be



Arteries and Bones in Arm Showing Where Blood Flow Can Be Stopped

Wherever there is an exposed artery and a bone against which it can be thrust there will be found a place where bleeding can be arrested.

met. "For arresting bleeding of the hand alone," says the Red Cross Textbook, "pressure on the pulse at the outer side of the wrist and at the same place on the inner side will stop bleeding." Both parts of the artery must be controlled as they form a loop from which other arteries to the fingers branch.

No Bleeding and Therefore No Tourniquet

Event No. 4 was for the full teams:

A miner fell out of a cage a distance of about 15 ft., just as the cage started up the shaft. He is found to be unconscious and to have the following injuries: Compound fracture of the left leg below the knee with bone sticking out on inside of the leg. Practically no hemorrhage. Treat and carry on an improvised stretcher.

The first-aid men should have read the remarks quoted before on the dangers of the tourniquet. They certainly would not have then, with unanimity, clapped it on the

patient's leg before he started to bleed. Perhaps his leg artery may have received some injury and shock has caused a temporary cessation of the blood flow. Well and good. The right practice would be to put the tourniquet in place untightened, so that it could be tightened up should the blood flow become dangerous. But with a hemorrhage, such as described, the probabilities are that nothing worse than capillary bleeding is to be anticipated and the tourniquet is really not likely to be needed. However, the first-aid men put it on, subjecting the patient to both unnecessary pain and needless danger.

Do Not Smother a Patient after Reviving Him

Event No. 5 was also a full-team event:

A miner is found unconscious due to afterdamp and has received burns of the hands, forearms, neck and face. Treat and carry 50 ft. on a stretcher made of coats and poles.

Here the most marked error made was to put the gauze on the patient before making holes for his nose and mouth. The man has become unconscious from afterdamp; his breathing is doubtless labored and it is most important to delay long enough to provide for his untrameled respiration.

The Penalties and Awards

The penalties and discounts used by the American Mine Safety Association were adopted. The judges were all medical men; in fact, the Red Cross will not permit laymen to act as judges in events in which it participates. The principal awards were as follows:

Sanchez Challege Cup. Donated by M. Sanchez, of Lexington, Ky., to W. G. Duncan Coal Co., Graham, Tenn. (Cup must be won twice in succession before it becomes the property of any team; meantime, it is to be competed for annually.)

State University Trophy Cup. Donated by the State University and presented by Henry S. Barker, the president of the university, to the Continental Coal Corporation team No. 1.

Lungmotor, donated by the Life Savings Devices Co. Won by the W. G. Duncan Coal Co., Luzerne team.

Sixty dollars in gold, donated by the Jeffrey Manufacturing Co. and an Anemometer donated by the Davis Instrument & Manufacturing Co. This was presented for division between the Stearns Coal Co. Barthell team and the Wisconsin Steel Co. Benham team.

Six vest-pocket compasses, donated by the Fairmont Machinery Co. Won by W. G. Duncan, Skibo team, Greenville, Ky.

Fifteen dollars in gold, donated by Ohio Brass Co. Won by the Continental Coal Corporation, Barker team.

Twelve dollars cash, donated by Bryan-Hunt Co., of Lexington, Ky. Won by the Consolidation Coal Co. Jenkins team No. 1.

The Benham team of the Wisconsin Steel Co. getting a larger score than the Barker team of the Continental Coal Corporation received the 1913 first prize for which the two teams had previously tied. This was a large silver cup presented by the Goodman Manufacturing Co.

There were several other smaller prizes. Medals were awarded to the members of the team receiving the highest average, by the American Red Cross and the American Mine Safety Association.

During the afternoon the large explosion gallery was fired, twice, once with a permissible explosive with a deflective force equal to a half pound of 40-per cent. glycerin dynamite, tamped by one pound of clay and once with black blasting powder of equal deflective force tamped by two pounds of dry clay. In each case, plenty of bituminous coal dust was present, and as might be anticipated, there was no explosion in the first instance and a most severe one in the second.

Free Course of Instruction for West Virginia Miners

In order to further the work of the operators in improving mining methods and conditions in West Virginia, and to assist the State Mining Department in an educational and safety campaign, the Board of Regents of the State University has appointed an additional member of the faculty, whose business it will be to organize training schools for the miners throughout the state. This new faculty member is Robert S. Gatherum, who has been designated as Assistant Professor in Mining, and his appointment will become effective July 1.

Mr. Gatherum's duties will keep him constantly in the mining fields, and as the classes in mining instruction are organized, the work will be put in charge of some well qualified local man. The courses of instruction will be such as are recommended by the Department of Mining at the University, and will be selected according to the conditions in each locality. Lantern slides and motion pictures will show how mining camps may be made both sanitary and attractive; how accidents occur and how they may be avoided; the safe method of undercutting coal by pick and machine; how roofs should be examined and posts set; the proper handling and storage of explosives, etc. These pictures have been made to develop the "safety-first" idea, and will be readily understood by the foreigners who are unable to speak English.

Equipment will also be carried to demonstrate the characteristics and behavior of the various mine gases, and a few simple experiments with each gas will impress upon the miners their properties and dangers. A number of instructive experiments will also be performed upon coal dust, for the purpose of emphasizing its danger. The lectures will include such subjects as sanitation, first-aid-to-the-injured, the raising of garden produce, etc.

Mr. Gatherum is a practical mining man, and is especially well fitted for the duties of his position. He made his start as a trapper boy in the mines of West Virginia at the age of 14, and after wielding the pick for a number of years, he accumulated sufficient funds to secure an education as mining engineer at the West Virginia University, and has since been located in the New River and Kanawha fields.

This further indication of the University's desire to extend its usefulness and carry its instruction to the miners will be generally commended. That such movements tend to decrease the death and accident rates can be proved from the results that have attended similar efforts elsewhere. The Kanawha and New River fields have been chosen to inaugurate the movement, which will be extended to other fields as soon as possible.

Coming Meetings

The summer meeting of the **West Virginia Coal Mining Institute** will be held in Cumberland, Md., June 2, 3 and 4.

The annual meeting of the **Mine Inspectors' Institute of the U. S. A.** will be held in Pittsburgh, Penn., June 9, 10, 11 and 12, with headquarters at the Seventh Avenue Hotel.

The annual meeting of the **International Railway Fuel Association** will be held in Chicago, Ill., June 18, 19, 20 and 21, with headquarters at the Hotel La Salle, La Salle and Madison Sts.

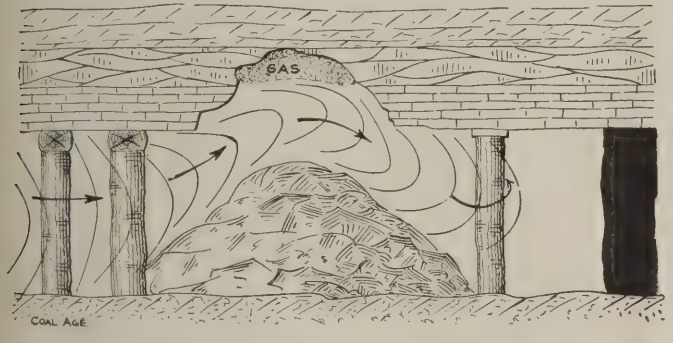
Discussion By Readers

Explaining an Extraordinary Experience

The extraordinary experience described by John Lawlor, Jr., COAL AGE, Apr. 25, p. 682, while unique, will not, I believe, be regarded as wholly phenomenal, when the attendant circumstances are taken into consideration. In my opinion, the peculiar action of the flame of the open light, the flame cap and the inflammation of the mixture with its billowy or undulatory movement can be explained in accordance with the operation of natural laws under unusual conditions and experimented with in an unusual manner.

According to the description given, the roof fell to a height of about 3½ ft. above the line of stratification of the drawslate. By the building of a brattice extending toward the face, from the last cut-through, the sectional area of the air passage was considerably reduced and, as a result, the air traveled with a much higher velocity. When this current reached the cavity left by the fall, it would naturally expand some, but its course would be deflected upward above the fall.

Referring to the accompanying figure, I have indicated by the light curved lines the comparative velocity



ILLUSTRATING ACTION OF AIR CURRENT ON ACCUMULATIONS OF GAS

of the air waves passing over the fall. At the top of the fall and above the passing air current, I have indicated by dotted lines the gas which is issuing from the crevices of the strata and is in different stages of dilution by the air current. Under these conditions, while the air passing over the fall might be practically free from gas to any extent that could be detected by the lamp, the gas close to the roof would be almost pure (unmixed with air). Between the passing air and the accumulating gas, there would be a more or less undefined line where the mixture of gas and air would be inflammable and above this line a light would be extinguished by the sharp gas near the roof. A lamp raised into this mixture would, therefore, first show a cap; but, later, the lamp would be extinguished by the sharp gas.

Referring to the flame cap leaving the lamp, and floating upward with a gyratory movement, it is possible to imagine that in this contracted area and limited space, with a free flow of gas above and a pure air current flowing below, the peculiar phenomenon was presented of a sharp transition from an inflammable to an extinctive atmosphere. Again, by any sudden deflection of the air into the cavity, it may be supposed that, with the rapid diffusion of the gas assisted thus by the velocity of the air current, an inflammable portion of this accumulation was swept from the main body and carried forward as described.

The wave-like appearance of the burning mixture is sufficiently common to need no explanation. It is a well known fact that gas often travels a considerable distance in stratified layers, in a strong current of air. In my own experience, I have often been forced to the conclusion that a higher percentage of gas is found in the air close to the roof and extending partly down the sides or ribs of the entry. This condition, I believe to be due to the air current being retarded more at these points of contact with the roof and sides of the entry, whereby the air supply is less in proportion to the quantity of gas present at those points. The impression that there was "gas all around;" as Mr. Lawlor expresses it, is most assuredly correct; but it was this fact that made the experiment he conducted more dangerous. Again, since the gas acted in the usual manner when the air current was cut off, it is reasonable to suppose that there was nothing in the composition of the gas that would give rise to the peculiar manifestations described.

I. C. PARFITT.

Jerome, Penn.

Safety or Refuge Chambers in Mines

Letter No. 4—I am an ardent believer in the adoption of any means that will tend to the conservation of human life. In respect to the construction of safety chambers in mines, as a means to this end, the question naturally suggests itself: Will such chambers provide the greatest degree of safety, without making suitable auxiliary provisions that will render them available under all conditions. I am inclined to answer this question in the negative. I do not offer this statement as an argument against the installation of such refuge places in mines, or to detract, in any degree, from their utility. I simply want to draw attention to a fact that is already well known, but too apt to be overlooked; namely, that such chambers provided in mines will not be "havens of refuge" under all conditions.

Ignoring, for the present, the number, location and manner of construction of the chambers, and confining this discussion to the question of their accessibility at the moment of need, as a measure of their efficiency, I think that the chances are chiefly against their availability, in most mine disasters. In discussing the question, knowing by experience that an explosion may occur in any portion of the mine, we should consider three cases:

First, assuming the explosion takes place at a point *inby* from the location of the chamber. It is apparent that the pasageways leading to the place of refuge may be rendered impassable, either by the destruction caused by the force of the explosion, or by the presence of afterdamp or fires. In either case, the refuge chamber would be inaccessible to the survivors at the working face.

Second, assuming the explosion occurred at a point *outby* from the location of the chamber, while the passageways leading thereto may not be obstructed as in the previous case, by broken timbers and falls of roof, they may soon be so filled with afterdamp as to be impassable, and access to the refuge chamber again cut off.

Third, if the explosion should occur in the immediate vicinity of the refuge chamber, it is possible that not only the roadways would be rendered impassable, but the chamber itself might be destroyed or the entrance thereto effectively blocked. It is necessary to consider these contingencies as possible, whether there be provided one or more such places of refuge.

Granting the truth of the foregoing remarks, we must conclude that to make the refuge-chamber idea effective, it will be necessary to supply the workmen with appliances that will be a protection and enable them to reach the refuge chamber under conditions that would otherwise make this impossible, owing to the intervening afterdamp. In line with my previous statement, I would suggest the advisability of installing in every working place a breathing apparatus and portable electric lamp that would be available for each man, in time of need. I believe this provision would help to make the refuge chamber available to survivors of an explosion.

While much attention has been given to the work of rescue following an explosion, it seems to me, as has been suggested by John Rose, COAL AGE, Apr. 18, p. 657, that more attention should be given to precautionary and protective measures, both legal and otherwise. The question of expense is a minor factor in comparison with the possibility of saving human lives. There is probably no more hazardous business or occupation than that of coal mining, and few in which there is more recklessness and carelessness displayed on the part of the workers. It will be generally admitted that there are no greater gamblers on human life than miners, and this must be controlled by moral suasion or physical force—law.

I. C. PARFITT.

Jerome, Penn.

The Mine Foreman

Letter No. 5—I have been much interested in what has been written in regard to the responsibilities resting on the mine foreman and his relation to the superintendent. While I think that every man serving in the capacity of superintendent of mines should be capable of passing any examination required of mine foremen, I believe that many foremen who find fault because the superintendent does not accept their suggestions and adopt the methods they propose, are themselves to blame. In many such cases, the incompetency rests with the foreman and not with the superintendent.

It is well known that there are many incompetent mine foremen who hold certificates of competency, but who surely have never passed a rigid examination. Such men lack the necessary ambition to make them successful in the operation of a mine; they are, in fact, only "timekeepers." All men are alike to them; they know little of the work being done, because they do not get around the mine to personally inspect and superintend the work.

Compare such a man with the competent and ambitious mine foreman who realizes that he is more than a mere "timekeeper." This man is known to all his men and he, in turn, knows the character of every man in the mine. He is a good judge of human nature and this fact gives him the ability to handle men successfully. He is always ready to adopt improved means or methods; he consults his assistants and firebosses on every important question. He is devoid of prejudice or biased opinions. Such a mine foreman is not satisfied except when he has everything working in proper order. After starting the men to work in the morning, he proceeds to examine the roadways, travelingways, air courses and working places in the mine. He thus acquaints himself with every condition that exists in the workings. He expects his assistants and firebosses to spare no pains or effort in making the mine safe. He instructs them to report to him at once any place in regard to which there may be a doubt.

It is unnecessary to state that such a man has generally the hearty coöperation of his superintendent; and even when this is lacking, he seldom complains, but strives to produce the best results with the material at his command. His knowledge of mining and thorough acquaintance with the conditions underground enable him to impress his ideas and to offer practical suggestions.

By thus comparing the competent and incompetent mine foremen and the manner in which each performs his work, it is made plainly apparent that it is the negligence, incompetency and lack of ambition on the part of a foreman that is more often the cause of mine accidents, than the incompetency of the superintendent.

B. J. CROOKS, Asst. Foreman,

Midway, Penn. Carnegie Coal Co.

Letter No. 6—The mine foreman is a greater factor and plays a more important part in the coal-mining industry of today than is generally supposed. The plan of development, methods of producing coal and provisions for the safety of the men, in many of the smaller operations, are left wholly to him; and the results obtained are measured by his ability and management.

With respect to the elements necessary to produce results, mine foremen may be classified as competent and incompetent; successful and unsuccessful; ambitious and unambitious; industrious and indolent, etc. The successful mine foreman of today must be both practical and progressive, the methods of operation in the mining of coal are constantly changing. Old and defective systems are being replaced by new and improved means and methods. To such an extent is this true that the successful foreman of a few years ago, following the same methods now as then, would be a failure today.

The mining law of Tennessee, in prescribing the duties of mine foremen, places on them the burden and responsibility of maintaining safe and sanitary conditions in the mine. The position thus involves great responsibilities, and the mine foreman should realize this fact and prepare himself to meet its requirements and demands, as far as possible. Again, the operator places on him the burden and responsibility of putting out the coal at a minimum cost.

With the duties and responsibilities imposed by the mining law on the one hand, and the results demanded by the operator on the other hand, the mine foreman's position is not an easy one, but one requiring careful preparation, thought and the exercise of good judgment. It is apparent at a glance that the duties of the mine foreman are many and arduous. Mine managers and superintendents frequently make the mistake of permitting the mine foreman to be over-taxed. Because he is on a fixed salary and responds willingly to calls at any hour is no excuse why he should be expected to work nights and Sundays, almost without cessation. There is a limit to human strength and endurance, and a nervous strain produced by such over-taxation will often develop a nervous and discouraged worker. Relaxation and rest are even more essential for the mine foreman than for the mine mule, whose working hours are well guarded.

Mine foremen, to a certain extent, become what their superior officials make them, and this effect, in turn, is reflected in the character of men he draws around him. An energetic, active, painstaking foreman develops the same characteristics, in time, among his men. His position is thus a high and responsible one, and the influence he exerts is a potent factor in the success or failure of the operations in his charge. He must be a leader and not a driver of men, faithful in his attention to duties in the mine and persistent in his endeavors to acquire knowledge. Though holding a higher position than the men under him, the successful mine foreman, if not lacking in common sense, will consult with his men and develop among them advisers and efficient assistants in the carrying out of his plans.

A valuable element in the make-up of a mine foreman is honesty of purpose that should be plainly manifest in all his dealings between the company and the men. He can show no favoritism. In his efforts to improve conditions and achieve results, he will doubtless make mistakes, as have all men who have accomplished things worth while.

There is today an increasing demand, in the coal-mining industry, for intelligent mine foremen—men with strong minds and active brains, men who are studying the problems of safety in mining and economy in production with all the zest at their command. Foremen are needed with moral and elevating force of character, who can wield an educating influence over the miners in their charge; inspiring them to better and nobler aims in life, which make for better homes, better citizens and better communities. These are the essential elements of success.

JOHN ROSE.
District Mine Inspector.

Dayton, Tenn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

SECONDARY SPLITTING

Secondary splitting involves the principles of both tandem and split circulations. The tandem portion consists of the main airway of the primary split and the airways branching from this and forming the secondary split.

It is necessary to first find the general pressure potential for the secondary split section. This is equal to the sum of the pressure potentials of the airways forming that split. This general potential for the secondary split is then combined with the corresponding primary potential, according to the method employed for a tandem circulation, which is thus regarded as one branch of the primary split.

The accompanying diagram shows clearly the method of naming the splits and indicating them by symbols. The

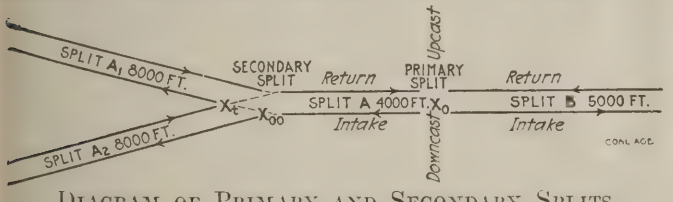


DIAGRAM OF PRIMARY AND SECONDARY SPLITS

primary splits, branching from the point where the air current is first divided, are designated by the letters A, B, C, etc., and the corresponding potentials by X_a, X_b, X_c, etc.

Secondary Splits are designated A_1, A_2, etc., and B_1, B_2, etc., depending on the primary split from which they branch: and the corresponding split potentials by X_{a_1}, X_{a_2}; X_{b_1}, X_{b_2}, etc. The general potential for a primary split is designated X_o, and for a secondary split X_{oo}, or X_{a_o}, X_{b_o}, etc.

In secondary splitting the operation is much simplified by calculating the general potential for each consecutive point or section, beginning always at the inby end of the system and finding first the general potential for the secondary split; then combining this in tandem with the corresponding primary potential; and using this result to find the general potential for the primary split, in the same manner as for the secondary split. Two formulas only are necessary; the one expressing the summation of the potential values for a split circulation, and the other a similar summation for a tandem circulation. They are as follows:

General split potential, $X_{po} = \Sigma X_p$

General tandem potential, $X_{pt} = \dfrac{1}{\sqrt{\Sigma\,(1/X_p^2)}}$

In all splitting calculations it will generally be found more convenient to use the pressure potential, for the reason that the calculation of the distribution of the air is based on equal pressures, for all splits starting from one point.

The Coal Age Pocket Book

Example—An air current of 120,000 cu.ft. per min. is passing in a mine in two splits, as follows:
Split A, 5x10 ft., 20,000 ft. long; 40,000 cu.ft. per min.
Split B, 5x10 ft., 5,000 ft. long; 80,000 cu.ft. per min.

More air being required, a careful investigation shows that Split A can be again divided at a point 2000 ft. inby from the foot of the downcast shaft, thereby forming two secondary air splits, each 5x10 ft., 8000 ft. long, including the return. This would make Split A 4000 ft. long including the return. With the same power on the air, what quantity of air will be circulated in this mine after dividing Split A?

Solution—The first step is to calculate the potential values of the different sections or splits, both before and after dividing split A to form the two secondary splits A_1 and A_2. This being a comparison of two circulations, it is possible to use the relative potentials, reducing the areas, perimeters and lengths to their lowest relative values, which gives

		(Relative values)
Before dividing Split A:		
Split A,	$a = 50;\ o = 30;\ l = 20{,}000$	$a = 1;\ o = 1;\ l = 20$
Split B,	$a = 50;\ o = 30;\ l = 5{,}000$	$a = 1;\ o = 1;\ l = 5$
After dividing Split A:		
Split A,	$a = 50;\ o = 30;\ l = 4{,}000$	$a = 1;\ o = 1;\ l = 4$
Split B,	$a = 50;\ o = 30;\ l = 5{,}000$	$a = 1;\ o = 1;\ l = 5$
Split A_1,	$a = 50;\ o = 30;\ l = 8{,}000$	$a = 1;\ o = 1;\ l = 8$
Split A_2,	$a = 50;\ o = 30;\ l = 8{,}000$	$a = 1;\ o = 1;\ l = 8$

Relative potentials, before division:

$$X_a = a\sqrt{\frac{a}{lo}} = 1\sqrt{\frac{1}{20\times 1}} = \frac{1}{\sqrt{20}} = 0.2236$$

$$X_b = 1\sqrt{\frac{1}{5\times 1}} = \frac{1}{\sqrt{5}} = 0.4472 \qquad \Sigma X = 0.6708$$

Relative potentials, after division:

$$X_a = a\sqrt{\frac{a}{lo}} = 1\sqrt{\frac{1}{4\times 1}} = \frac{1}{\sqrt{4}} = 0.5000$$

X_b = *Same as before* = 0.4472

$$X_{a_1} = 1\sqrt{\frac{1}{8\times 1}} = \frac{1}{\sqrt{8}} = 0.3535 \qquad X_{ao} = 0.7070$$

X_{a_2} = *do* = 0.3535

Tandem summation (X_a and X_{ao}):

$$X_t = \frac{1}{\sqrt{1/X_a^2 + 1/X_{oo}^2}} = \frac{1}{\sqrt{1/0.5^2 + 1/0.707^2}} = 0.4082$$

$$X_o = X_t + X_b = 0.4082 + 0.4472 = 0.8554$$

Since the power is the same, before and after division

$$\frac{Q_1^3}{(\Sigma X)^2} = \frac{Q_2^3}{X_o^2};\ \text{and}\ \frac{120{,}000^3}{0.6708^2} = \frac{Q_2^3}{0.8554^2}$$

$$Q_2 = 120{,}000\sqrt[3]{\left(\frac{0.8554}{0.6708}\right)^2} = 141{,}100\ \textit{cu.ft. per min.}$$

Inquiries of General Interest

Effect of Short-Circuiting Air on Speed of Fan

A mine ventilating fan is discharging a certain quantity of air into a mine when a door is set open between the main-intake and return airways in the mine, thereby short-circuiting the air current at that point. When this occurs, I have noticed that the load on the engine or motor driving the fan is increased. Will you kindly explain the reason for this effect?

INQUIRER.

Stotesbury, W. Va.

The setting open of the door and the consequent short-circuiting of the air current underground, at once cuts out the mine resistance and the pressure on the air in the fan drift drops accordingly. Under this decreased pressure, a much larger quantity of air flows through the fan, which greatly increases the work or power absorbed in the fan itself.

It is this work, which is absorbed or lost in the fan, that affects, in a measure, the torque or turning moment. The work thus absorbed varies directly as the square of the velocity of the air passing through the fan. The ratio of increase in the velocity and quantity of the air current, caused by the short-circuiting of the air, will be determined by the relative mine potentials or the relative resisting capacities of the airways before and after the short-circuit takes place. It should be perfectly evident, therefore, that the load on the engine or motor will be increased as the square of this ratio, and the power as the cube of the same.

A Checking System for Coal Loaded by Miners

I will appreciate an expression of opinion with reference to a problem that is a constant source of trouble to all mine operators and also in respect to a plan I have devised for obviating the difficulty.

I refer to the matter of properly checking the amounts of slate and slack loaded by the miners; and of keeping a check also on those portions of the mine from which the dirtiest coal is loaded. Heretofore, this checking of the miner's output has been attempted by selecting mine cars at random and picking over the whole car, which meant that in all probability, a miner would not have more than two or three of his cars picked a month. The result was a tendency for the miner to take chances and load excessive quantities of rock, and shoot his coal carelessly with a resulting abnormally low percentage of lump to slack. If each mine car could be picked and records kept of the percentage of rock, slack and lump, the problem would be solved at once, but that is impracticable.

According to my scheme, a sample of a predetermined quantity is taken from each car and in such a manner as to prevent the car being loaded so as to affect the fair average character of the sample taken. This sample of, say 100 lb. to the car is delivered to a "sample box," which is marked with the same check number as that of the car from which it is taken. This sample is then treated in any convenient manner to determine the percentages therein of rock, lump and slack. A daily report is kept in which the percentages of rock, lump and slack, as shown by the tests of the samples taken, are tabulated under each check number. We have had this system in effect at Banner Mines for some time, and the results obtained I regard as very satisfactory.

As soon as the men became aware that a large proportion of their cars would be sampled the percentages of rock began to fall off so noticeably that in less than ten days' time the amount of rock loaded, as shown by the amount of refuse hauled away from the picking belt and washer, had decreased very materially. The amount of slate picked by hand at the picking tables was practically reduced one-half.

By arranging a bonus system for rewarding miners whose percentages of rock were below a predetermined average amount, and whose percentages of lump were above a predetermined average amount, it seems quite probable that the men might be stimulated to better mining and loading. The tabulated report of the tests could be kept uptodate and placed where the miners could inspect it. The men that are in the "bonus class" could be designated each day. This tabulated sheet would show the operator at a glance what men are loading the cleanest coal, what men are shooting their coal best and hence have the highest percentage of lump where lump is desired; and, by knowing the location of the working places of the respective miners, it will indicate which parts of the mine, if any, are producing the dirtiest coal.

Such a system would also serve as a warning to men whose percentages are constantly poor, and would enable the operator to eliminate, when opportunity occurs, by a system the fairness of which cannot be questioned, the undesirable ones from among his miners. A vital feature of the system is the maintenance of the check number on the sample corresponding to that of the car, so that the samples can be taken without interrupting the usual rapid dumping of the mine cars. The samples can be tested at leisure, and the results tabulated.

A discussion of this system with such suggestions as you see fit to make will be appreciated.

ERSKINE RAMSAY,
Vice-President and Gen'l Manager,
Pratt Consolidated Coal Co.

Birmingham, Ala.

[The above draws attention to an exceedingly practical and important matter. Let COAL AGE readers suggest how an effective checking system of each miner's daily output of coal can be maintained without delaying the dumping of the cars. Or, it may be, someone can offer a substitute for the system suggested that will be equally effective in securing the loading of clean coal, as well as an accurate knowledge of the coal mined in different sections of the mine.—ED.]

Examination Questions

Pennsylvania Bituminous Mine Foremen's Examination, May 5 and 6, 1914

Ques. 1—What observations would you make on your daily examination of the working places in a mine?

Ans.—Observe closely the condition of the roof and coal face, to see that it is properly secured with the necessary timbers and sprags; observe the condition of the working face with respect to fine coal and refuse; observe the general manner in which the miner performs his work, keeps up his place, loads his cars, handles his supplies of powder, oil, timber and tracking and otherwise observes the rules and regulations of the mine. If safety lamps are used, observe carefully the condition of the lamp and manner of its use by the miner. If machines are used for cutting the coal, observe the manner in which this work is being done. Inspect all drill holes and shots to be fired and give necessary instructions to insure the safety of the men working in each place.

Ques. 2—What instruction, oversight and attention would you give the workmen on your daily rounds and what special attention must be given to pillar work?

Ans.—Besides what is mentioned in the previous answer, it is important to observe that each man has the needed supplies of timber, tracking, etc., to make his place safe and that he timbers his place promptly and securely. Careful attention should be given to see that each man performs his work in a safe manner. In pillar work, it is most important to see that sufficient timbers are set to secure the roof behind the men and prevent the falls from extending over the loose end of the pillar. It is also important to observe that the line of pillar work is kept fairly straight.

Ques. 3—Before hiring a workman in any capacity, what questions would you ask before giving him employment?

Ans.—Ask him for his certificate and references, if he has any; find out where he has worked before; in what capacity, and ascertain why he left that place. Inquire how he would proceed to timber his place, mine and load his coal; and ask him to explain his manner of charging and firing a blast. If safety lamps are in use, ascertain if he has had any experience in gas and give him a safety lamp to take apart and put together again. Give him a set of instructions to read and see if he can read and understand them to your satisfaction.

Ques. 4—What are the efficient limits to which the ventilation of a mine may be split?

Ans.—The velocity of the air current practically determines the limit of splitting or dividing the air. This limit of velocity at the working face varies under different conditions, but should seldom fall below 200 ft. per min.; and, in many cases, the velocity of the air current passing the working place should not be less than 400 or 450 ft. per min.

Ques. 5—State clearly what provisions should be made and appliances installed to insure a mine being thoroughly and efficiently ventilated, and state where such appliances should be placed.

Ans.—The ventilating equipment of a mine starts at the surface, although, in a few exceptional cases, a deep shaft and the absence of any gas may admit of furnace ventilation being employed, which, however, is not a safe or practicable system for use in a gaseous or a shallow mine. The mine ventilator located on the surface should be a fan of sufficient capacity to supply the required quantity of air against the necessary water gage, the latter being determined by the resisting power of the mine. If a mine is gaseous or dusty, there is the possibility of explosion; and, to prevent the destruction of the ventilating apparatus, explosion doors should be provided above the fan shaft. The fan should be set a sufficient distance back from the top of the shaft to avoid damage from any cause arising from its proximity to the shaft.

In the mine, air bridges, preferably overcasts, should be built at the mouth of each section of the workings, so as to provide a separate split of air, as early in its development as practicable. The air current should be properly conducted throughout the mine, by substantial air-tight doors and stoppings. The air should be made to sweep all working faces, and, wherever necessary, temporary brattices should be constructed to carry the air forward, or for the purpose of deflecting the air current into cavities in the roof or other void places. Regulators should be used to properly regulate the air so as to proportion the supply to the need in each section of the mine. Such regulators must be placed where they will not interfere with the haulage of coal.

Ques. 6—What provision should be made for the safe handling of explosives and detonators in mines, including transportation of the same?

Ans.—General Rule 13, Art. 25, of the bituminous-mine law of Pennsylvania, provides that no person shall carry into the mine, at one time, a greater quantity of powder or other high explosive than is required for use in one shift and such quantity shall never exceed 5 lb., except in the case of shotfirers requiring a larger amount to complete their work, as provided in Art. 16. It is also provided that all powder carried into the mine must be contained in metallic cans or canisters.

Art. 16 further provides that no powder or high explosive shall be stored in any mine. Black powder, for use in mines, must be put up in 5-, 10-, 15- and 25-lb. metallic cans, or canisters, or equally safe receptacles. No black powder, explosives or detonators shall be hauled on any electric motor trip, unless encased in boxes of non-conductive material. In dry and dusty mines where gas can be detected on the safety lamp, none but permissible explosives shall be used. No charge shall consist of more than one kind of explosive. The law provides that all permissible explosives, for use in bituminous mines, must be marked with the name of the manufacturer, name of the explosive, method of handling and full instructions for use. Detonators must at all times be kept in securely locked cases and separate from other explosives.

Coal and Coke News

Harrisburg, Penn.

Taking issue with the opinion of the Interstate Commerce Commission regarding the joint freight rates on what are known as industrial railroads or "tap lines," which roads connect with a great many bituminous mines, the Public Service Commission on May 14, decided that the proposed cancellation of established joint rates is not justified and should not, therefore, go into effect.

At the final hearing of this case on the above date, attorneys for trunk lines contended that under a ruling of the Interstate Commerce Commission there was ample justification for the withdrawal of joint rates heretofore maintained with the terminal connecting roads, while counsel for the Union and Monongahela railroads, the complainants in the case, were emphatic in their declarations that interstate commerce is not subject to the regulatory control exercised by the Federal Commission.

George S. Patterson, representing the Pennsylvania R.R., questioned the authority of the Public Service Commission to suspend the rates, which became effective on the above date. There is no empowering clause in the act creating the commission he asserted, and the Interstate Commerce Commission has already declared the practice of terminal allowance to be illegal.

Charles MacVeigh, general counsel for the United States Steel corporation, and representing the Union road and shippers along its lines, appealed for a just recognition of state rights, notwithstanding the Interstate Commerce Commission's decision.

In reviewing the case, it was shown the trunk lines allege, under the Interstate Commerce ruling, that delivery of cars at points of inter-change is actual delivery of cars at destination. Under the new tariff there will be an additional tonnage charge of 15 cents for hauls of only 14 miles, in many instances. In the Pittsburgh district, the region most affected in the case, there are approximately 30,000,000 tons of freight transported annually, the greater portion being coal and steel. An adverse decision means a yearly loss of $2,500,000 to the Monongahela Connecting R.R. and $5,000,000 to the Union Railroad.

The Lehigh Valley Answers Government

The Lehigh Valley R.R. on May 14, denied in the Federal Court that it had entered into combination or conspiracy to restrain or monopolize the production, transportation and sale in interstate commerce of anthracite trade, located along the lines of the company. The denial was set forth in the road's answer to the government's suit under the Sherman anti-trust law.

Another defendant company, the Delaware, Lackawanna & Schuylkill R.R. also filed answer, making denial of the charges that it is a party to any combination to restrain the anthracite trade. This road, 50 miles long, was acquired by the Lehigh Valley R.R. to serve collieries in the anthracite region.

Denial of similar character was filed on behalf of the various individual defendants, who are officials and directors of the company sued by the government, and who are personally mentioned in the government complaint.

The Lehigh Valley Coal Sales Co. and various other railroad and coal companies, which are defendants, filed their answer about two weeks ago.

In its general effect, the answer of the Lehigh Valley R.R. is a complete and specific denial of all the charges made by the government. The transportation of anthracite has not been moderately profitable, this company sets forth and up to the present time the owners have not received and are not now receiving a return commensurate with the value of their investment in the property.

The railroad company denies it owns or has ever owned anthracite lands in Pennsylvania or elsewhere, although it admits that some of its constituent companies were chartered by the State of Pennsylvania, both as railroad and coal companies. For many years, the answer asserts, it was the policy of the State of Pennsylvania, "to bring about a joint development of the anthracite mining and transportation industries."

The railroad company denies any domination of the Lehigh Valley Coal Co. or any other coal companies through stock ownership or otherwise, but asserts that the mines of the coal mining company are operated and its affairs are entirely controlled by officers who have no connection whatever with the railroad company. It is conceded that the president of the railroad company is the president of the coal company, but as president of the latter, the answer says, "he acts solely in an advisory way respecting the fiscal affairs of said company, and has never exercised any jurisdiction in regard to the mining or production or sale of coal."

Denial is made also that the road has been guilty of granting rebates or of charging unreasonably high rates for transportation of anthracite over its lines to the coal markets, or that the railroad company advised the coal company to organize a coal sales company or that any restriction was placed upon its stockholders when the Lehigh Valley Coal Sales Co. was organized.

PENNSYLVANIA

Anthracite

Edwardsville—Settling in the old workings of No. 3 shaft of the Delaware & Hudson Co. on May 9, caused a cave 10 ft. in diameter and more than 20 ft. deep on Summit Street, opposite two school houses, and for several hours the people of the neighborhood were driven from their homes and given much uneasiness. The most apprehension was felt over the condition of the gas and water mains on the affected street.

Minersville—While eating supper on May 11, the family of Mrs. Kerns, had a narrow escape from being swallowed into the old workings of William Penn Colliery. The earth suddenly caved under the front portion of their home and in their front yard to a width of 70 ft. the depression being 50 ft. in diameter. The house was pulled from its foundation walls and left on the brink of the pit.

Exeter—The Pennsylvania Coal Co. has erected at the old Schooley shaft, a most modern plant for the removal of water from this old abandoned operation. Two large pumps, electrically driven, are working to perfection. The water is now 200 ft. from the top of the shaft, and it is expected that in a short time the Checker seam may be entered. Gas has been encountered and a large fan has been installed for its removal. When the Checker is reached a large force of men will be put to work cleaning away the débris and rotted timber, replacing the same with new, preparatory to resuming mining. The shaft is about 500 ft. deep, but it is considered the worst part of the pumping is over.

Hanover—Representatives of the Taxpayers Association, which is composed of all the large coal companies, were unable to secure an injunction to restrain the commissioners of Hanover Township from letting contracts for the repairing of roads, entailing an expenditure of $100,000.

Scranton—There was a general exodus from their homes of the people living in the 600 Block on Luzerne St. on May 16, when the Lackawanna Coal Co. officials notified them that the neighborhood is threatened with a mine cave in the Bellevue Colliery workings.

Mahanoy City—James Brothers have leased the East Bear Ridge Mine near Mahonoy from the Girard Estate and will build shortly a breaker employing about 800 men.

Mt. Carmel—The Richard Colliery operated by the Susquehanna Coal Co. was the scene of a disastrous explosion on May 15, when one man was killed and seven more injured. All the injured were taken to the Shamokin hospital. It is thought that one of the men opened his safety lamp and ignited the gas. It is also considered remarkable that more fatalities were not recorded, as not only the breast but the entire gangway was filled with gas when the explosion occurred.

Bituminous

Pittsburgh—The Conemaugh Smokeless Coal Co. has started the opening of a large development in Indiana Co. The contract involves the sinking of a 200-ft. shaft and the excavation of a slope 950 ft. in length, and will entail an expenditure of about $100,000. The tract of coal land embraces about 2000 acres and adjoins a tract of 3000 acres

owned by the Operatives Coal Mining Co. of Johnstown. The capacity of the mine will be about 200 tons of coal per day. The mine will be operated by electricity exclusively.

Connellsville—The strike at the Herbert plant of the Connellsville Central Coke Co. has been settled, but the plant is not being operated, having suspended because of lack of orders. No reduction in wages took place. The men who remain on the job to keep the plant in working condition are being paid the old wages. The shut-down is indefinite but is not expected to last for any considerable length of time.

Marianna—The mines here which have been shut down for some time may be re-opened shortly. Large numbers of men have been out of work for months and times have been hard.

Wishaw—A part of the air-shaft at No. 1 Mine caved in recently and a number of timbers dropped into the shaft. Although it will take some time to complete repairs and get the mine in shape for running, the damage is not as extensive as was at first reported. It was rumored shortly after the accident that the fan had fallen into the air-shaft.

Cresson—One of the mine cages at No. 9 shaft of the Pennsylvania Coal & Coke Corporation fell nearly 800 ft. down the shaft May 14, when the hoisting rope broke. The cage and the loaded car which it contained were completely wrecked. Fortunately no workmen were injured, but it was night before sufficient repairs could be made to hoist the miners out of the shaft.

WEST VIRGINIA

Wellsburg—Mine No. 3 of the West Virginia-Pittsburgh Coal Co., formerly known as La Belle mine, near this city, is shut down on account of the strike of practically all of the men working in it. Some violence has occurred, several men having been attacked by the strikers.

Charleston—After meeting May 15 for further consideration of the wage scale between the miners and operators of the Kanawha field, the joint sub-scale committee adjourned until May 25, upon which date another attempt will be made to adjust the existing differences. In the meantime the miners in the Kanawha field who walked out on an unofficial strike have been induced to return to work pending a settlement.

Kingwood—It is stated that the Preston Coal Co. located at Independence will soon be able to resume operations upon a full scale. The company owns several hundred acres of coal, and a new plant said to be one of the most modern in the state will shortly be completed when employment will be given to some hundreds of men.

Bluefield—In the first aid contest held in Bluefield, May 13, under the auspices of the Pocahontas Operators Association, the first prize was won by the team from the Louisville Coal & Coke Co. at Goodwill, the second, by the team from the Pocahontas Consolidated Collieries Co. at Maybeury while the third place was taken by the team from the No. 6 Works of the United States Coal & Coke Co. at Gary. In the one man event George E. Wysor, of the Crane Creek Coal & Coke Co., C. C. Bailey, of the Louisville Coal & Coke Co. and T. J. Burwell of the Pocahontas Consolidated Collieries Co. tied for first place, all making perfect scores. It has been arranged that this tie shall be decided in another contest to be held in Bluefield on May 30 next. Sixteen teams including a colored team and a woman's team participated in the contest.

ALABAMA

Birmingham—The property of the Wadsworth Red Ash Coal Co., comprising about 1200 acres of rich Cahaba coal land near Falliston, Shelby County, Alabama, has been purchased by R. N. McDonough, J. H. McDonough and J. T. Robertson, all of Birmingham, the consideration being about $175,000. It is the intention of the new owners to continue the name of the old company and to double the capacity, which is now 200 tons per day, as rapidly as possible. Stephen H. Green will continue as general manager of the new company.

KENTUCKY

Louisville—After nearly two months of lagging negotiations the operators and union miners of the Western Kentucky coal field agreed recently on the terms of a contract as to wage scale and working conditions to run for two years from Apr. 1, last. The three points, which, had been the principal bones of contention were at length decided as follows: Mule drivers shall draw 10 cents more each day and the operators will pay for and own the harness; the operators shall have the right to change the method of computing wages from the "run of mine" to "screened coal" at any time they see fit, except during the course of a working day; the operators shall have the right to change the method of cutting from the "ton" to the "square foot" upon a day's notice.

OHIO

Logan—A general appeal has been sent out on behalf of the miners in this vicinity, who have not been working since the general suspension on Apr. 1, and who had worked on short time for months prior to that date. It is said that women and children are in many cases insufficiently fed and clothed, and that help is badly needed. The appeal is signed by the committee in charge of the work of collecting supplies and cash contributions necessary to relieve the distress existing.

Columbus—Negotiations by which John S. Jones, of Chicago, Ill., and Newark, Ohio, as head of a syndicate was to take over the Sunday Creek Co. properties, have been declared off. Although the sale was announced last week as being practically closed, some of the details could not be agreed upon when it came to preparing for the transfer. There are reports that the affair will be reopened. Recent rulings of the federal court, growing out of the Sunday Creek Co.'s former relations with the Hocking Valley Ry., demand some form of reorganization for the big coal corporation.

Martin's Ferry—Miners in the eastern Ohio field are considerably interested in the report from attorneys that the new wage-scale agreement cannot contain a check-off clause. It is said that the Longshoremen's Act recently passed by the legislature will not allow a workman to sign away his wages.

Farmers in the mining section of Belmont Co. are blaming the strike of the coal miners for the many robberies being committed. It is said that chickens and live stock are special objects for theft.

INDIANA

Sullivan—The Monon Coal Co. has begun sinking shafts at the Steel Tipple and Mammoth mines to vein No. 5, the others having been mined out. Walter Bledsoe and A. T. Bennett, of Chicago, have leased the Baldridge mine near Farmersburg and will reopen it. The Peabody-Alwert Co., which operates the Reliance mine, near Shelburn, has dissolved partnership, Mr. Alwert taking over his partner's interest.

Linton—The Vandalia Coal Co. recently announced that it would start two more of its mines immediately. This will give employment to about 500 idle workmen.

ILLINOIS

Herrin—The Chicago & Carterville Coal Co. is rebuilding its washer at mine A at this point, entailing an expenditure of several thousand dollars.

Harrisburg—The Illinois Mine Rescue Car No. 3, from the Benton station, which has been in Harrisburg for the past month, has completed the work here and gone to Eldorado. During the time the car was at Harrisburg, Messrs. Scott and Nicholls trained 26 men in first aid and helmet work.

East St. Louis—Fines aggregating $15,000 were assessed against the "Big Four" and the Indiana Harbor lines when they pleaded guilty in the U. S. District Court on May 14 to charges of rebating and conspiracy. Each road was fined $7500. This virtually completed the cases which grew out of the government's investigation in which three railroads were charged with making discriminatory rates for hauling coal mined by the O'Gara Coal Co., of El Dorado, Ill. The third railroad, the Grand Trunk, several months ago pleaded guilty to charges of rebating and was fined $5000.

Canton—The coal mines of Illinois are again in operation after a delay of several weeks awaiting an adjustment of the new wage scale. The operators state that the new agreement is satisfactory and that no labor troubles are anticipated. The demand for coal is also reported good. In the signing of the contract, while both sides had to make numerous concessions, the operators are pleased that no material increase in the cost of production has been entailed, and the miners are glad to have gained improved working conditions.

Pekin—A petition of creditors was recently filed in the U. S. Courts to have the Champion Coal Co. of Pekin adjudged bankrupt. It is believed that the liabilities will approximate $6000 and the assets are expected to be in an equal amount when the schedules are filed. Ira J. Covey is the representative of the petitioning creditors.

ARKANSAS

Little Rock—Petitions bearing over 18,000 signatures to establish a miners qualification law under the initiative and referendum acts were recently filed with the secretary of state. This qualification measure would provide for the es-

tablishment of a board of examiners for coal miners, and also for numerous other reforms advocated by the Arkansas Federation of Labor.

Prairie Creek—Attorney General McReynolds has authorized the use of United States deputies as mine guards to protect the property of the Mammoth Vein Coal Co., at this place. The miners are locked out and there is a rumor that the operators intend to resume operations on the open-shop plan.

RECENT COAL AND COKE PATENTS

Coal and Gas Furnace. M. J. Farquhar, Wilmington, Ohio. 1,088,559. Feb. 24, 1914. Filed Dec. 16, 1909. Serial No. 533,375.

Chimney Cap. W. L. Carter, Waterloo, Iowa. 1,088,060. Feb. 24, 1914. Filed Apr. 12, 1913. Serial No. 760,679.

Draft Regulator for Furnaces. J. Hefferon, Cheyenne, Wyo. 1,088,572. Feb. 24, 1914. Filed Apr. 24, 1913. Serial No. 763,403.

Coal-Leveling Machine for Bee-Hive Ovens. W. Sangster, assignor to Covington Machine Co., Covington, Va. 1,089,675. Mar. 10, 1914. Filed July 7, 1908. Serial No. 442,306.

Bucket Conveyer. M. A. Kendall, assignor to Stephens-Adamson Mfg. Co., Aurora, Ill. 1,090,156. Mar. 17, 1914. Filed Aug. 10, 1911. Serial No. 643,358.

PERSONALS

Wade Harley, a coal mine foreman operating near Adrian in Upshur County, West Virginia, was shot and severely wounded by an Italian on the evening of May 14.

Joseph Northover, of Seanor, Penn., has been promoted from assistant mine foreman to mine foreman at the Eureka No. 39 mine of the Berwind White Coal Mining Co.

Colonel William Leckie recently purchased 200 acres of coal land in Pike County, Ky., and will shortly open a coal operation under the name of the Douglas Coal Company.

Benjamin Allen, mine examiner of the Black Diamond Coal Co. was killed by an explosion of firedamp on Sunday night, May 10, at about 10 o'clock p.m. Mr. Allen was considered a very careful mine examiner.

J. W. Galloway, vice-president of the Maryland Coal Co. of West Virginia was recently elected president of that firm at a meeting of the directors held in New York. He succeeds William H. Ziegler who resigned some time ago.

J. H. Woodward, president of the Woodward Iron Co., who has been for some weeks ill at his winter home at Orlando, Fla., has returned to his Birmingham home much improved in health. It was feared for a time that he would not recover.

Wm. Nicholson, for many years deputy mine inspector in West Virginia, has accepted a position with the New River Collieries Co. This places him in entire charge of the underground working of the mines at and near Eccles. Mr. Nicholson has resigned his position with the Jewell Ridge Coal Co., and after a short vacation will enter upon his new duties.

CONSTRUCTION NEWS

Benham, Ky.—The Wisconsin Steel Co., Benham, Ky., announces the further extension of the Wasioto & Black Mountain R.R. and the opening of a new coal development on Poor Fork, three miles from the Benham plant. Work is to be started within 30 days.

Kingwood, W. Va.—It is reported that the work of opening the big mine of the Kingwood Collieries Co. at Snyder will be commenced soon. The output of this company will be large and many men will be employed. The general offices will probably be located at Kingwood.

Pound, Va.—The Indian Creek & Pound River R.R. has been purchased by Knoxville and Bristol capitalists who announce a 12-mile extension of the road from Pound to Freeling, Va., to open an extensive coal and timber area. A large coal plant and an extensive lumber mill will be installed within six months.

Whitesburg, Ky.—The Roberta Coal Co., with hearquarters at Baltimore, makes the announcement of another new development near Thornton or Sargent, Ky., the exact location yet to be determined. A short line branch of railroad will be necessary. June 1 is the day named for the beginning of the development work.

Pittsburgh, Penn.—Contractors at work on the construction of the Montour R.R., which reaches the new coal mines of the Pittsburgh Coal Co. in Allegheny and Washington counties expect to have the road completed by July 1. The road will be 52 miles long, and will reach a field that has for years been held in reserve.

Whitesburg, Ky.—One thousand men are at work at Haymond on the construction of the industrial city which the Mineral Fuel Co. is erecting there. The company has just added a big planing mill to the band-saw mill which has been in operation for some time and is pushing operations. Rapid progress is being made in construction.

Hanlin Station, Penn.—A Pittsburgh coal mining company has recently driven stakes for the erection of a tipple to develop a large territory at this place. This structure will occupy the same location as one erected here some 25 years ago by the Keystone Coal Co. Work will also be started at once for erecting houses for miners.

Hazard, Ky.—The Ashless Coal Co., recently organized, will make an extensive coal development near Hazard, three miles from the Lexington & Eastern R.R., and will build a three-mile branch of the road out to the property, the construction to be started at once. The coal plant will have a capacity of 2500 tons per day from the start.

Whitesburg, Ky.—Track laying on the Younts Fork, Potters Fork and Bottom Creek branch lines of the Lexington & Eastern R.R. from Fleming to Naymond and Hemphill, is being pushed with all possible speed. Within a short time all three branch lines will be completed and in operation. At least 60,000 tons of coal is now mined and ready to be shipped out.

St. Louis, Mo.—Work was started May 11 on the 56 coke ovens, to cost $750,000, for the Laclede Gas Light Co., on South Broadway, adjoining the city limits. The ovens will form a row 30 ft. wide and 300 ft. long. Each oven will be 22 in. wide inside, 29 ft. long, and between 8 and 9 ft. deep, and will hold 14 tons of coal. In addition to the coke ovens, a holder is being built to contain 1,000,000 cu.ft. of gas.

Brownsville, Penn.—Improvements aggregating about half a million dollars are to be made at the Alicia coke plant of the W. H. Brown interests, two and half miles south of Brownsville. It is proposed to let a contract for 400 ovens within the next few days. These will cost approximately $700 each. It will be necessary to build new tracks, increase the power plant, and provide other necessary and extensive equipment to meet the additional output.

Columbus, Ohio—The construction of the proposed 40,000-hp. electric power plant at Floodwood, Ohio, which is backed by English capitalists, and which will furnish power to a large number of coal operations in the Hocking Valley field, seems practically assured, as Herman Gamper, who is in charge of the project, states that a market for the current is assured under contracts already made, sufficient to warrant the construction of the plant. It is believed that some of the units will be in operation by November.

NEW INCORPORATIONS

Knoxville, Tenn.—The Climax River Coal Co. has been incorporated with a capital stock of $5000. The incorporators are Nell S. Jenkins, Kyle B. Jenkins, Charles Jenkins, E. P. Luttrell, and J. H. Frantz.

Dayton, Ohio—The S. J. Patterson Pocahontas Co. has been organized for the purpose of mining coal. The capital stock is $75,000, and the incorporators are S. J. Patterson, H. J. Cresse, E. L. Fleming, D. E. Durnell, and H. B. Cromer.

Pineville, Ky.—The Straight Creek-Bell Coal Co. has been organized here with $50,000 capital by J. T. Asher, F. N. Asher and others for the purpose of developing Bell and Harlan County coal properties. Developments will be started during the summer.

Philippi, W. Va.—The High Carbon Coal Co. has been organized with a capital stock of $75,000 for the purpose of mining coal. The incorporators are S. A. Moore of Charleston, William G. George, R. E. Talbott, H. J. Wilcox and J. B. Ware, of Philippi, W. Va.

INDUSTRIAL NEWS

Hellier, Ky.—The Rockhouse Mining Co. has made an increase in its Hellier plant and is now shipping 75 cars per day. This is soon to be increased by 100 or more cars daily.

Richardson, Ky.—The T. J. Philips Coal Co., which lately incorporated, has purchased 2340 acres of coal land near here for development. T. J. Philips is the president and manager and L. R. Swain secretary and treasurer.

Somerset, Penn.—The Consolidation Coal Co. is said to have recently booked orders for 1,140,000 tons of Somerset County coal for the South American trade. This means that all the mines will be worked to capacity during the current year.

Evansville, Ind.—The Spacer Epperson coal mine, a few miles east of this city, which was appraised by the Warrick County Circuit Court at $23,000 was recently sold at public auction to William Epperson for $1500, he being the only bidder.

Cincinnati, Ohio—An extension of time until Oct. 15, 1914, has been allowed the Chesapeake & Ohio Ry. Co. in which to sell its holdings in the Kanawha & Michigan Ry. Co. The original time set for disposing of these holdings expired May 13.

Fayetteville, W. Va.—The Logan Mining Co. has closed a lease on the Lawson tract of 1100 acres on Main Island Creek. This area will be developed together with the Covey tract which it adjoins by a 200 ton mine. The development will be begun immediately.

Connellsville, Penn.—The Republic Iron & Steel Co. recently shut down 50 of its 400 beehive ovens at the Republic plant in order to ship coal to its recently completed by-product ovens at Youngstown, O. It is understood that this suspension is only temporary.

El Paso, Tex.—American soldiers on duty at the International Bridges have a strenuous time when coal is being shipped across the boundary. Fuel is being imported in considerable quantity for the Mexican railroads, and each carload of coal has to be shifted and probed in a search for hidden rifles and cartridges.

Hazard, Ky.—The Slemp Consolidated Coal Co. has leased another 1000-acre coal tract near Hamden to Pennsylvania and Maryland capitalists who will start at once the development of the property. A good-sized coal plant will be established. The work will be directly on the line of the Lexington & Eastern Railroad.

Cornettsville, Ky.—The Cornettsville Coal Co. has been organized by Arch Cornett, T. S. Tarbell and others with a capital stock of $40,000 for the purpose of making extensive coal developments on Big Leatherwood Creek, five miles from here. A short branch line of the Lexington & Eastern will be built to reach the new coal operation.

Jenkins, Ky.—The Consolidation Coal Co. has made an increase in tonnage at its 201, 202 and 203 mines at Burdine, three miles from here, and is now shipping 125 cars per day. Another increase will be made, it is said, by June 1, and all the company's plants in Jenkins, Dunham and McRoberts will make big increases soon afterward.

Mater, Ky.—The Elkhorn Coal Co., recetly organized by J. Henry Hall, C. L. Bastin and others, of Lexington, is beginning the mining of coal, building miners' houses, tipples, etc., and will be shipping within three weeks. This work is directly on the Lexington & Eastern R.R. Several hundred hands will be employed when the operation is in full swing.

Washington, Penn.—Owen Murphy, who is developing the coal interest on Coon Island, has purchased the Pittsburgh coal underlying the farm of the late Henry Cain, containing 222 acres. This tract is well located for development. The coal measure where the shaft is being excavated is 412 ft. below the surface. The work is progressing in good shape.

New Orleans, La.—Pierre Lacaze, vice consul of France at New Orleans, recently stated that the French Government had purchased a large tonnage of Alabama coal for its vessels in Mexican waters, and that probably a much larger tonnage would result a little later on. He stated that the French Government saved $2 per ton by buying the Alabama fuel.

Toronto, Ont.—The Grand Trunk Pacific Ry. recently let the contract for the new coal dock to be erected at the mouth of the Mission River at Fort William, Ont., to the Thunder Bay Contracting Co. The cost will be about $1,250,000. The buildings will have a capacity of 100,000 tons of anthracite, and equal amount of bituminous, in addition to the unroofed storage yards.

Birmingham, Ala.—The Maryland Coal & Coke Co. recently purchased the business of W. G. Coyle & Co., Inc., coal dealers of New Orleans, La., including all retail yards, docks, barges, tugs, etc. The deal involved several hundred thousand dollars, and was made to provide a market for the company's Sipsy River coal, which it is expected will largely go to export.

Cincinnati, Ohio—As a result of the establishment of a new management for the "Big Four" R.R. independent of that of the New York Central Lines, it is authoritatively stated that the coal and ore department headquarters will be removed from Chicago to Cincinnati. H. M. Griggs, general coal and ore agent, with his entire force, will maintain headquarters in Cincinnati, with branches in Pittsburgh and Cleveland.

Bluefield, W. Va.—The statement issued by Comptroller Cox covering the shipments of the Pocahontas coal field for the month of April shows these exceeded the shipments of the corresponding month for 1913 by about half a million tons. The total shipments during April, 1914, aggregated 2,117,286 tons, as compared with 1,534,220 tons for April, 1913. Up to the present time, the appearances indicate that May, 1914, will run far in excess of the corresponding month of last year.

Ashland, Penn.—One of the largest transfers in anthracite coal properties in this vicinity in recent years, occurred on May 16, when Abel I. Culver, of New York, purchased the holdings of the Shipman Coal Co., owners and operators of the Colbert Colliery, consisting of 500 acres of virgin coal land with deposits of almost 20,000,000 tons. The average yearly production is about 225,000 tons. The former owners were John B. Corliss, of Detroit, Mich., Robert E. Carter and J. M. Stauffer, of Hazleton, Penn.

Youngstown, Ohio—Byproduct gas produced at the new coke ovens of the Republic Iron & Steel Co. is said to be displacing producer gas and coal at the company's Lansingville, mills, and connections are being made in order to enable other mills and open-hearth furnaces to use this fuel. A large coal consumption will be displaced by the use of this by-product of the company's coke ovens, besides considerable natural gas.

Jackson, Ohio—Decrease in mining activity throughout this field as the result of exhaustion is the reason given by the Hocking Valley Ry. Co. for abandoning an electric railway between Jackson and Wellston. The line is 10 miles long and has been operated electrically for nearly 20 years. There were hourly trains, the patronage coming largely from the mining camps, but the company claims the road is now a losing proposition. Taking effect May 25, the electrical equipment will be entirely discontinued, but for the purpose of holding the franchise, temporarily at least, a few steam trains a day will be run. Some of the communities which bought lighting service of the company will be in darkness until other arrangements can be made.

La Follette, Tenn.—Edward V. d'Invilliers, a coal-mining expert of Philadelphia, together with his associates, Walter Gilman and J. B. Dilworth, are making an inspection of the coal and coke properties of the La Follette Coal, Iron & Ry. Co., at La Follette, Tenn., in the interest of the bondholders, the Electric Corporation, the Old Colony Trust Co., and the American Trust Co., all of Boston, Mass. This firm was placed in the hands of Neil Robinson, of Charleston, W. Va., as receiver on Dec. 23 last, by whom it has been since operated chiefly to furnish coking coal for the La Follette Iron Co., which firm operates the furnaces, ore mines, stone quarries, coke ovens, coal washers, etc., under lease from the La Follette Coal, Iron & Ry. Co., the latter firm furnishing the coal to the Iron company under contract.

Birmingham, Ala.—Looking to submitting bids for a big supply of coal to the United States Government, through the port of Galveston, for use during the presence of the fleet in Mexican waters, representatives of the coal-mining interests of Birmingham are now in New Orleans. Some of the larger corporations have gone so far as to make arrangements for the handling of large quantities of coal through Pensacola or New Orleans, and for loading same at Galveston on government vessels. Capt. W. O. Smith, army quartermaster at New Orleans, will open bids within a few days, the stipulation being the producer must be in a position to furnish at least 10,000 tons, if not more, every month. The bidding is open to all coal concerns in the South able to fulfill the conditions. Tests have recently been made at Pensacola by the government, and while there is no information as to the necessary qualifications, it is understood that the Alabama coal stood the test well.

Coal Trade Reviews

General Review

Anthracite slowing down into the customary midsummer dullness. Distress prices prevailing on bituminous, but surplus stocks are nearly exhausted and there is a more hopeful feeling. Lake shipments make a big increase.

The domestic grades of anthracite continue in moderately good demand, but the steam sizes are under steadily increasing pressure. The May circular is generally maintained on the prepared grades, but the agencies are now openly seeking for business, and the next move will be a restriction in the production. It is evident that the customary midsummer dullness is now close at hand. Orders are generally plentiful for the current month, but the outlook for next month is not encouraging by any means. Any unusual dullness is ascribed partially to the tight money situation which is making it inconvenient for buyers to accumulate stocks as in previous years.

There has been a further sharp decline in tidewater bituminous quotations at down East points, where the market seems to be on the verge of the utter demoralization which has characterized previous dull seasons. With the distress prices now prevailing, consumers not already contracted will prefer to take their chances in the open market for the time being at least. The demand is down to the vanishing point and the market is as dull and flat as it is possible to imagine. Even the steamship demand has eased off. Consumers generally show no anxiety over delays in shipments on contracts, and there is scarcely any movement from the mines, except on specific orders.

A heavier movement in the Lake trade has resulted in an increased production in the Pittsburgh district particularly as regards the larger interests, many of whom are under nearly full time operations. Ostensibly circular prices are ruling, but it is known that occasional concessions are offered. There are no favorable indications of any increased consumption, and the conservative operating interests are quietly looking around for some temporary business at moderate prices to carry them over the dull period.

Although the Ohio market continues at a complete standstill, operators are expressing anxiety as regards their Lake contracts, which they are in danger of losing unless they are able to resume operations shortly. A plentiful supply of vessels is now available in the Lake trade, and all the demurrage coal at the loading ports has been cleaned up.

As a result of an excellent week dumpings at the Hampton Road piers the supplies in the local yards there is below normal and circular prices are being generally maintained as a rule. A decidedly optimistic feeling also prevails in the Southern market due partially to some heavy government orders for American warships operating in Mexican waters, and likewise to some inquiries from foreign governments for the same purpose. It is generally thought that the bottom corner of the trade has been turned, and a more hopeful feeling prevails over the future.

The Middle Western consumers appear to be reaching the end of their surplus stocks and the market seem to be slightly better. The wage scale question has now been definitely disposed of throughout the Middle Western states and mines are gradually getting under operation again. Prices as a rule are somewhat steadier, though weak at certain points.

EASTERN MARKET

Delivered price materially less and market for Pocahontas and New River is on the verge of being demoralized. Extraordinary dullness prevails on all grades. Marine freights low. Anthracite quiet; the shippers running short of orders.

Bituminous—To some degree the expected has happened. Prices alongside and on cars at practically all the New England ports have receded materially during the past week. While the $2.85 f.o.b. price has not yet been shaded on f.o.b. sales, there can be no further pretence of netting back anything like that figure on the orders recently closed on a delivered basis; $3.40 on cars at Providence, $3.30 or less alongside Boston, and $3.70 on cars Bangor, the latter for deliveries to Dec. 1, cannot by any possibility yield $2.85, f.o.b. Norfolk, and the indications are that still lower figures will be made the next fortnight or so. Various West Virginia operators have apparently concluded it is better to keep mines running and get what prices can be had. It really looks as if the market in this territory were on the verge of demoralization.

Meanwhile, the consumers who did close contracts are increasingly dilatory about accepting deliveries. The supply of water for the textile mills is the highest of recent years and instances could be multiplied of plants that on that account are using only 10@15% of their normal amount of fuel. The uncertainty of fall business for many kinds of manufactures is another factor in a situation that is almost unparalleled for summer dullness.

The call for Pennsylvania grades is almost at the vanishing point, the scattering business that offers being mostly confined to Pocahontas and New River. Operators are not loading cars except on firm orders; the risk of demurrage is too great.

Marine Freights are quiet. So much coal is standing at all the shiping ports that record dispatch prevails and that means quicker trips and more coal brought forward. The result is that shippers are at a loss to place steamers and some low rates have been quoted. Large schooners can be had at 55c., Hampton Roads to Boston.

Anthracite—Orders are being sought now by practically all the companies except on stove size. There is no gossip on prices, the May circular being rigidly maintained in all directions. A restriction of mining is the next move looked for.

Bituminous prices at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.90@1.50	$1.20@1.65	$1.67@1.77	
Philadelphia*.....	2.15@2.75	2.45@2.90	2.92@3.02	
New York*.....	2.45@3.05	2.75@3.20	3.22@3.32	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	.....	$2.80@2.85
Boston†.....	.....	.....	.....	3.40@3.70
Providence†.....	.....	.....	.....	3.50@3.78

* F.o.b. †On cars.

NEW YORK

A discouraging dullness still characterizes the bituminous market. However, close observers report surpluses exhausted while there is a tendency to hold tonnages closer and a better feeling prevails. Anthracite slowing down.

Bituminous—The New York soft-coal market is about as dull and flat as it is possible to imagine. Even the steamship business has slowed up perceptibly, and consumers under contract show no anxiety whatever even when their shipments get one to two weeks behind. There is scarcely any business being negotiated on new contracts, buyers not already covered preferring to take their chances in the open market for the time being at least. Slack coal which was in such heavy demand last year has fallen off to 40c. a ton while some Western Maryland coal has been offered in the local market at $1.85 with no buyers. Mines in the Central Pennsylvania district are operating at probably 40 to 50 per cent. capacity.

But even in the face of all these adverse conditions, it is a notable fact that the market is being relatively well maintained, at least as compared with the utter demoralization which has characterized other dull seasons. The general feeling prevails that there is a great deal of coal at tidewater, but if there were a normal market, the supply would be entirely inadequate. In fact authentic reports are to the effect that the accumulated surpluses are now practically all cleaned up. There is little or no tonnage coming in on consignment, shippers refusing to risk such shipments under prevailing market conditions; as a result, there is not so much demurrage coal reported. Stocks are being generally kept low.

The market continues quotable about as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—Full time operations continue the rule in the hard-coal regions, but the customary mid-summers dullness is already becoming evident. The domestic grades are mostly in active demand, but there is more pressure on the steam sizes and some restriction in operations next month seem to be inevitable.

In the prepared grades, stove coal is the only size that is generally active all along the line. Egg coal, which was in such good demand a few weeks ago, has now slowed up materially, while chestnut is also in long supply. Pea coal is heavy while the poor grades of barley are selling at figures which will scarcely cover the freight charges, and rice is about the same.

We quote the New York hard-coal market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.70	$4.55@4.70	$4.65	$4.50@4.65
Egg	4.95	4.95@4.95	4.90	4.80@4.90
Stove	4.95	4.95@4.95	4.90	4.90@4.90
Chestnut	5.20	5.05@5.20	5.15	5.00@5.15
Pea	3.55	3.25@3.55	3.45@3.50	3.20@3.45
Buckwheat	2.80	2.65@2.80	2.50@2.75	2.10@2.75
Rice	2.30	2.30@2.30	2.00@2.25	1.75@2.25
Barley	1.80	1.65@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

No marked change in anthracite situation, although there is a tendency toward dullness as the season progresses. Prospects not considered good for June, and curtailed mining possible. Bituminous on a parity with week previous, with no improvement in sight.

Anthracite—As the season progresses, it is becoming more apparent that with the close of the month of May, there is likely to be a period of dullness lasting through most, if not all, of the summer months. This is indicated by a perceptible falling off in the placing of orders. It is understood that the operators are fairly well filled up with orders, sufficient to carry them over the current month, without recourse to curtailment, but the situation looks anything but favorable for the ensuing month, and it is feared that the market can be well taken care of by short-time work at the mines.

This dullness is probably due to the fact that many householders are postponing the filling of their bins until the fall. It is a fact that many people who have heretofore purchased their supplies in the spring, are simply buying as necessity requires, instead of placing orders for their entire requirements. Lack of industrial activity may be responsible for this, in a measure.

It is understood that the market is absorbing the output of egg, stove and broken, but chestnut still continues to drag, and it is only with a hard pull, and liberal concessions on the part of the individual operators that this latter size is moving off. As indicated last week, steam sizes still continue to flood the market, and concessions of 25 to 30c. per ton are currently reported.

Price at tidewater are as follows:

	Circular	Individual
Broken	$4.35	$4.35 @ 4.45
Egg	4.60	4.60
Stove	4.60	4.60 @ } 4.70
Chestnut	4.85	4.70
Pea	3.25	3.00

Bituminous—The last week witnessed no change in the soft-coal situation. As a matter of fact, conditions seem to grow worse, instead of better. Industrial establishments are buying from hand to mouth, rather than enter into new contracts at the present figures demanded.

BALTIMORE

Production heavily curtailed to avoid surpluses. The hard-coal men are also complaining that business is light.

During the week just closed a half dozen more foreign charters were announced for late May shipment, and the prospect is that this class of business will show a heavy total for the month. The coastwise movement to the north is largely restricted to company-owned colliers, while southward the sailing vessel delivery is a feature

Mining districts of Pennsylvania and West Virginia are still busy urging coal upon agencies and consumers. Production has been largely cut to prevent surpluses. West Virginia slack was in somewhat better demand, several Western industries of importance having entered the field for this fuel. Slack was selling around 55c.; run-of-mine at 80c. and three-quarter at 85 to 90c. Pennsylvania low-grade fuels are offering at unprofitable prices in many cases at from 95c. to $1. Little or no change was noted in better fuels, selling to the trade at from $1.15 to $1.35.

Hard-coal men are also complaining of rather poor business. The spring ordering is not as brisk as it might be. The solid foundation of the anthracite trade, however, make it certain that any ground lost now will be made up by heavier business in mid-summer and early fall.

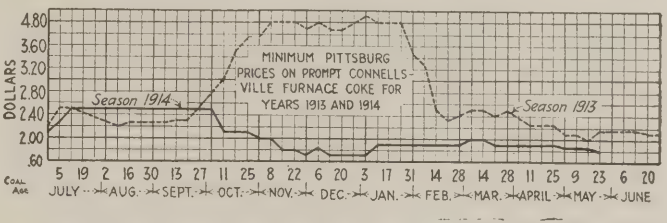
CENTRAL STATES

PITTSBURGH

Coal production increased, and nearing 60% of capacity. Lake shipments larger, demand being otherwise very poor. Prices fairly well maintained, particularly on contract. Connellsville coke stagnant with prices weak and production exceeding shipments.

Bituminous—Coal production in the Pittsburgh district is up to between 50 and 60% of capacity, contrasting with a rate of about 40% ten days ago. The largest coal interest is operating at 60% or more, but a number of the smaller ones are either closed or working at a low rate.

There has been no increase in consumption either by railroads or by industrial plants, while domestic consumption has, of course, decreased further. A slight improvement in demand has occurred through the further exhaustion of stocks, but these are still fairly important. The chief improvement has been by reason of heavier shipments in the lake trade. These are now of moderate volume, though still well below the average for this date. The Northwest does not seem to be much in need of coal, and the lake season as a whole promises to involve a light tonnage, though the rate toward the close of the season may mount up to normal.



Reports generally are that full prices are being obtained, but there is still some cutting, particularly in slack, caused by increased production of slack through the heavier lake shipments. Regular prices, which are quite well maintained for contracts, are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

Connellsville Coke—The market continues stagnant. There is practically no demand for furnace coke, either prompt or contract, and odd lots are frequently offered at under the regularly quoted market without finding takers. Consumers manifest no interest whatever in contracts for second half. Few foundry-coke contracts are being negotiated for the twelvemonth beginning July 1, though the great majority of contracts expire at that time. The market is quotable approximately as follows: Prompt furnace, $1.80@1.90; contract furnace, $2; prompt and contract foundry, $2.35@2.50 per ton at mines.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 9 at 312,100 tons, an increase of 6490 tons, and shipments at 291,166 tons, a decrease of 8273 tons. Production appears to have exceeded shipments by 20,934 tons.

BUFFALO

Miners accept old scale and return to work. Prospect of much surplus coal unless operators are cautious. Mines must prepare to meet slack conditions. Anthracite only fairly active. Coke unchanged.

Bituminous—There is no particular improvement in the trade and none can be expected until the surplus is much reduced. The mines tributary to this market are practically all active again, though the operators protest that they are not going to produce coal any faster than they can sell it. But there is quite an amount of it at different points awaiting disposition, some of which is paying car service, although Buffalo is not so overstocked as certain Canadian points. Most of this coal comes from a few sources, the operators seeming to be willing to suppose that they will come out better next time. The rule is to run the mines somewhat more than is necessary to take care of contracts and depend on semiregular customers to absorb the balance.

The prospect is for a slow market for an indefinite time. The lake trade is as dull as any other and there is no indication of any increase of consumption in any line. From present indications nothing to be expected beyond a possible slow improvement late in the season. Conservative coal operators and jobbers are looking for a few contracts and regular orders at living prices, pending a return of better conditions. Quotations remain weak on the basis of $2.80 for Pittsburgh

lump, $2.70 for three-quarter, $2.55 for mine-run and $2.15 for slack, with Allegheny valley sizes about 25c. lower.

The Allegheny Valley operators and miners, at a meeting on May 12 signed an agreement to continue the old wage scale for two years longer. The only change was to put the blacksmithing charge on a tonnage basis.

Coke—The coke trade is not active and shows no indications of improvement. Prices being at the bottom, do not change as makers of the best coke refuse to make further reductions. Quotations remain on the basis of $4.50 for best 72-hr. Connellsville foundry.

Anthracite—The demand is moderate in general, though the supply is not liberal. It is stated that the mines are not running full and that the tidewater demand is stronger than it is Westward. Some jobbers of independent anthracite report that they have difficulty in obtaining enough to fill their orders. The Canadian demand is still light.

The lake shippers are not getting much coal and are handicapped by the scarcity of small vessels, which are wanted for minor ports. Lake shipments for the week were 102,000 tons. The amount reported includes some cargoes that should have been put into last week's list.

COLUMBUS

Interest centered on the court's decision on the screen law. Ohio operators fear they will lose Lake contracts while considerable outside coal consigned to the Lakes is backing up into the regular market because of the shortage of vessel tonnage.

At this writing operators are anxiously awaiting the decision of the Federal court judges, advising whether or not the mine-run law shall become effective on May 20. Arguments on the restraining order were made May 2 and all negotiations between miners and operators are being held in suspense for the time being. Both sides are ready to take the matter up again as soon as the legal status is established. The constitutionality of the law will come up for later hearing, but while being fought out in the courts the mines can resume work under a temporary agreement.

The Hocking Valley contingent is anxious to get to work on account of their lake trade. Lake shippers have orders on which they could have been loading two weeks ago, but for labor trouble and there is danger that this business will be cancelled to large extent and placed with districts which are not idle. Eastern Ohio coals being largely for steam purposes, feel no special demand at this time, and the producers there are likely to be more independent in their dealings with the miners. There is practically no difference between the two on a screen scale, but in case the mine-run law became effective there will be a varience of about 8c. per ton.

As far as the general market is concerned it would seem to make no difference whether or not Ohio mines resumed at this time. Demand for all grades in competition with this field is still sluggish. About the only signs of life are inquiries from public-service companies and some other big steam users, looking to the replenishing of storage stocks thirty or sixty days hence. This is having no effect upon the low-priced offerings made by West Virginia and Kentucky. Advices from these states show much dead coal in railway yards, with mines only running part time.

Orders being placed by the dealer trade for fancy splints are largely for July and August delivery, and can hardly be considered current business. The smokeless grades are maintaining schedule with difficulty, as prices are being shaded by independent producers.

Pending the resumption of work, the old circular is nominally in force as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.35
3-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack	0.85@ 0.80		0.85@ 0.80	0.75@ 0.70
Coarse slack	0.75@ 0.70	0.95@ 0.80	0.75@ 0.70	0.65@ 0.60

TOLEDO

Market continues quiet, but the outlook is more hopeful. Crop prospects never before so favorable. Industrial demand showing a tendency to improve and Lake trade looking better.

Nearly all the coal concerns report the situation quiet, but almost without exception they declare that business is bound to be better, later on. There is already some picking up in trade from the large manufacturing concerns; the railroads are also beginning to buy some little coal. The crop prospects in northwestern Ohio continue splendid in spite of the heavy rains of the past week which washed out some. The lake shipping is beginning to look better and it is believed that there will be a large demand from uplake ports as soon as the over-supply stocks are disposed of. There is a great deal of coal on track in Toledo and considerable is being loaded on big lake freighters. Prices remain unchanged and are being largely ruled by the law of supply and demand.

CLEVELAND

Demand for spot coal much improved and the approach of general buying movement seems near at hand. Retail circulars announced, but buying is limited. Lake shippers finding vessel capacity much easier.

Though prices have not changed materially the last week, the number of companies in the market has materially increased. The orders are not large, but indicate that stocks in consumers' bins are nearing exhaustion. Fairmount gas coal continues to be the principal product offered with Youghiogheny and odd lots of other Pennsylvania fuel appearing. West Virginia operators are not consigning much coal, but are accepting orders at prices no higher than consignment coal normally brings.

Youghiogheny shippers have had some slack on the market the last week at prices that compare favorably with Fairmount. Bargain prices on Pocahontas slack are being offered and operators are trying to move all they can to make it profitable to prepare sizes that are in good demand.

The Lake Market has improved from the shippers' standpoint. A week ago there were more coal cargoes than vessel capacity, but now the supply of tonnage is in excess of the demand. The first rush is over and coal that was under car service has been moved though not without leaving a large expense behind. The supply of cargoes from upper lake ports is so small independent vessel owners are having difficulty finding enough business to make it worth while to keep all of their vessels in commission. This has resulted in a few boats being temporarily tied at the docks.

The retail dealers have issued summer circulars. Hard coal is 15c. a ton higher than last year, 10c. of the advance being caused by the Pennsylvania tax and the 5c. was due to increased operating expense in the local yards. Other grades and kinds of coal have not changed prices this year. The issuing of summer prices is not an indication of retail sales. The bulk of the present business is booking orders for delivery in July and August.

Shipment at spot prices are practically the same, as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.05		
Lump, 1¼-in.		$2.35@2.45	
Lump, ¾-in.		2.25	$2.00@$2.05
Mine run	2.60	2.10	1.90
Egg	3.05		
Slack	2.20@2.60	1.70@1.80	1.70@ 1.90

CINCINNATI

A slight improvement in the situation is apparent, largely due to the partial removal of the embargo on shipments to lake ports. Stocking of domestic coal is heavier locally, but the steam market is still slow.

With a steady increase in the movement of domestic grades, due to the beginning of deliveries by dealers, the market on this line of fuel is in much better shape than for some time. Smokeless is usually the leader, with contracts taking care of all available coal for several months ahead; and with a marked stimulation to the lake movement, it seems that the situation is in a fair way to be straightened out, as far as the domestic market is concerned.

The persistent depression existing in a number of industries which are normally large consumers of steam coal continues, and keeps this side of the market decidedly slow. In fact, despite several factors which have for some time tended to stimulate the trade, such as embargoes, labor troubles and lockouts, the market has for some weeks been decidedly dull. The increased production of screenings, due to the improvement in the domestic market, has therefore resulted in some cheap nut and slack being placed before consumers in this market, but this, as usual, has failed to help things to any extent.

DETROIT

Bituminous supplies still excessive and there is an almost complete absence of any business. Slack particularly heavy selling down to practically nothing.

Bituminous—The domestic market is quiet; in fact there is almost a complete adsence of any business. This applies equally well to contract business, the requirements on which are much reduced as a result of the accumulated stock. There are many of the new contracts that have not been closed as yet, and consumers are expecting to obtain concessions on last years prices on these. The steam trade is also dull and heavy with much unsold coal on the market, some of which is occasionally moved at sacrifice prices.

Slack is particularly heavy, and selling down to practically nothing. In general, shipments to this market are so much in excess of requirements, that it is going to be exceedingly difficult to maintain any circular at all shortly. Supplies are in such excess that it is impossible to foretell when normal conditions will be reestablished.

Anthracite—The hard-coal trade continues up to full expectations, all the tonnages coming in having been easily absorbed so far.

HAMPTON ROADS

Dumpings for week have been good. Demand for run-of-mine showing some improvement. Less than a normal number cars in railway yards.

Dumpings over the piers at Hampton Roads during past week have shown up well and in consequence there is less than a normal supply of coal in railway yards. The principal shipments during the week as usual have gone to the New England market with foreign shipments to Port of Spain, Kingston, Canal Zone, Dakar, Para, Manaos, Santiago and Brindisi. So far as can be ascertained circular prices are being maintained. There is no demand for high volatile and no extra large amount of this coal on hand at tidewater.

The new pier of the Chesapeake & Ohio Ry., at Newport News, is now about completed and vessels may be loaded from there any day. This pier is about 200 ft. longer than the new one of the Norfolk & Western at Lamberts Point, but otherwise is almost identical in construction. It is understood that the Chesapeake & Ohio intend doing away with three of their small wooden piers, leaving only No. 12, which will be used to take care of barge loadings and perhaps small schooners or any overflow when the berths at the new pier are all occupied.

LOUISVILLE

Wage settlement expected to adversely affect the market. Some curtailment, but a few operators are selling at a sacrifice in order to keep the mines going.

No marked changes have taken place in the Kentucky coal market, though the labor settlement in a part of the western Kentucky field is expected to have a bearish influence on the market. The demand has shown no increase and though in the eastern Kentucky field work has continued on a rather generous scale, some of the operators are beginning to curtail.

Here and there in the eastern field an operator has sold at sharply cut prices, seeking to keep his organization going, even when necessary to sell below the cost of production. In a general way, however, prices continue at the former level. Orders for June are slow coming in.

In the western field, pea and slack, while scarce, is at a slightly lower price, ranging from 45 to 50c., f.o.b. mine, with nut and slack both east and west ranging from 60 to 75c. Eastern lump and block coals range from $1.30 to $1.80.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Improvement shown in steam grades, but lump coal still quiet. Furnace and foundry coke also dull. Pig-iron market is stagnant and car supply ample.

The Alabama operators are in a more optimistic mood than they have been for the past six months, believing that the worst of the dull market is over, and that business is on the eve of a prosperous season. While the market at the moment is far from satisfactory on steam coal, recent developments show an improvement in that line.

The government is now testing Alabama coals for use on the warships through the ports of Pensacola, Mobile and New Orleans, and will also probably place an order locally for approximately 10,000 tons of steam coal per month, for an indefinite period, to be delivered at Galveston for use on the warships, transports, etc. The French government has recently purchased a large tonnage of coal from this district for use on its warship in the Gulf, stating that a test has shown it to be equal to any in the world, and much cheaper, and that probably a much larger tonnage will be contracted for in the near future.

All of this has had a tendency to dispel the clouds of depression. The lump-coal market is only fair, though the majority of dealers are holding back, believing that they will get a reduction in price later on. The tonnage being moved is not as large as ordinarily at this time of the year. Blacksmith coal continues in a satisfactory condition, while both furnace and foundry coke are quiet. There is practically nothing doing in the pig-iron market, sales being small.

INDIANAPOLIS

Large buyers have about cleaned up the storage piles and are in the market again in a small way. Operators look for increased orders soon. Some domestic trade on account of cool weather.

With the Indiana wage scale settled for the next two years, operators are now busying themselves making contracts and are succeeding fairly well. The railroads, having exhausted the stocks laid by to tide them over the wage-settlement period, are now in the market again. The public utilities and factories are also near the end of their supplies. Most of the contracts being made or renewed are for two years. The factory situation seems about normal for the season. As the time for the wheat harvest approaches, there is a more optimistic feeling, and operators expect results soon from this improved sentiment.

Prices at the mines hold generally steady, although concessions of 10c. a ton are reported in spots, except for screenings, which are scarce. The domestic trade in Indianapolis has been better than usual for May, although after the signing of the scale there was a let-up in demand from consumers. Retailers say that such contracts as they have been able to make for Eastern coal are on about the same basis as last year's. The fact that the Illinois operators and miners have signed up, takes away somewhat from the expectations of the Indiana coal operators that they would reap advantage from any continued trouble in neighboring states.

CHICAGO

Market shows improvement. Spot buying increased by railroads and other public utilities. Many contracts renewed on last year's basis. No improvement seen in anthracite or smokeless coals. Coke market continues dull.

Slightly better conditions were evident n the Chicago market during the week. With railroads running through their storage piles and factories doing the same, some spot buying has developed. The demand is steady, but there were no purchases of unusually large lots. The majority of the companies are renewing contracts on practically the same basis as last year. The only increase in price is in screenings, in a few cases this being from three to five cents higher. But the dealers are not buying much for the future, as money continues tight with them. They are, however, taking the attitude that the small amount of business evident is a herald of more to come.

The tone of the anthracite market continues dull, with but little buying. Conditions are not up to the normal expected for this time in May. The trade is disturbed somewhat by an announcement that tariffs have been filed by the larger roads requesting an advance of 25c. a ton on anthracite in Chicago and the territory reached by the Chicago market.

Mines are sending smaller shipments of smokeless than is customary, as a result of warm weather. Contract shipments are being filled, but there is little outside buying. The market for this coal is practically established at $1. Illinois mines resumed operations following an agreement between producers and miners, but they are being run only on half time. With dull conditions in the iron and steel trade, furnace and foundry coke is also slow. There is little active trading in domestic coke, due to conditions which effect other domestic fuels.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.77	1.95	1.67	

Coke—Connellsville and Wise County, $5@5:25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

ST. LOUIS

New wage scale signed up on the same basis as the old one. Mines resuming operations and there is a surplus of coal with prices low.

The labor situation in Illinois is practically cleared up with the same arrangement for the coming two years as the operators and miners had before. Mines are gradually resuming in Williamson and Franklin counties, and also in the fifth and ninth districts. Several of the operations started in to apply lump coal on mine-run contracts, with the result that a heavy tonnage of screenings was produced, which cut the price from 95c.@$1 down to 80c. and 85c. in the high-grade field, and the Standard about the same.

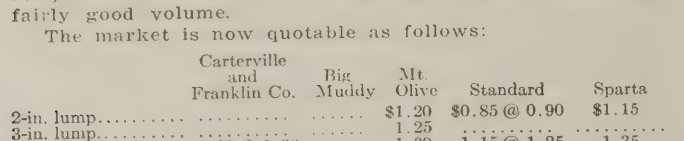
The St. Louis Public School contract was awarded the Polar Wave Ice & Fuel Co. on Standard coal, at a price of $1.74¾ per ton delivered, up to $1.77 delivered. Figuring on

the $1.77 price, with 52c. for freight, this leaves $1.25, and deducting 40c. there is only 85c. left; there is also a city scale ticket and the natural loss on a car of coal, which brings the price down to about 85c. at the very most. In addition, the coal has to stand inspection before it is delivered. Contracts are being taken on steam business for wagon-load delivery, at the rate of two loads a week, at $1.78 per ton delivered, for Standard lump coal. The only result of this competition will be a few more bankrupt operation shortly.

The Franklin County operators have advised that their coals will advance 10c. a ton per month, beginning with June 1 for domestic sizes, and it is expected that this action will be followed by the better producing mines in Williamson County. Domestic business locally is at a standstill, with the exception of anthracite, which is moving in fairly good volume.

The market is now quotable as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	$1.20	$0.85 @ 0.90	$1.15
3-in. lump	.....	.....	1.25	.....	.....
6-in. lump	$1.20 @ 1.30	.....	1.30	1.15 @ 1.25	1.35
Lump and egg	1.85 @ 2.15	$2.00	.....	.....	1.15
No. 1 nut	1.20 @ 1.30	.....	.....	.....	.....
Screenings	0.80 @ 0.85	.....	.....	0.65 @ 0.70	0.75 @ 0.80
Mine-run	1.10 @ 1.20	.....	.....	0.80 @ 0.85	.....
No. 1 washed nut	1.40 @ 1.50	2.25	1.50	.....	.....
No. 2 washed nut	1.35 @ 1.45	.....	1.25	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.80 @ 0.85	.....	.....	.....	.....



KANSAS CITY

Decreased production injects a better tone into the trade. Prospects of a record-breaking wheat crop also creating a more hopeful feeling.

Business has apparently improved in the Southwest, though some sales managers take the attitude that the increase in demand is rather apparent than real, being the result of decreased production. A new source of business has opened up, however, following preparations for the harvesting of one of the biggest wheat crops of years in Kansas and neighboring states. All of the threshers burn coal, and operators are looking forward to the harvesting with almost as much eagerness as the farmers themselves. The indirect results of the big crops also are worth noting, having a highly favorable effect on business in general. The lack of demand for lump has resulted in cut prices in some cases, though many operators prefer holding it rather than selling at the quotations which have obtained in some quarters recently.

PORTLAND, ORE.

Warm weather causes rapid falling off in demand. Inquiries regarding coal shipping through Canal. Australian coal has dropped out of the local market.

Warm weather set in a couple of weeks ago and since then the coal trade here has been decidedly sluggish. In fact, it is said that business has not been so slack for many years. The chief demand is for domestic purposes, industries mostly using electricity, fuel oil or wood. It is pointed out, however, that if the opening of the Panama Canal results in lower freight rates, the consumption of coal will be much increased. Under existing conditions coal and wood prices are about equal. Pennsylvania anthracite now is quoted at $18 per ton here, it will be possible to retail it at $12@13 per ton when shipped in vessels by canal route. West Virginia coals, such as New River and Pocahontas, that now sell here at about $18 per ton can be retailed at $10 or $12 per ton. At present these coals are brought here by rail and the Great Lakes route.

With Utah coal selling here at $9.50 a ton, delivered, it is expected that if West Virginia coal can be obtained at $10 or $12 per ton, the railroads carrying the Utah, Wyoming and Washington coals will grant more liberal freight rates. This would bring coal prices to a lower level than wood and result in a larger consumption.

Coal dealers are of the opinion that very little Australian coal will be imported here in the future, as freight rates are too high at present, and it also means tying up of too much money.

PRODUCTION AND TRANSPORTATION STATISTICS

IMPORTS AND EXPORTS

The following is a comparative statement of imports and exports in the United States for March, 1913-14, and for the nine months ending March, 1912-13-14, in long tons:

	9 Months			March	
Imports from:	1912	1913	1914	1913	1914
United Kingdom	5,911	7,451	9,691	96	1,23
Canada	729,584	1,061,411	746,411	107,048	91,64
Japan	12,885	42,657	83,208	440	1,73
Australia and Tasmania	159,720	117,158	197,925	10,141	25,76
Other countries	1,501	3,257	3,430	.....	1,42
Total	909,601	1,231,934	1,040,540	117,725	121,82
Exports:					
Anthracite					
Canada	2,530,190	3,324,179	2,607,383	153,572	162,17
Uruguay	.....	.....	84	.....	.....
Other countries	48,270	58,947	46,639	4,950	1,27
Total	2,578,460	3,383,126	2,654,106	158,522	163,43
Bituminous,					
Canada	7,987,237	8,295,614	9,577,352	736,549	620,36
Panama	330,433	340,259	281,394	32,500	23,68
Mexico	235,493	264,537	235,122	57,629	29,97
Cuba	804,094	915,889	902,437	110,727	115,30
West Indies	506,769	456,013	425,071	53,308	44,61
Argentina	.....	.....	99,388	.....	22,97
Brazil	.....	.....	196,837	.....	11,15
Uruguay	.....	.....	40,492	.....	18,45
Other countries	774,316	741,597	905,457	99,230	132,08
Total	10,637,342	11,013,909	12,663,450	1,089,943	1,018,61
Bunker coal	5,124,183	643,942	582,129	5,754,530	5,377,07

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for March and the nine months ending Mar. 31, 1913 and 13, in short tons:

	March				Nine Months			
Destination	1914	%	1913	%	1914	%	1913	
Tidewater	323,567	20	328,442	24	2,587,748	19	2,720,022	2
East	242,136	15	292,410	20	1,987,701	15	2,032,099	1
West	931,657	59	700,150	50	8,163,886	60	5,809,347	5
Total	1,497,360		1,321,002		12,739,335		11,561,468	
From Connections								
Bituminous	98,733	06	71,588	05	825,951	6	494,699	(
Anthracite	945		309	01	11,421		9,138	(
Total	1,597,038	100	1,392,899	100	13,576,707	100	12,065,305	10
Coke	40,658		32,207		292,105		227,550	

FOREIGN MARKETS

GREAT BRITAIN

May 8—The market is not quite so firm. Buyers are only arranging their pressing requirements in anticipation that with a reduction of present tonnage supplies and increased production, easier conditions will be in evidence. Chartering has recently been rather slow. Quotations are approximately as follows:

Best Welsh steam	$4.68	Best Monmouthshires	$4
Best seconds	4.44	Seconds	4
Seconds	4.26	Best Cardiff smalls	2
Best dry coals	4.32	Seconds	2

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry $4.80@5.52; furnace, $4.08@4.56.

COAL FREIGHT DECISIONS

I. C. C. No. 5912—Lombard Brick & Tile Co., vs. Chicago and North Western.

Following **Hammerschmidt & Franzen Co. v C. & N. W. Ry. Co., ante,** page 71; **Held.** That defendants' rates for the through transportation of coal and coke from points east of the Illinois-Indiana state line to Lombard, Glen Ellyn, Wheaton, and West Chicago, Ill., are unduly prejudicial to those points and unduly preferential to Chicago and Provis Ill., in the amounts stated herein.

STATE GEOLOGICAL SURVEY

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 22
Issued Every Saturday
Hill Publishing Company

NEW YORK, MAY 30, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Virginia-Pocahontas Coal Company,
Coalwood, W. Va.



Carter Coal Company, Warren, Ky.



A Barsteel Gathering Locomotive
That Will Operate in a 29-Inch Clearance

Here is an illustration of a Baldwin-Westinghouse Barsteel electric gathering locomotive that operates successfully in a clearance of twenty-nine inches—36 inches was heretofore considered about the limit for locomotives.

Great care has been exercised in keeping the overall height to a minimum, as is shown in the general construction of the locomotive and the location of the reel.

There is not a projection above the top of the frame anywhere and ample room has been provided to permit the operator to crouch upon his seat.

The reel is driven by an independent motor contained inside the reel drum. This motor is in effect an electrical spring. It tends to wind the cable up and its turning force acts as a brake and keeps the cable taut when the locomotive enters the room and promptly takes up all slack when the locomotive returns.

With this type of reel there is easy access to the locomotive motors, because of its being located out of the way on the rear of the frame. The armature of the reel motor can be readily removed for inspection and overhauling.

Locomotives of this type have successfully solved the problem of gathering in very low rooms. Our specialists in mine haulage, who make a careful study of various mining problems will be glad to assist you in selecting the proper equipment for your mines.

Get in touch with them by writing to either company.

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 MAY 30, 1914 NUMBER 22

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 873

Safety. Poem by Berton Braley.

CAUSE AND EFFECT OF COLORADO STRIKE: *Page* 874

A letter from E. H. Weitzel, manager of Colorado Fuel & Iron Co.'s coal mines.

HANDLING THE NEGRO MINER IN THE SOUTH: *Page* 875

This class of labor is naturally shiftless, being content to let the morrow look out for itself. Laws should be passed prohibiting garnishments and compelling merchants and money lenders to look to the man rather than the company for payment. More frequent paydays are also advisable. COAL AGE, Vol. 5.

*A MODERN KENTUCKY PLANT: *Pages* 876-877

A small but well equipped plant and coal washery in the Cumberland Gap coal field of Kentucky. The double-entry room-and-pillar system of mining is employed. R. J. Sampson. COAL AGE, Vol. 5.

THE ECONOMY OF MACHINE MINING: *Pages* 878-879

The difficulty of obtaining accurate figures in which to base a just comparison of the cost of machine-mined and pick-mined coal. The need of carefully considering the peculiarities of the coal seam and all the conditions affecting the mining of the coal. A brief review and classifications of charges, including a due regard to danger of accident due to use of machines for cutting the coal, breakdowns, opposition of men to installations, etc. Wesley S. Harris. COAL AGE, Vol. 5.

DEEPER MINING MORE DANGEROUS: *Page* 879

*EFFICIENCY AND THE PURCHASE OF POWER IN COAL MINING: *Pages* 880-881

Purchasing power usually awakens the coal-mine management to the possibilities of saving good money in the use of current. While these possibilities undoubtedly exist and might be taken advantage of under private supply, the significant fact remains that this is seldom done. A. E. Gregory. COAL AGE, Vol. 5.

*HANDLING COAL ELECTRICALLY: *Pages* 881-882

CHOOSING A TRADE IN PENNSYLVANIA: *Page* 882

*ELECTRICITY IN COAL MINING—III: *Pages* 883-884

This is the third article of the series on this subject. Explanations and diagrams are given of the various electric signaling systems prevalent in coal-mining operations. David R. Shearer. COAL AGE, Vol. 5.

WAGE CONDITIONS IN NEW MEXICO: *Page* 884

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 901

COAL AND COKE NEWS: *Pages* 902-905

THE LABOR WAR IN COLORADO: *Pages* 885-886

A regularly paid militia, with proper support, would have made peace in Colorado without bloodshed. But the sense that the militia was without the necessary backing emboldened the malcontents to acts of violence. A. J. Hoskin. COAL AGE, Vol. 5.

ELECTRIC LAMPS FOR THE PREVENTION OF MINE ACCIDENTS: *Pages* 886-887

EFFECT OF PANAMA CANAL ON WORLD'S COAL MARKETS: *Pages* 888-890

A careful analysis of ex-Governor MacCorkle's interesting paper on this subject. As probably one of the best informed men in the country on our export trade, Mr. Wadleigh's frequent exceptions to statements in the original paper are of particular interest. The second installment of this article will appear in an early issue. F. R. Wadleigh. COAL AGE, Vol. 6.

COAL MINING ACTIVE IN NEW MEXICO: *Page* 890

THE COLORADO STRIKE: *Pages* 891-892

The strike is largely over in Colorado, but is in strong evidence still in Washington and New York, where a determined effort is being made to create adverse sentiment to the operators, so that the troops will be ordered to close the mines. Lieutenant K. E. Linderfelt denies he struck Tikas and charges the Ludlow colonists with many crimes.

EDITORIALS: *Pages* 893-894

The Purest of Human Pleasures—Getting in the Spotlight—An Application for a New Position—The Need of a Balanced Publicity—The New Meaning of Success.

WHO'S WHO IN COAL MINING: *Page* 895

Brief sketches of the lives of John C. Reid, general manager of the Chinook Coal Co., Lethbridge, Alta., Canada, and W. L. Moss, vice-president and general manager of the Continental Coal Corporation, Pineville, Ky.

LEGAL DEPARTMENT: *Page* 896

Recent Judicial Decisions.

DISCUSSION BY READERS: *Pages* 897-899

Calorific Value and Volatility of Coal Dust as Affecting the Violence of Explosion—Weak Links in Coal Mining. Letter No. 1—Double Neck Rooms—The Mine Foreman. Letter No. 7.

STUDY COURSE IN COAL MINING: *Page* 899

INQUIRIES OF GENERAL INTEREST: *Page* 900

Study Question—Ventilation.

COAL TRADE REVIEWS: *Pages* 906-910

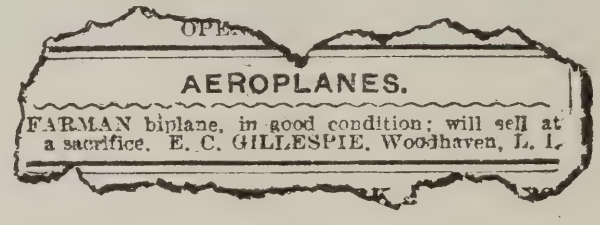
ADVERTISING INDEX: *Page* 26

NUMBER OF COPIES PRINTED THIS ISSUE 11,250

None sent free regularly, no returns from news companies, no back numbers.

Second-Hand Airships!

The Weekly Ad-Talk Page



IMAGINE that advertisement, which recently appeared in the New York World, in a paper ten years ago! You would have thought some one had gone crazy—but today it's only commonplace. That's how rapidly things are progressing in the machinery field. The machines, processes and methods of yesterday are antiquated.

A coal mine quits on Saturday night with mule haulage and opens Monday morning with electric motive power.

This is the day of quick progress and every mother's son of us must step lively to hold the pace.

Which is one of the best reasons why technical papers are about as valuable today for their advertising pages as for their editorials.

Our ad section contains the advertisements of the latest, most efficient and most economical things in machinery, equipment and supplies for coal mines.

Do you follow the ads—*closely?*

It pays.

COAL AGE

Vol. 5. NEW YORK, MAY 30, 1914 No. 22

Safety

By Berton Braley

Written expressly for Coal Age

When everything is going right
And life is merry as a song,
When there is lots of work in sight
And luck is running good and strong,
It's fun to travel with the bunch
And blow your money like a king,
But—just you get my little hunch,
A bank account's a handy thing.

Today you mine the good black coal
And do your work and draw your pay,
And then you spend your little roll
And life is glorious and gay,
Tomorrow—things may go to smash
Your luck may turn from fine to rank,
And then you'll wish you had the cash
You might have salted in the bank.

You can't be certain of your fate,
The roof may fall, the damp explode,
And that'll be a bit too late
To save the money that you "blowed,"
Your wife and kids will mourn for you
And starve, perhaps, because you died,
Why not cut out a spree or two
And lay a little roll aside?

The game of life is mighty tough
And rainy days are often met,
It's wise to lay away the stuff
To keep you safely from the wet,
Just bank a little of your pelf,
Don't spend your earnings fast and free,
—I never saved a cent, myself,
But don't you be a fool like me!

Cause and Effect of Colorado Strike

[A personal letter to the editor of Coal Age, and published by special permission.]

I regret that the press of the country has been so willing to print sensational stories concerning the strike in Colorado. Prior to the trouble which commenced last September, we were paying higher prices for labor in our mines than were paid in most Eastern fields, and our men were receiving better wages as a whole than in almost any section of the country.

We were, and had been for some time, working eight hours per day; were paying twice a month in cash; had abolished the use of scrip; were always willing to allow the miners a checkweighman; and in fact were complying with all the demands made except the increase of wages and recognition of the union. Our men were, so far as we could tell, entirely contented and subsequent developments strengthened our belief in this matter.

Agitators Were Imported

The United Mine Workers of America brought in about 30 agitators of different nationalities from outside the state, and these men did all they could for several months prior to September to inflame the minds of our employees and to persuade them to believe that they were being unfairly treated.

A convention was finally called in Trinidad on Sept. 16, 1913, which was attended by delegates purporting to come from our mines, but who really were brought in in a number of cases from other districts. At only one of our 21 mines was a meeting held and delegates sent from our property to the Trinidad convention. Delegates furnished by the leaders and who did not represent our mines, of course, were willing to vote for a strike.

The strike call was responded to by approximately 25 per cent of the miners in the Trinidad and Walsenburg districts. Immediately following the call, every means of intimidation known to the Mine Workers Union were used to force our men to quit work. This action resulted in another 20 per cent. leaving the collieries.

The strike was called on Sept. 23, and acts of intimidation began on Sept. 26 when hacks going to the mines were stopped by armed men and the passengers taken from the vehicles and forced to return to the railroad depots under threats of death. A considerable supply of firearms was bought and shipped into the district by the union leaders as early as ten days before the strike was called. A reign of terror was instituted by the Mine Workers Union, and the promiscuous shooting of people who were traveling in the direction of the mines, the burning and dynamiting of bridges on the railroads serving mine properties, and many other unlawful acts resulted in the Governor calling out the militia on Oct. 28.

Most of the Men Returned to Work

Immediately after peace had been restored the miners began to return and by the middle of January we had all the men needed to produce the coal necessary to fill our orders, and before the first of April we were losing time at some of the mines on account of shortage of orders.

The militia was withdrawn on April 16, and on April 20, the strikers resumed their lawless acts. They began by perpetrating assaults on different mining properties, attempting to massacre men at work and destroy properties with fire and dynamite. This, of course, finally resulted in the calling out of federal troops.

The deplorable happenings at Ludlow on April 20 and 21, which have been so grossly misrepresented in the press, were certainly not chargeable to the mine operators. The continual talk about armed thugs being used as mine guards is the veriest rot, as is also the stories circulated about shooting the women and children. There has not been a single striker's wife or child killed or molested by a mine guard. However, two children of one of our employees were shot by strikers while in their home at our Tabasco mine on Oct. 26.

Women and Children Were Suffocated

The women and children who lost their lives in the burning of the Ludlow tent colony were suffocated by being placed in a cellar under one of the tents and covered over by tight plank boards with mattresses thrown over the floor. This was done by strikers themselves in their ignorance of natural laws, and the women and children were suffocated not by the burning of the tents, but by the lack of air circulation in the hole in which they were placed by their would be protectors.

In the different stories sent out by the union and published in the newspapers of the country, there is no mention made of the wives and children of the five or six thousand miners who are now at work, and had it not been for the volunteer services of these men, many of our properties would have been destroyed in the recent reign of terror instituted by the strikers.

At all of our collieries our miners begged for means of protection and when it could be furnished, they willingly went out and assisted in driving back the strikers who were attempting to come in and murder their women and children and destroy our property.

Mines Are Operating to Normal Capacity

We have now practically all the men we can use in our mines, and while I am not certain that this condition prevails at the plants of all the other companies I am sure that the Colorado operators as a whole could produce coal enough to fill their orders if they were left alone and not molested by men on strike.

Conditions are quiet at the present time, and our mines are working every day and will continue to do so as long as the authorities are able to prevent act of violence on the part of the strikers. *It is absurd for the United Mine Workers to demand of us that we discharge or force into the union our loyal employees who have stood by us throughout the trouble and are satisfied with their working conditions.*

E. H. WEITZEL,
Manager of Coal Mines,
Colorado Fuel and Iron Co.

Pueblo, Colo.
May 19, 1914.

Handling the Negro Miner in the South

SYNOPSIS—This class of labor is naturally shiftless, being contented to let the morrow look out for itself. Laws should be passed prohibiting garnishments and compelling merchants and money lenders to look to the man rather than the company for payment. More frequent paydays are also advisable.

"A nigger is a colored person who has no money."

The above is an epigrammatic definition of a class constituting from one-half to two-thirds of the labor at most coal-mining operations in the South.

The aptness of the definition will immediately appeal to those who are familiar with the negro and the treatment so generally accorded him around many Southern operations.

It is to be regretted that such a definition has any significance, but many will, upon reflection, admit that it is too true.

It is on account of the characteristic disregard of the negro for money beyond today's need, and the fact that, as a rule, he can hardly be induced to put in a full month's work, that the attitude of many operators is simply to make the best they can of his labor without paying any regard to the whys and wherefores of his shiftlessness or give any study to methods and measures that would keep him at work more steadily and make a better laborer of him.

It is not altogether the fault of the negro that he is so aptly designated as a "colored person without money." There are a number of contributing causes, some of which the operator has direct control over and others which he can do much to minimize.

His Checks Are Often Heavily Discounted for Cash

The first cause and one which most operators control directly is the operation of commissaries and the issue of checks which can be traded there. These are too often, heavily discounted for cash before they get to the store. By nature the negro is glad to get hold of "real money." When payday comes only once a month, the check window, which is usually open all day, is a constant invitation to him to draw his day's earnings, which he can either trade at the commissary or sell to ready buyers for cash, say 60 or 70c. on the dollar. Under the latter plan he loses a good percent. of his earnings, so as to enjoy spending what is left immediately.

In too many cases the commissary is an adjunct of coal-mining operations, not as a necessity to take care of laborers, but as a money-making proposition. In such cases, the company store is an absolute preventive against the acquiring of any ideas of thrift on the part of the workmen and causes them to live from hand to mouth.

Some operators will claim that this is the only way to handle negro labor. These officials go blindly forward on the assumption that the sooner the negro can get hold of and spend his money, the quicker he will get back to work. On the other hand, this theory has been disproved by the practice of many operators of running their commissaries simply as a plant necessity, supplying the best goods at the lowest cost and getting their returns from increased tonnage mined by more contented workmen.

How the Negro Can Be Enabled to Get Out of Debt

The negro can be cured of his natural shiftlessness if the "white folks" will help him. As far as the commissaries are concerned, this can be done by issuing store checks once or twice a week instead of every day and paying off twice a month. The negro after all likes to feel that he has a little ahead and like any other human being he likes to find some money in his envelope on payday. If you don't believe it, try it on him.

The greatest indirect contribution to the general shiftlessness of the negro and one that keeps him jumping from place to place, going to court, etc., is the ease with which he can be induced to borrow money, buy furniture, clothes, books and pictures, on the installment plan—in too many cases far beyond his means and at exorbitant rates and prices. In most of the Southern states the garnishment laws are such that as soon as he fails to make a payment, he is garnisheed and in most cases this means the holding up of his wages until he can either pay or secure a release, to say nothing of the costs which he must pay.

However, in some states even the existing laws covering garnishments will be found very effective in affording relief to the man who is garnisheed by a loan shark or installment furniture man, if the company will only help the man to help himself. For example, in one Southern state the law states plainly that $25 of a man's earnings are exempt from garnishment, yet some operators honor garnishments served on their workmen without giving them the benefit of such exemption. It is not enough to fire a negro for being garnisheed. He simply moves and goes to work at another place, but the man he owes trails him and garnishees him again.

Garnishment Laws Should Be Changed

The remedy for the garnishment evil is to remove the trouble at the source. This can be done in some cases by taking advantage of existing laws, and in others by taking steps to secure better laws. People will quit lending money at illegal rates and selling furniture, clothing, etc., at extortionate prices when they learn they must look to the man and not the company for payment.

It is pleasing to note that all over the South, people are learning that it pays to give the negro every chance to improve his condition, and that when this is done he becomes a better workman. There is plenty of room for improvement yet, and especially will coal-mining people find that it pays to conserve the earnings of negro workmen rather than feed and fatten on them.

There is reason to believe the day is not far distant when our epigram will have lost most of its significance. There is no doubt its coming will mean increased production and profit for the coal-mining concerns, for the negro will work harder to save money than he will to pay an unfair debt incurred to buy something he no longer wants.

A Modern Kentucky Plant

By R. J. Sampson*

SYNOPSIS—A small but well equipped plant and coal washery in the Cumberland Gap Coal Field of Kentucky. The double-entry room-and-pillar system of mining is employed.

The mines of the Yellow Creek Coal Co. are located at Bosworth, Bell County, Kentucky, in what is known as the Cumberland Gap Coal Field. They are some 5 miles west of Middlesboro and are reached by a branch of the Louisville & Nashville R.R., over which the Southern Ry. also has track rights.

Analysis of the Sandstone Parting coal shows: Moisture, 2 per cent.; volatile matter, 33; fixed carbon, 57 ash, 7.2; sulphur, 0.55 per cent.

The lower or "stray" seam has a thickness of 36 in clean coal. No analysis of a sample taken at this mine i available.

The Deane seam is 4 ft. 2 in. thick, clean, with the ex ception of a very thin stratum of soft clay near the top

Some 40 ft. over the Poplar Lick is the Klondike seam Its average thickness is about 4 ft. 6 in., with a shal parting some 2 ft. from the bottom, which varies greatly



General View of Power Plant and Washery

The company first began operations in the Poplar Lick and the Sandstone Parting seams, these two being opened at the same time. Coal was first shipped in January, 1902.

These two seams, only, were worked until 1912, when another bed, some 750 ft. below the Sandstone Parting coal, was opened. This has not been satisfactorily correlated, but is believed by some authorities to be the Straight Creek seam.

In 1913 development of the Deane seam, on the north side of the hollow, was begun. The Poplar Lick seam, at an elevation of approximately 2500 ft. above sea level, here shows a section of 4 ft. 6 in. of clean coal.

Analysis of this coal is as follows: Moisture, 4.46 per cent.; volatile matter, 33.57; fixed carbon, 60.12; ash, 1.43; sulphur, 0.52 per cent.

The Sandstone Parting coal, some 700 ft. below the Poplar Lick, has an average thickness of 48 in. One foot from the bottom there is a sandstone parting some 4 in. or 5 in. thick.

*Middlesboro, Ky.

in thickness. The Yellow Creek company has as ye done no work in this measure.

The Double-Entry Room-and-Pillar System Is Use

In all of the mines the ordinary double-entry room and-pillar system of mining is used. Fans have been in stalled at all but the newest of these openings. On th south side, in the two old mines, the air is not split, bu in the lower mine on that side and in the mine on th north side splitting of the air is accomplished by mean of overcasts—a split being made for each cross-entry.

In the two new mines, the coal is undercut with short wall chain cutters, two Sullivan, one Jeffrey and on Goodman machine having been installed for this purpose In the other two mines the coal is undercut by hand.

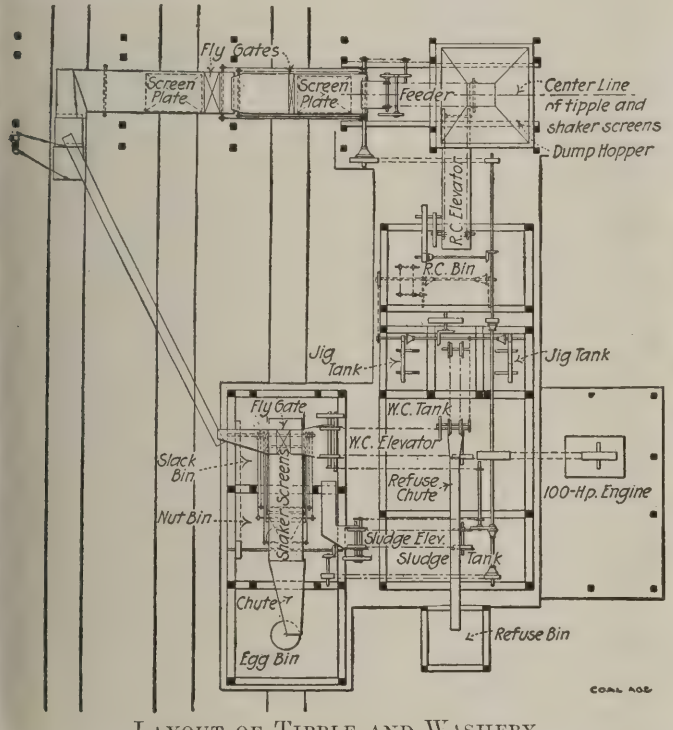
Three 7½-ton Goodman electric locomotives compris the haulage equipment.

From the Poplar Lick seam the coal is lowered b means of a retarding conveyor of the rope and disk typ The conveyor trough is 36x18 in., the disks being a tached to a ⅞-in. wire rope, on 4-ft. centers. The ca pacity of this conveyor is 100 tons per hour. It di

charges into bins, from which the coal, together with that from the Sandstone Parting seam is loaded into 8-ton monitors. These acting on a gravity incline, also carry the coal from the lower seam.

On the north side of the hollow, monitors also handle the coal to the same tipple as that from the south side, but onto a separate dump. All of the coal passes over the same screens. Up to the present time, it has been possible to load only three sizes of coal at one time, the tipple having been provided with but three railroad tracks.

For several years the company has had a contract with the Southern Ry., which practically covered its entire output. This contract will expire during 1914, throwing the coal on the open market in competition with that from other sources.



Layout of Tipple and Washery

Immediately under the lower seam there is a thin stratum of clay, which comes up with the coal; this, together with some of the parting in the Sandstone Parting bed, makes it imperative that it be mechanically washed.

To accomplish this, there was recently begun the construction of the most complete and largest washing plant which has yet been built in this section. It has a capacity of 1200 tons per day and was designed and built by the Pittsburgh Coal Washer Co.

The coal is dumped as before and passes over a 4-in. screen. The screenings go into a chute to the boot of the "raw-coal" elevator, while the oversize is loaded at the tipple as block coal.

Under the 4-in. is placed a 2½-in. screen. By means of a fly-gate, the oversize from this screen may or may not be passed into the chute, which feeds the raw coal elevator, i.e., in case it is not necessary to wash this size, it can be loaded at the tipple as egg.

From the raw-coal elevator, the material is passed down through a "retarding tower" into a bin. An opening on each side in the bottom of this bin supplies raw coal to conveyors, which feed two Pittsburgh jigs of a guaranteed capacity of 50 tons per hour each.

From the jigs it is carried to the screens at the top by the washed-coal elevator. Waste from the washers is carried by the refuse elevator to a chute, which empties into a bin on the outside of the building.

At the screens are made three grades of fuel, slack, nut and egg. The nut and egg sizes are lowered into bins by means of spiral lowering chutes, which prevent breakage. In case a run-of-mine product is desired, there is provided a chute from the screens back to the tipple bins, which carries all of the washed coal and loads it with the block at the tipple track.

The bin gates are cast with a hollow rim provided with openings for pipes. Steam is circulated through this rim to prevent freezing of the water which, of course, collects at the lowest point.

The chutes just below the gates are provided with openings, through which is circulated the cleanest water available. The finer particles thus taken out pass to a hopper,



View on the Jig Floor

thence by means of a chute to the sludge elevator and thence to the sludge tank and slack bin. The nut and egg sizes are loaded from the chutes by movable loaders.

The Power Plant

The boiler house is equipped with two batteries of two 150-hp., fire-tube boilers each. One battery is held in reserve. In the engine room a Ridgeway duplex engine drives a 300-kw., General Electric generator, by belt connection. A Houston-Stanwood, 100-hp., duplex engine furnishes power for the washer. It operates on 100-lb. pressure at the throttle.

A camp of 152 comfortable cottages shelters some 200 employees. There will be added shortly 75 to 100 men, materially increasing this force. A well stocked company store supplies the camp with all of the necessities and not a few of the luxuries of life.

At present the output is from 400 to 500 tons per day, but this will probably be increased in a few months to from 800 to 900 tons daily. To run the washer at its full capacity of 1200 tons, an approximate total output of 1700 tons would be required.

The coals of this district are gradually getting onto the market in the North and Northwest. The opening of the Panama Canal should divert no little West Virginia fuel which is now being shipped into that section, thus creating a greater demand for the product of this field, a demand which the operators here are preparing to supply satisfactorily.

The Economy of Machine Mining

By Wesley S. Harris*

SYNOPSIS—The difficulty of obtaining accurate figures on which to base a just comparison of the cost of machine-mined and pick-mined coal. The need of carefully considering the peculiarities of the coal seam and all the conditions affecting the mining of the coal. A brief review and classifications of charges, including a due regard to danger of accident due to use of machines for cutting the coal; breakdowns, opposition of men to installations, etc.

This is a question of vast importance to the mining industry of the country and especially so in Indiana at the present time inasmuch as the miners in joint convention with the operators at Terre Haute have just demanded that the differential between pick-mined and machine-mined coal be reduced to 7c. per ton. As yet, however, it has received little or no consideration by operators and mine managers. Absolutely accurate figures are not obtainable, because accurate data are not available. Comparison is an argument, but fails to establish a fact because of varying conditions. Items of cost that should properly be charged to the production of machine-mined coal are, ofttimes, charged to another account, or to the production as a whole where the coal is part machine-mined and part pick coal, thus affording an opportunity for serious error in judgment.

Coal operations are in many particulars analogous to the high cost of living about which we hear so much, in that we as mine managers, in many instances, fail to produce dividends for our companies on account of our zeal to own or operate so called modernly equipped mines. In this age of efficient apparatus, it is, of course, necessary to be uptodate and abreast of the times in order to successfully compete with the live wires of our business; but this does not necessarily mean or imply that all mines must be equipped with mining machines in order to be modern.

Cost of Equipment Justified

Mining machines and the necessary equipment for successfully operating them at the average colliery cost an immense amount of money. If money is injudiciously spent in equipping a plant for cutting coal with machines, overhead charges for interest, maintenance, depreciation and taxes will be correspondingly heavy. Conditions may justify the expenditure in order to properly recover certain coals and at the same time safeguard life and property; but such moneys should be judiciously and wisely expended and then only after exhaustive analysis of conditions surrounding the proposed operation. The fact that one's neighbor mines his coal with machines is not sufficient reason for one to so equip his own property. Usually each mine, and especially each coal, has its peculiarities that deserve careful consideration. Many pointers and suggestions that are worthy of serious deliberation may be had from the man at the face. Such pointers and suggestions only cost when ignored or neglected.

It is fair to assume that all uptodate companies maintain accounting systems that are a criterion by which they may determine approximately the relative costs of pick-mined and machine-mined coal; and it would appear from the large number of machines in operation that opinion is practically unanimous in their favor. However, there are many angles that afford viewpoints not generally considered in this connection, a few of which it will be the purpose of this article to now briefly enumerate in order to open a discussion of the matter by readers of Coal Age.

Classification of Charges

The writer submits that interest on investment, maintainance, depreciation and taxes on all extra equipment over that necessary for the successful operation of the property as a pick mine should properly be charged to machine-mined coal. In this list should be included all extra housing, boilers, boiler settings, boiler fittings and accessories such as feed pumps, steam headers, etc., in addition to generating units, settings, switchboards and accessories, transmission lines and machines. Further, also, under the head of supplies should be included and charged to machine-mined coal all extra repairs, fuel, water, oil, tools and office supplies over and above that necessary for the successful operation of the property as a pick mine; and under the head of labor, should be included and charged to machine-mined coal all extra expenditures for electricians, wiremen, firemen, oilers, jerries, drivers, tracklayers, bit sharpeners or blacksmiths and clerical force over and above that necessary for the successful operation of the property as a pick mine.

It will be readily conceded that all extra expenditures for electricians, wiremen, firemen and oilers should properly be charged to machine-mined coal, however, it may be well to call attention to the fact that jerries are quite frequently required to timber after machines, clean slate and refuse at switches and turns on account of the additional space required for machines to turn; extra drivers are frequently necessary due to the fact that they are required to get sharp bits to the machines and dull bits to the shop, must occasionally await the moving of a machine thereby losing time and in most mines in Indiana must drive further for their loads or past one extra place out of every three, due to the fact that three working places are allowed each two loaders; extra track layers are frequently required for the same reason, viz., that they have more track to keep up and over a larger territory due to the fact that three places are allowed two loaders; bit sharpener or extra blacksmith should properly be charged to machine-mined coal where the machine men are not charged for smithing; clerks, purchasing agents, accountants and bookkeepers will readily call to mind countless hours that have been spent in ordering machine supplies, checking freight bills and keeping track of supplies. Delays and shutdowns due to trouble with boilers or generating units should properly be charged to machine-mined coal where machines are responsible for such trouble. Many of us have experienced delays in both hoisting and haulage due to our generating plants being overloaded by reason of having been required to put ad-

*Superintendent, Little Giant Mine, Monon Coal Co., Linton, Ind.

ditional machines in operation when the generating plant was already working at or above its rated capacity.

Danger of Accidents Considered

All expenditures for personal injuries directly due to mining machines or transmission lines used exclusively for supplying power to mining machines should properly be charged to machine-mined coal as should also all expenditures or loss by reason of mules or horses being killed by such transmission lines. While discussing this phase of the subject, it may be well to call attention to the matter of accidents in general. The fact is well recognized by many mining men that there is more danger from falls of coal, roof and drawslate where machines are used than in pickwork. This is undoubtedly due to the fact that the charge of powder is placed nearer to, against or in the roof, in the case of machine work, where the shattering effect of the charge is greater on the cover than when a larger charge is placed more remote from it. This is of great importance when we consider the large proportion of accidents from these causes. This is emphasized by quoting John Dunlop, state mine inspector, third district of Illinois, as reported on page 984 of Coal Age, June 28, 1913, wherein he says: "It is true that more powder is used where coal is being shot off the solid and it is probable that the roof is affected by the heavy shooting, but careful perusal of the reports of the state inspector of mines shows that 60 per cent. of the men killed by falling coal, roof and drawslate are struck down in mines where the coal is almost all undercut by machines. As these mines produce only about 52 per cent. of the total output, it seems that they have an undue proportion of accidents, and it is not fair to ascribe the maintenance of rate or increase in accidents to shooting out of the solid."

With respect to the recovery of coal, it may be said that the machine has proved to be an advantage, but even this will be a difficult matter to substantiate when we take into consideration the fact that machine bottoms are seldom taken up by the loader and when machine men make their own bottoms, they leave from 2 to 8 in. of coal. The coal is thus not only lost, but the working thickness of the seam is decreased by reason of the bottom coal being left.

We pass the matter of loss on powder sales without comment, due to the fact that the price to the miner has remained the same for several years while the operator has been required to pay more and more for it each year until at the present time the margin of profit is small.

The writer is of the opinion that it is possible to maintain a more regular output at pick mines than at machine mines unless the operation has a surplus of both miners and working territory. Machine breakdowns are largely responsible for this situation. If we maintain an excess of machines and territory in order to offset such a condition, it requires an additional investment.

Last, but not least, is the matter of the good will of employees. The writer holds that the mining machine, even in its most perfected state, is responsible for much of the dissatisfaction, discontent and labor trouble around mines. There are many reasons for this conclusion which must be manifest to all mine managers. Probably the most important of these is that men are ofttimes thrown idle for a day or days by reason of being out of coal due to the machine being broken or the machine men being out.

The fact that three of the sixteen demands presented to the operators by the miners of Indiana would tend to decrease the differential between pick and machine coal is significant.

Deeper Mining More Dangerous

The official figures of the accidents in the anthracite mines of Pennsylvania, in the last annual report of the Department of Mines, just published, show a marked improvement over those of the previous year, but the report also carries a warning. Of the 615 accidents that occurred inside the mines in 1911, 337, or 54.7 per cent., were attributed to the carelessness of the victims themselves, 45, or 7.31 per cent. to the carelessness of others, and 233, or 37.89 per cent., to unavoidable accidents. In 1912 there was 498 accidents, or 117 less than in the previous year, but of these 322, or 64.66 per cent., were attributed to the carelessness of the victims themselves, 32, or 6.43 per cent., to the carelessness of others, and 144, or 28.91 per cent., to unavoidable accidents.

Thus it would seem that the mine workers are growing more careful of others, but also more careless of their own safety. In this connection, Chief James E. Roderick, of the Department of Mines, writes:

"If the accidents resulting from carelessness and disobedience of rules could be eliminated, the fatalities in the mines would not be greater than in many vocations in the cities.

"The work of the coal miner becomes more dangerous as the operations grow more extensive and attain to greater depth. This has become apparent in recent years to mining officials and other persons interested in mining, and has created a demand for stricter and more modern legislation and for the adoption of the most approved means and methods for the protection of human life."

Cost of Maintaining Strikes During the Year 1913

Special Correspondence

In his annual report for the year 1913, submitted to the International Convention of Miners at Indianapolis, in February of this year, Secretary-Treasurer William Green makes the following statement:

On account of the strong opposition of the coal operators and their friends, in the non union fields, we have been forced to spend large sums of money.

During the year 1912 we spent	$706,225.20
For 1913 for relief alone	1,621,942.67
Total for the two years	$2,328,942.87

The amount spent for aid in the year 1913 was distributed as follows:

District No. 7 (Penna Anthracite)	$600.00
District No. 8 (Block Coal Indiana)	9,400.00
District No. 10 (Washington)	20,000.00
District No. 13 (Iowa)	986.43
District No. 15 (Colorado)	661,600.00
District No. 17 (West Virginia)	318,600.00
District No. 19 (Tenn. & Kentucky)	2,832.75
District No. 20 (Alabama)	4,134.16
District No. 23 (Kentucky)	8,500.00
District No. 28 (Vancouver Island)	584,000.00

Miscellaneous expenditures were as follows:

American Federation of Labor tax	$56,337.18
Salaries and expenses, officers, organizers and employees, for 1913	290,764.09
Supplies	4,431.95
Office expenses	7,161.98
Printing	12,589.72
Telephone, postage and express	5,307.45

The report summarizes

Total income	2,159,031.69
Total expenditures	2,102,261.44
Balance on hand	278,032.30

The above items furnish interesting food for thought in connection with the article on Lessons of the Vancouver Strike, published in our issue, May 16, p. 801.

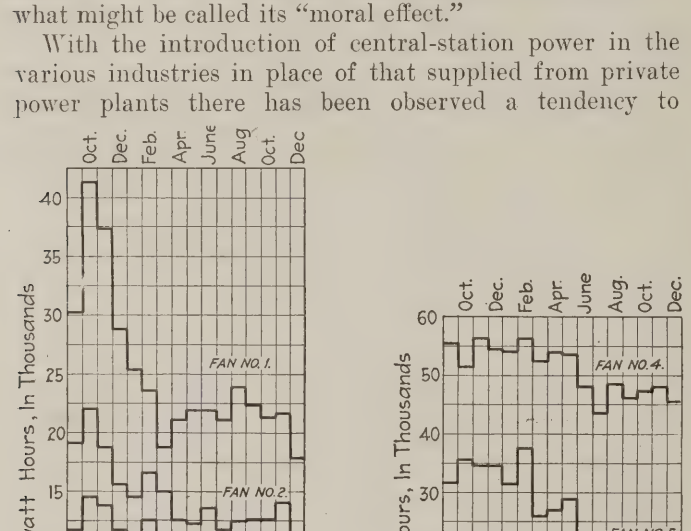
Efficiency and the Purchase of Power in Coal Mining

By A. E. Gregory*

SYNOPSIS—Purchasing power usually awakens the coal-mine management to the possibilities of saving good money in the use of current. While these possibilities undoubtedly exist and might be taken advantage of under private supply the significant fact remains that this is seldom done.

There is one phase of the use of central-station power which has not received the consideration which it deserves; that is, its bearing upon operating efficiency or what might be called its "moral effect."

With the introduction of central-station power in the various industries in place of that supplied from private power plants there has been observed a tendency to



Charts Showing Decreasing Power Requirements of Fans Nos. 1 to 5 Inclusive

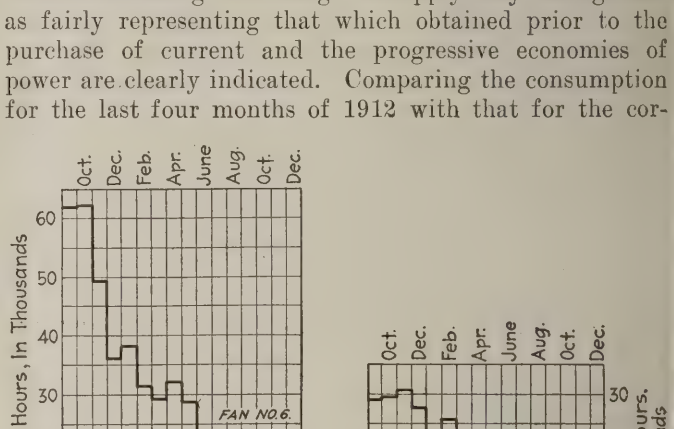
greater efficiency in the use of current. Wasteful methods long tolerated under operation from private plants give place, in many cases, to a regimen of careful economy in the use of power.

Probably few situations offer greater possibilities for improvement in this respect than the average coal mine as operated from its own plant. Coal is cheap and, consequently, little thought is given to economy in the use of power. Moreover, this attitude is largely justified inasmuch as any saving in current consumption can reduce the power costs but little except as regards the single item of fuel, since labor, interest, depreciation and other so called fixed charges remain practically the same in any case.

With the employment of purchased power on the other hand any economies in its use show a much greater proportionate saving in money and, what is of more importance as an incentive to economy, the entire cost of power is represented in the monthly bill rendered by the central station. With private-plant operation the manager rarely knows even approximately the cost of power; when buying it, however, it is impossible that he should be ignorant of its cost since every power bill is a reminder.

Considerable Savings Are Shown

The accompanying charts give a graphic representation of results actually secured in the saving of power as applied to the ventilation of a number of mines in the Pocahontas coal field, following the change to central-station power, which took place in August, 1912. Prior to this time these fans had been electrically operated from private plants. The power consumption for the first few months following the change in supply may be regarded as fairly representing that which obtained prior to the purchase of current and the progressive economies of power are clearly indicated. Comparing the consumption for the last four months of 1912 with that for the cor-



Charts Showing Decreasing Power Required by Fans Nos. 6 and 7.

responding period of 1913, the reduction in the cases of five of the seven fans represented varies from 40 per cent. to over 60 per cent., while for the other two the reduction was 34 per cent. in one case and 14 per cent. in the other.

These economies were secured by a variety of means. In several cases where fans had been operated at constant speed 24 hours per day, and where the conditions permitted of operation at a reduced capacity at night, the old motors were replaced with those of the two-speed type which permitted the rapidity of rotation to be reduced one-half. As a reduction of 50 per cent. in the speed of a fan reduces the power required by about 80 to 85 per cent., this change in itself accounts for a large part of the saving of power.

In some cases there was found to be considerable waste of power in the short-circuit of air currents as a result of leaky brattices between the air courses and the haulage ways. The remedy was obvious and inexpensive. In one or two cases the air delivery was found to be larger than was necessary or desirable, and in these instances the re-

*Appalachian Power Co., Bluefield, W. Va.

duction of fan speed resulted not only in a saving of power, but in a lessened tendency to dust disturbance by reason of the reduced air velocity.

Power Saving Is Not Restricted to Fans

The saving of waste energy has not been limited by any means to the operation of mine fans. The power consumption for haulage and cutting and even for pumping has been materially reduced although the results cannot so readily be demonstrated as in the case of ventilation, owing to the more variable nature of the load.

Of even more importance perhaps than the saving in power consumption, as a result of the improvements in distribution and use of power, may be the improved performance of the operating equipment. Defective bonding, for instance, not only entails loss of power, but what is worse, is likely to cause overheating of such equipment as locomotives and cutting machines, thus reducing their working capacity. It may easily happen, therefore, that improvements having as their object simply the reduction of the power bill will result in other benefits of even greater value.

While it is true that the economies described in this article could have been effected quite as well in connection with power service from private plants, the significant fact is that they were not thus secured. Indeed, it is doubtful if the possibilities of economy were even suspected until after the purchase of current. Moreover, the cause of the newly awakened interest in power economy is not that the purchased energy costs more; on the contrary, even for equal power consumption the costs usually are less than under private plant operation.

No, it is not that the cost of power is higher than before but simply that it is now known, whereas before it was not. As one operator expressed it, "Your meter is the best boss I have."

Handling Coal Electrically

The loading or unloading of granular material in bulk such as coal from cars or boat and its transportation to some nearby point is today seldom accomplished by manual labor. For unloading particularly, the laborer with his wheelbarrow, the horse hoisting a bucket and similar devices have been superseded in most cases by some form or other of electrically operated "grab" or "clam shell" suspended and actuated either from a crane or monorail carried on an overhead framework.

The accompanying illustrations show some of the many applications of this principle to industrial practice. Fig. 1 shows a gantry crane employed for the unloading and storing of coal from railroad cars. Fig. 2 shows the adaptation of the suspended grab bucket to the coaling of a power plant. In this case the track or trolley passes entirely through the building and is so arranged that the same apparatus that supplies coal to the bunkers from the right discharges ashes from the left of the building to railroad cars.



Fig. 1. Gantry Crane with Grab Bucket for Unloading and Storing Coal

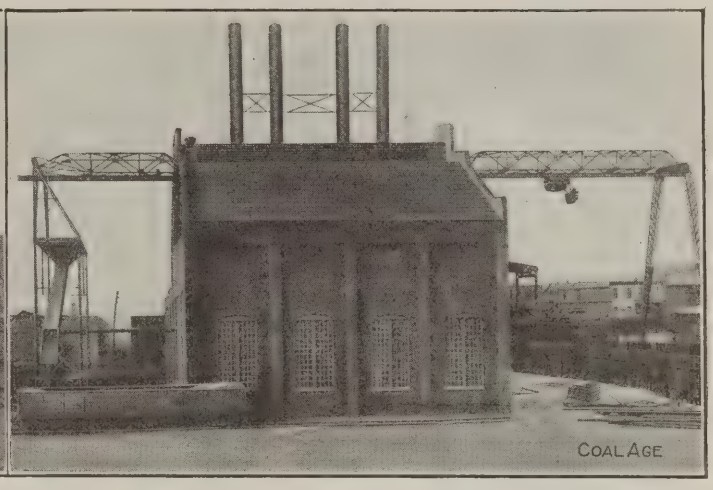


Fig. 2. A Grab Bucket Arranged to Deliver Coal to and Remove Ashes from a Power Plant

Fig. 3 is a general view of a grab bucket and monorail tram for unloading coal or other granular substance and conveying it or other material about storage yards or works. Fig. 4 shows the bucket and traveler in greater

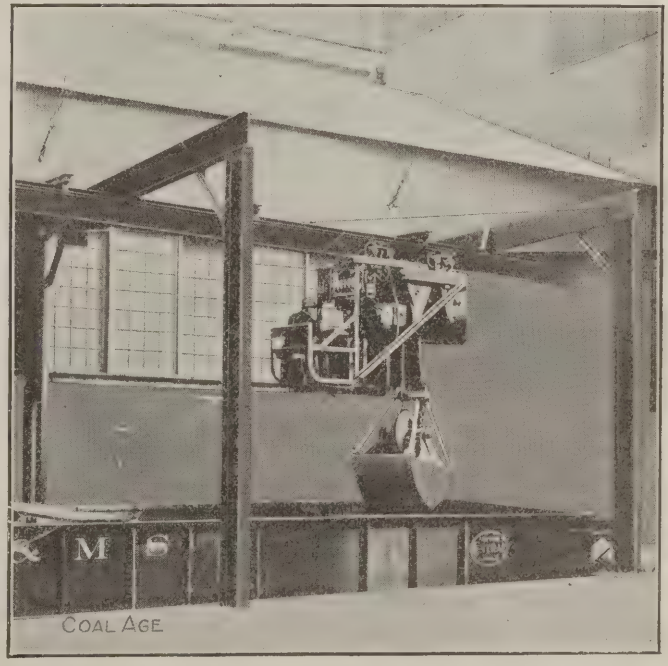


Fig. 3. A Grab Bucket, Operated from an Overhead Monorail

detail. It will be noted that the operator sits in a cab on the traveler and rides back and forth with it. He is thus enabled to see all that goes on at both traveler and bucket. He can, therefore, place the latter in the most advantageous position to pick up its load or to discharge its contents at any point desired.

In the case of the equipment above illustrated the trolley rail is a 15-in., 42-lb. I-beam, the bucket has a capacity of 1⅝ cu.yd. and the total weight of bucket and trolley is 13,000 lb. The full bucket may be hoisted at the rate of 150 ft. per min. and travel along the track can be accomplished at the rate of 350 ft. to 700 ft. per min.

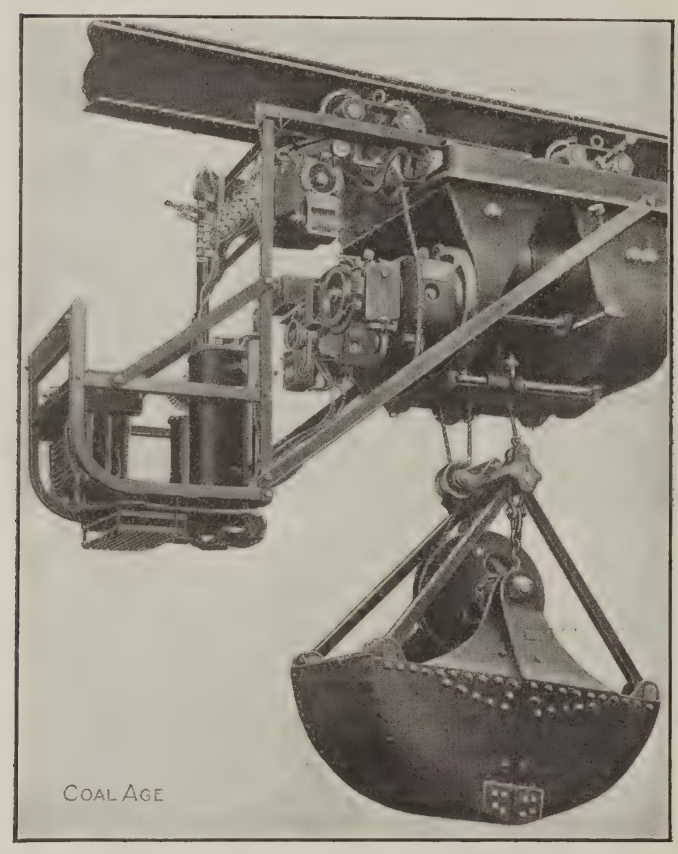


FIG. 4. NEAR VIEW OF GRAB BUCKET AND TROLLEY

Choosing a Trade in Pennsylvania

If you want to make money as a wage earner in Pennsylvania, get a job in a tin-plate factory. Your average daily wage will be $3.10, your annual income $837, and you will work 270 days in the year. These figures were compiled, for the benefit of those about to choose a trade, from the last Annual Report of the Secretary of Internal Affairs of Pennsylvania.

If you covet more leisure and want to earn the third largest average daily wage in the state, get a job in the anthracite mines. Your average daily wage will be $2.60, your annual income $605.80, and you will work only 233 days in the year. Your choice of a trade depends on whether you prefer a high daily wage, maximum annual income, or fewest working days.

In order to present these alternatives graphically, tables have been worked out from the above mentioned Annual Report, covering the nineteen industries in Pennsylvania, each of which pay out over $4,000,000 a year in wages to employees. In the first table, showing the average daily wage, the manufacture of tin plate leads with a daily wage of $3.10, the manufacture of pig iron comes second with a daily wage of $2.66, and anthracite mining comes third with a daily wage of $2.60. In the second table, showing the number of working days, anthracite mining has the minimum of 233 days, the manufacture of pig iron is second with 237 days, and bituminous mining third with 248 days. In the third table, showing the annual income based on the product of the first two, the manufacture of tin plate leads with $837, the manufacture of steam and electric locomotives is second with $750, iron and steel, rolled into finished form, is third with $694.98, while anthracite mining with its many holidays and more abundant leisure has fallen to seventh place with $605.80.

AVERAGE DAILY WAGE OF ALL WAGE EARNERS EMPLOYED IN THE NINETEEN LARGEST INDUSTRIES IN THE STATE OF PENNSYLVANIA

1	Tin plate	$3.10
2	Pig iron	2.66
3	Anthracite mining	2.60
4	Steam and electric locomotives	2.50
5	Iron and steel, rolled into finished form	2.43
6	Bituminous mining	2.35
7	Iron and steel, ingots and castings	2.28
8	Cars and car wheels	2.24
9	Furniture	2.03
10	Electrical supplies	1.96
11	Machinery	1.91
12	Hats	1.86
13	Cement	1.80
14	Carpets and rugs	1.69
15	Cotton goods	1.56
16	Boots and shoes	1.47
17	Yarns	1.35
18	Silk	1.22
19	Hosiery	1.21

AVERAGE NUMBER OF DAYS WORKED IN THE NINETEEN LARGEST INDUSTRIES IN THE STATE OF PENNSYLVANIA

1	Anthracite mining	233
2	Pig iron	237
3	Bituminous mining	248
4	Furniture	262
5	Tin plate	270
6	Carpets and rugs	277
7	Yarns	282
8	Silk	284
9	Iron and steel, rolled into finished form	286
10	Iron and steel, ingots and castings	289
11	Boots and shoes	289
12	Hosiery	289
13	Hats	291
14	Cement	292
15	Cotton goods	293
16	Steam and electric locomotives	300
17	Machinery	301
18	Cars and car wheels	302
19	Electrical supplies	304

AVERAGE ANNUAL INCOME OF ALL WAGE EARNERS EMPLOYED IN THE NINETEEN LARGEST INDUSTRIES IN THE STATE OF PENNSYLVANIA

1	Tin plate	$837.00
2	Steam and electric locomotives	750.00
3	Iron and steel, rolled into finished form	694.98
4	Cars and car wheels	676.48
5	Iron and steel, ingots and castings	658.92
6	Pig iron	630.42
7	Anthracite mining	605.80
8	Electrical supplies	595.84
9	Bituminous mining	582.80
10	Machinery	574.91
11	Hats	541.26
12	Furniture	531.86
13	Cement	525.60
14	Carpets and rugs	468.13
15	Cotton goods	457.08
16	Boots and shoes	424.83
17	Yarns	380.70
18	Hosiery	349.69
19	Silk	346.48

It is claimed that the adoption of the hydraulic system of stowing wastes would be beneficial in many directions. There being no loose wastes or gobs, a reduction in the loss of "effective" ventilation would accrue. There would be less liability of explosions. The risk of falls would be reduced, owing to the more substantial support afforded the roof. Again, collieries would be more sightly if we put back into the worked-out places of the mine the material drawn therefrom in the process of working. The waste at present goes to form the huge, unsightly culm piles so frequently seen on the surface near coal mines.

Electricity in Coal Mining

By David R. Shearer*

SYNOPSIS—This is the third article of the series on this subject. Explanations and diagrams are given of the various electric signaling systems prevalent in coal-mining operations.

Since the earliest days of mine operation, it has been necessary to have some method of communication between those employed on the surface and the men working underground. At first these methods were very crude, taking the form of mechanical bells or gongs, operated by a system of wires from the bottom of the shaft by a series of jerks or pulls from handles located at some convenient place. Later we find the first simple electric system, consisting of one electric bell and one push button, using either two wires, or one wire and a ground return to complete the circuit.

A system of this type in its simplest form is shown in Fig. 1. Communication was carried on over the wires by means of a system of signals, in some instances, this being the Morse telegraph code. After some time this simple bell service was made more efficient by adding additional buttons and additional bells to the same circuit, forming a multiple system, Fig. 2. We next find the return-call method of wiring being used with a bell and push button at each end, thus, either station could signal the other without ringing the local bell, Fig. 3. This system may be used with three wires or two wires and a ground return.

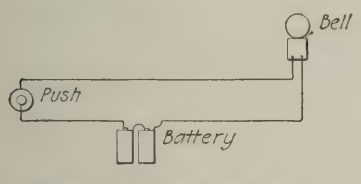


Fig. 1. Simple Bell Signal Circuit

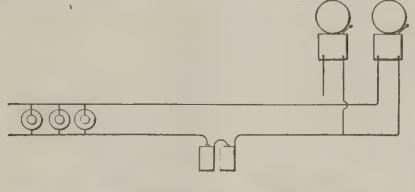


Fig. 2. Multiple-Bell Signal System

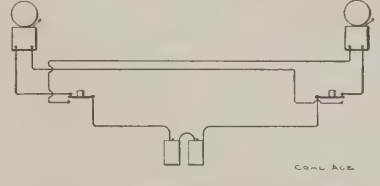


Fig. 3. Return Call Bell System

All of these arrangements work satisfactorily for short distances. But as extensions were made, adding more resistance to the line and increasing the number of points at which leakage might take place, it was found necessary to employ a great number of batteries in order to force sufficient current through the line wires to adequately operate the electric bells. This difficulty was overcome by two methods, each of which, however, added a certain amount of complexity to the operating system.

One of these methods consisted in the use of mechanical gongs, which contained a heavy clock spring operating the bell, together with a very delicate release mechanism, operated by a magnet, Fig. 4, through which a weak line current was passed. The electricity, although not of sufficient force to ring the bell, could nevertheless release the mechanical spring so as to operate the hammer striking the gong. This system operated very well if the springs were kept wound up, but frequently those in charge neglected the winding, in which case, of course, no signals could be received.

Relays May Be Introduced

To obviate this difficulty, electric relays were introduced. The operation of this system is as follows: The weak current from the line is passed through a magnet coil which actuates a delicate pivoted contact which in turn opens and closes a local circuit operating an electric bell, Fig. 5. In this case one battery is required for the line and another for each local bell section. Practically all modern systems of bell wiring used for great distances are operated on this principle and almost an infinite number of arrangements are possible and many complicated systems are in use at the present time.

One of the advantages of using relays on the line is that a closed-circuit relay may be used and the bell operated only when the current passing through the line wire is interrupted. Thus, the system automatically makes known any trouble arising from a break in the line wire from bad contact or from failure of the line battery

Several sources of power are available for operating bell systems. The earlier signaling arrangements used wet cells almost exclusively, the Leclanche type for open-circuit line work and for local bells and the gravity or bluestone type for closed-circuit line work. Owing to their convenience and adaptability, dry cells are used to a large extent in many of the smaller mines, while storage cells are employed in many of the larger operations. Where alternating current is available, a low-voltage transformer can be used with marked success, especially for local bell work. These transformers require a very small amount of power, which is taken directly from the line wires furnishing light. A transformer, however, cannot be used on a direct-current system, although the storage battery used on the bell system may be charged from direct-current lighting mains, thus avoiding the recharging and upkeep found necessary with ordinary wet cells.

Many types of wiring are used in running from one part of the mine operation to another, each method probably having some favorable points. Perhaps the most common practice is the use of bare iron telephone wire, supported on porcelain knobs, though insulated wire fastened to the woodwork by staples is sometimes employed. The chief objection to this method lies in the fact that dampness or moisture gathering on the wires allows a leakage of current and sometimes short-circuits the system entirely.

Neither method is applicable if many wires are to be used as too much room is occupied by the lines and their supports. In case several wires are to be used and especially where space is limited, as in a small shaft or tunnel, it is advisable to use a cable containing the number of wires required. In dry places, this cable may have a weatherproof braid insulation, but where dampness is prevalent, it becomes necessary to further protect the wires from moisture by an additional covering of lead.

Telephone Wiring Is Employed above Ground

Outside the mine or on the surface the wiring methods usually used are similar to those employed in telegraph or telephone work, consisting of poles, cross-arms, insulators and iron wires.

Probably the best of all known methods of communication between the different parts of the mining operation is by the use of mine telephones. If these are properly installed, and the wiring carefully done, the system is almost trouble proof. The telephones are usualy inclosed together with the battery necessary for their operation in waterproof iron boxes. The cable is lead covered and waterproof throughout. Several of these phones may be used on one line, and an easy method of communication established between numerous points in and around the mine. In some instances an inter-communicating system is used, whereby any one station can call any other station without interfering with those remaining or even ringing the bell of any but the one called. This system is especially common in large mining operations where it is frequently necessary to talk between the different offices, store rooms, or supply houses.

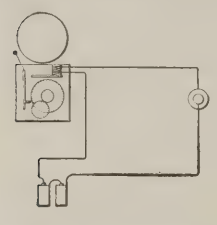


Fig. 4. Electrically Released Mechanical Bell

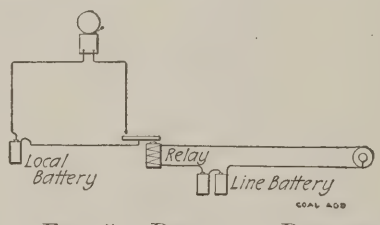


Fig. 5. Relay or Double-Circuit Electric Signal System

A mine telephone, in underground work, is especially useful at the time of a fall or explosion in the mine, for if any men are imprisoned in the workings they may be able to notify those on the surface of their condition and give such directions as might be of assistance toward their release.

Another system of wiring which is coming into some use is that of the automatic fire alarm. This system contemplates the use of many contact-closing thermostats, located at different points of the operation where danger of fire might be expected. In the event that a fire does occur, the heat communicated to these thermostats closes an electric circuit and rings a bell used for fire purposes only.

To adequately cover the many methods of signaling used in mines would require several volumes and a brief outline only is given of the ordinary methods in use. It is to be noted, however, that much time may be saved and sometimes even life and property preserved by the use of carefully erected signal systems. To secure the installation of an outfit suitable for the use of the given mine, the services of an engineer are usually to be required, as frequently the owners are not sufficiently acquainted with the methods available to determine the most suitable or efficient installation.

A Map Should Be Made

After such a system is installed and thoroughly tested under working conditions, a map should be drawn, showing the methods of wiring, the location of the batteries, sources of power and the exact position of every station. This diagram should not only be kept in the office of the superintendent, but should be posted up in the power house. At regular intervals an electrician should thoroughly test every part of the equipment, determining at the same time the strength of the batteries, if batteries are used, and their probable life. The man whose duty it is to inspect such a system should be required to furnish a written report, noting any defects or variations from normal operation. If defects exist, they should be remedied at once, as at any moment the satisfactory operation of bells or signals may be absolutely necessary.

Wage Conditions in N. M.

The following figures are supplied by the state mine inspector of New Mexico, Rees H. Beddow:

COAL THICKNESS, CONTRACT RATES, DAY AND MONTHLY WAGES AND DEDUCTIONS IN NEW MEXICO MINES

Number of corporation...	1	2	3	4	5	6
Thickness of coal bed, ft...	3-9	4-12	4-5	4-7	6	2-4
Contracts						
Mine run per short ton	0.55	0.55	0.55	0.63	0.63	0.75
Entry per yard	1.75	1.75	1.75	2.00	1.50	4.00
Cross cut per yard	1.00	1.50	1.75	1.50	1.50	1.50
Main slope per yard	1.75	1.75	1.75	2.00	1.50	4.00
Turning rooms	3.00	3.00	3.00	4.00	....	8.00
Setting 8-ft. timbers	0.50-1.00	....	0.50	0.80	....	1.00
Per Diem Wages						
Fire bosses	4.00	4.00	3.35	3.75	....	3.50
Shot firers	3.50	....	3.25	3.56	3.20	2.50
Tracklayers	3.25	3.10	3.25	3.20	3.20	3.15
Companymen	3.00	3.10	3.10	3.20	3.20	3.15
Timbermen	3.25	3.10	3.25	3.25	3.20	3.15
Company-men's helpers	2.75	....	2.50	3.20	....	....
Mule drivers	3.10	3.10	3.10	3.20	3.20	....
Car couplers	2.10	....	2.00	2.00	....	....
Rope riders	....	....	....	3.35	....	3.15
Door boys	1.25	1.30	....	1.50	....	....
Electricians	4.00	....	....	....	....	....
Boilermen	3.00	....	....	....	....	2.10
Engineers	....	....	....	....	....	3.15
Weighmen	3.15	....	....	3.20	3.20	3.00
Linemen	2.75	2.50	....	3.25	....	....
Motormen	3.10	3.10	3.25	....	....	....
Tipplemen	Various	2.05	2.25	2.50	2.50	1.50
Blacksmiths	3.75-4.00	3.75	3.75	3.75	3.25	....
Blacksmith helpers	2.25-2.50	2.50	2.50	2.65	2.50	1.75
Machine coal cutters	4.00	4.00	3.50	4.00	3.50	3.25
Machine helpers	3.00	3.10	3.10	3.20	3.25	....
Monthly wages						
Mine foremen	135.00	120.00	135.00	130.00	120.00	140.00
Stable bosses	75.00-95.00	80.00	85.00	80.00	80.00	110.00
Electricians	....	125.00	125.00	150.00	....	140.00
Engineers	100.00	85.00	90.00	125.00	....	....
Boilermen	....	75.00	....	....	....	....
Weighmen	....	80.00	75.00	....	....	....
Prices of Supplies						
Powder, per keg	....	....	....	2.50	2.50	2.50
Permissibles, per lb	0.20	0.20	0.18	....	....	0.20
Miners' oil, per gal	....	0.80	0.65	0.60	0.80	0.80
Deductions per Month						
Hospital	1.00-1.50	1.00	1.00	1.00	1.00	....
Doctor	....	1.00	....	....	....	1.00
Blacksmithing	1.00	0.50	0.50	0.50	1.00	0.50
House Rent						
Two rooms	4.00	4.00	4.00	4.00	5.00	4.00
Three rooms	6.00	6.00	6.00	6.00	6.00	6.00
Four rooms	8.00	8.00	8.00	8.00	10.00	8.00
Average, per room, per month	2.00	2.00	2.00	2.00	2.33	2.00

In this table 1 = Stag Canon Fuel Co., Dawson, N. M.; 2 = St. Louis, Rocky Mountain & Pacific Co., Raton, N. M.; 3 = New Mexico & Colorado Coal & Mining Co., Raton, N. M.; 4 = Victor-American Fuel Co., Gibson, N. M.; 5 = Diamond Coal Co., Allison, N. M.; 6 = Albuquerque & Cerillos Coal Co., Madrid, N. M.

Stoppings should be made of incombustible material and so constructed that there will be no leakage of air through them. Recently some investigations have been made as to the amount of leakage through stoppings, and the results obtained have been quite surprising. The amount of air lost through brattices as ordinarily constructed is very considerable. The efficiency of stoppings of various materials is a subject worthy of investigation by all large mining companies.

The Labor War in Colorado

By A. J. Hoskin*

SYNOPSIS—A regularly paid militia with proper support would have made peace in Colorado without bloodshed. But the sense that the militia was without the necessary backing emboldened the malcontents to acts of violence.

The general public is aware that a distressing condition exists in the Colorado coal-mining districts. There is no question regarding the seriousness of this state of affairs, and to set the entire matter before the readers of "Coal Age," the following explanations are presented.

In the Mar. 7, 1914, issue appeared an account of the early portion of the investigation then being conducted by congressional authority. During the stay of the congressional committee in the state, warfare in the camps was but temporarily suspended for everybody who was sufficiently familiar with the long-standing trouble to formulate opinions was convinced that the trouble was but smoldering and that the withdrawal of the congressmen would be a signal for renewed deadly activities. Governor Ammons, one citizen who held this belief, expressed it to a few friends at that time, adding that he wished the committee could remain in Colorado permanently.



U. S. Regulars Detraining for Service at Ludlow, Colo.

AMMONS IMPARTIAL

There can be no doubt that Ammons has endeavored to remain absolutely impartial in handling this situation. Indeed, his refusal to take sides brought upon him criticism first from one side and then from the other—criticisms that were quite unfair. Perhaps the statement that he has been weak-kneed possesses an element of fact but he should be given credit for trying to be square. This freedom from bias on his part is substantiated by the fact that, up to date (May 11), neither faction has been ready to make any specific charge against him, although both unionists and operators have suggested his impeachment.

MILITIA UNPAID

Governor Ammons was seriously handicapped from the start by the fact that the treasurer of the state, Roady Kenahan, is a union member and sympathizer. The sending of the militia into the troubled zone was absolutely warranted, and unprejudiced persons are unanimous in believing that, with proper appreciation for their services, these men would have been able to reëstablish peace in a short time. But remuneration for their distasteful and extremely hazardous duties was effectually blocked through the refusal of Kenahan to pay, or to devise ways for paying, the military bills.

Just as soon as the officers of the union found themselves protected at the state house and were assured that the congressmen were out of the state, they were emboldened to renew their offensive tactics on a stronger scale than ever.

*Mining engineer, 308 Commonwealth Building, Denver, Colo.

Because Ammons strove to compel Kenahan to pay the expenses of the national guard, he was denounced by the union officials and by all the strikers.

HOW LAW AND ORDER WAS DEFIED

Guerilla warfare increased daily until it finally mounted to pitched battles. Ridicule of the militia was expressed by all unionists who were openly pronounced in their efforts to exterminate these men. The soldiers were obliged to protect themselves, and their duties were thus made manifold, viz., to protect lives of all citizens; to protect property against incendiarism and other forms of destruction; and to preserve their own lives. It was no wonder that these men who went into this campaign unprejudiced and from all walks of life should acquire hatred for these willful enemies of law and order.

The breach continued to widen. Murder, arson and theft were probably perpetrated by representatives of both the union and the militia. This chaos culminated in an all-day battle that destroyed a tent colony at Ludlow. In this conflict, the strikers suffered heavily. Frail tent houses that had been erected to house families of striking miners were destroyed by fire and, of course, the soldiers were accused of willfully starting the conflagration. After the battle ceased, the bodies of 3 women and 11 children were found in a cellar or cave that had been excavated beneath one of the main tents, and the report was spread broadcast that the soldiers had wantonly murdered them.

UNION HAS ACTIVE PRESS AGENT

The secretary-treasurer of the United Mine Workers of America for this district, E. L. Doyle, wired lurid, misleading statements and accusations to all unions in the state and to editors of the press generally. In his telegram to the press he said "a score or more women and children probably murdered in the most terrible massacre in American industrial history. Women and babes forced to lie in ditches and cellars 24 hours without food or water. Murderous guards keep up attack on men, and all may be slaughtered." He wired the unions: "Tell the miners of your communities to defend themselves at any cost."

It seems probable, as reliable witnesses, who were on the ground, have said, that the women and children died in the pit through suffocation; that they had been placed there by their own men; and that the house-tents were not fired, at least, at first, by the soldiers who were a considerable distance away, but through the accidental overturning of stoves. Positively no wounds could be found upon the bodies of these victims. Moreover, officers of the militia are pronounced in declaring that the soldiers did not know that women and children were imprisoned until their bodies were found in the ruins.

A few days later, during another battle, a uniformed Red Cross surgeon, while attending a wounded militiaman, was shot dead by strikers.

THE UNITED STATES ARMY IS CALLED TO COLORADO

Thus the warfare has continued. There have probably been numerous casualties that did not reach the press. This bitterness between the state troops and the strikers can never be eliminated. The situation finally became such that the general public demanded the presence of Federal troops, and, after a few days of petitioning, President Wilson and Secretary Garrison complied with the almost universal request. Troops were slow in arriving, however, and many atrocities were committed. It seemed that as much damage as possible should be done before the government soldiers arrived.

The coming of the United States army was hailed with satisfaction by not only the public, but by the striking element, and it was hoped that peace could be quickly established. As fast as regulars reached a coal-mining district, the state troops evacuated or relinquished authority. But even yet, there are several unprotected camps. Leading men of the union have, in instances, met the Federal troops and greeted them cordially, professing perfect faith in them. How much of this was really sincere remains to be seen, but already there have been numerous acts committed by the unionists that upset the hopes of Colorado's noncombatant citizens.

During the occupation of the camps by the Federals, Chairman Foster, of the Congressional Investigation Committee, endeavored to induce John D. Rockfeller, Jr., one of the heavy holders of stock in the Colorado Fuel & Iron Co., to arbitrate with the union. It is not necessary to repeat here the telegraphic correspondence for it was published in these columns, but it will be well, perhaps, to recall some of it. Mr. Rockefeller wired back to Mr. Foster that the proposal had been forwarded to the officers of the company in Colorado.

TEN THOUSAND MEN WORKING

Upon receipt of the proposal, the principal operators in the state convened, Apr. 29, and sent to Mr. Foster a long telegram reciting events about as given herein but going into detail regarding the destruction by strikers of various mining plants throughout the state. The operators then claimed to be working 10,000 contented nonunion miners to whom they had pledged protection, and whom they declined to discharge from service at the behest of any organization. The telegram said: "We cannot enter into negotiations of any character with the officers and agents of the United Mine Workers of America who alone are responsible for the terrible reign of disorder and bloodshed." This document was signed by 20 leading operators in the state, including the Colorado Fuel & Iron Co.

On May 3, while serious demonstrations against Mr. Rockefeller were being enacted in New York, the same operators with the exception of the Colorado Fuel & Iron Co., held a conference and sent a remarkable telegram to President Wilson, deploring the attacks upon Mr. Rockefeller and denying that they, the operators, should be overlooked in the placing of responsibility. They announced their refusal to have any dealings with the "organization purporting to be a labor union calling itself the United Mine Workers of America."

LAWS ARE EXTREMELY DRASTIC

The telegram, which was lengthy, went on to say that the coal-mining code of Colorado is very strict, that it was approved by John Lawson, and it has been and is being enforced by James Dalrymple, a state coal-mine inspector and a member of a labor organization. It further charged that the leaders of the United Mine Workers of America, "by their criminal acts, have foreclosed any right it may ever have possessed to demand of us that we have business relations."

A proclamation from President Wilson is daily expected ordering the dispersal of all mine guards and strikers. The surrender of firearms to the Federal soldiers, in compliance with orders from Secretary of War Garrison, has not been as prompt on the part of the strikers as the war department had expected, and one union official is quoted as having said yesterday that his men's confidence in the troops had been betrayed. If this be true, it forebodes continued trouble and the Federal soldiers may witness the expression of an animosity such as was shown toward the state troops, though, of course, there will be less uneasiness as to the outcome. It is doubtful if the strike leaders are now able to control their followers in this matter of disarmament.

At this writing, operators and unions are standing pat and the situation threatens to be decidedly worse before it improves. The disinterested citizen can see no immediate settlement unless it comes about in some way as yet unsuspected.

Electric Lamps for the Prevention of Mine Accidents

By Francis A. Pocock*

The recent explosion at Eccles, W. Va., where 180 men lost their lives, should stir up the whole world to determine what method will eliminate such casualties.

The coroner's jury in its verdict, in part, found:

> The accumulation of gas in Mine No. 5, which was the primary cause of the explosion, was due to a short circuit of the air in the southern section of the mine. This gas was ignited by an open lamp and the explosion followed.

In this twentieth century of progress and development, there is no good reason for the existence of open flame lamps in the mines. These lamps are tolerated simply for lack of something better. Now that that something is on the market, in the form of the electric safety lamp, which decreases mine fatalities and makes chances of fire remote, why then does the operator still take that chance?

Advocates Use of Electric Lamps Everywhere

In every mine, there is room for a practical electric lamp that is clean, convenient, economical and safe under

*2203 N. Franklin St., Philadelphia, Penn.

all conditions. The electric mine lamp of today, in its latest improved form, is gradually being and must surely become universally recognized as the most practical, most efficient, and by far the safest of all existing mine lamps of any class.

It is an indisputable fact that in every mine there is a light problem. Whether the workings produce anthracite or bituminous coal, whether they are gaseous or nongaseous, whether they constitute a small or a large operation; the fact remains that the miners must be absolutely dependent upon artificial light in the execution of their work.

The electric lamp is the only light which really assures safety, and if all workers were equipped with electric lamps, and the so called flame safety lamps were placed in the hands of experienced men only, for the sole purpose of testing for gas, accidents in the mines would be reduced to a minimum. The electric lamp is one of the best devices ever invented as a preventive of mine accidents.

The U. S. Bureau of Mines has approved several electric lamps as permissible for use in gaseous mines, and that electric lamps are practical is proved by the number now used by coal operators throughout the country and by the many repeat orders these operators are placing for such lamps.

Aside from the importance of safety, everybody knows how uncomfortable and annoying to the miner is the foul-smelling, smoking oil torch, the fumes of which are detrimental to his health and decrease the efficiency of his work.

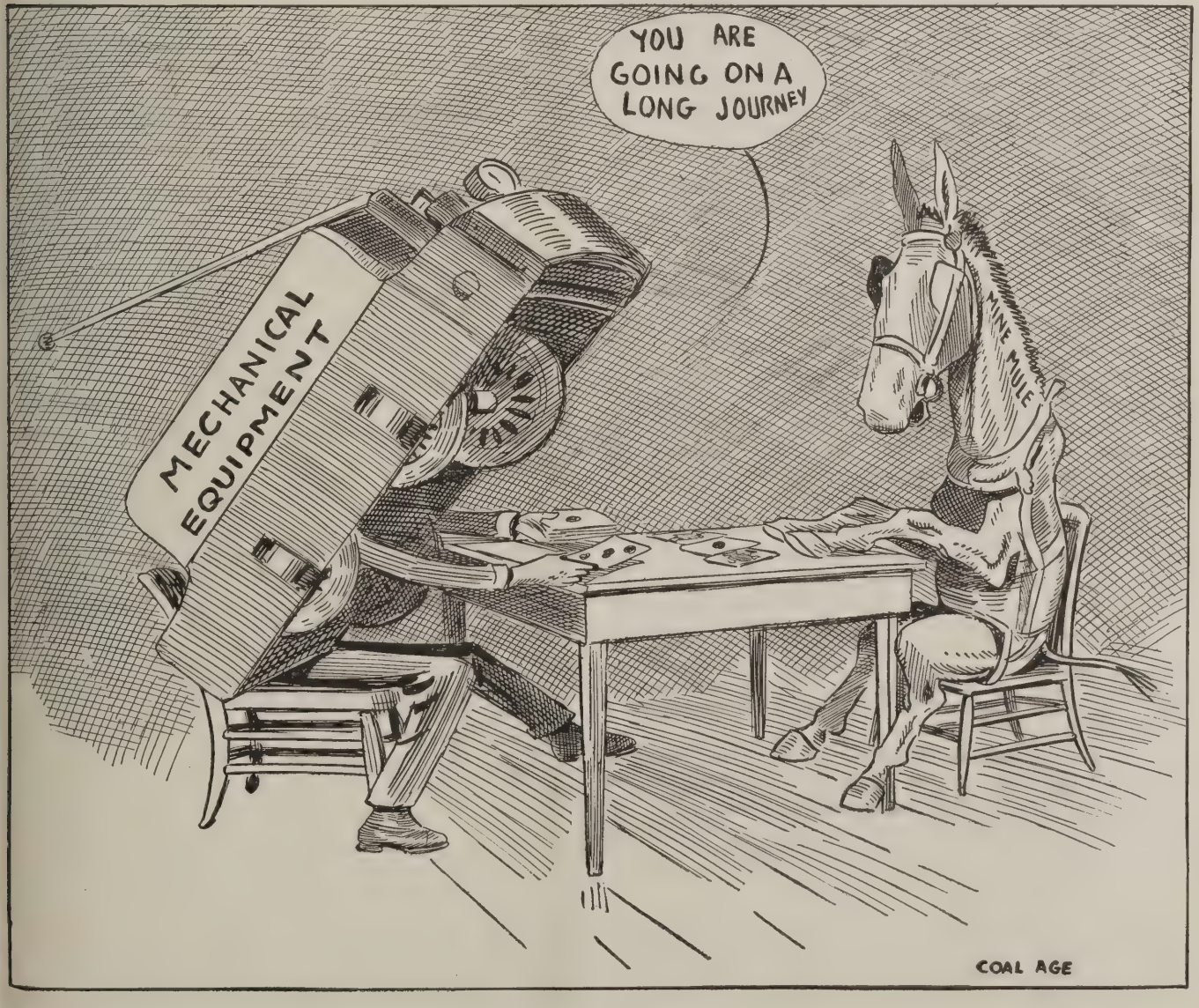
Mixed lights in gaseous mines are dangerous, and the use of safety lamps should be required by law in all such mines. Men will be careless, so why should operators take the risk of using both safe and unsafe lights in the same mine? Moreover, many powder explosions will be avoided by dispensing with open-flame lamps.

Coming Meetings

The summer meeting of the **West Virginia Coal Mining Institute** will be held in Cumberland, Md., June 2, 3 and 4.

The annual meeting of the **Mine Inspectors' Institute of the U. S. A.** will be held in Pittsburgh, Penn., June 9, 10, 11 and 12, with headquarters at the Seventh Avenue Hotel.

The annual meeting of the **International Railway Fuel Association** will be held in Chicago, Ill., June 18, 19, 20 and 21, with headquarters at the Hotel La Salle, La Salle and Madison Sts.



TELLING HIS FORTUNE

Effect of Panama Canal on World's Coal Markets

By F. R. Wadleigh*

SYNOPSIS—A careful analysis of Ex-Governor MacCorkle's interesting paper on this subject. As probably one of the best informed men in the country on our export trade, Mr. Wadleigh's frequent exceptions to statements in the original paper, are of particular interest. The second installment of the article will appear in an early issue.

I beg leave to offer a few criticisms of an article in Coal Age, beginning Feb. 14, entitled, "The Relation of West Virginia Coal to the Panama Canal." A paper of this kind to be valuable should be accurate as to facts, its deductions carefully made or it is of doubtful value.

This article begins with the following statements:

> The Suez and Panama Canal routes, respectively, control the great international trade lines of the world. Which of the rival routes will receive the bulk of the traffic will not be decided solely by the relative distances of travel, which, using one or the other will entail. After a somewhat careful investigation of these great trade routes, it seems that the shipowner will use one route or the other, actuated not only by mere distance but also by the price and quality of the fuel he can purchase along the line.

The first statement is one of those general and inaccurate statements so often made in selling arguments. The Suez Canal is now a controlling factor in one of the great international trade lines; it does not "control" anything. There is as yet no Panama Canal route. When the canal is completed, its effect on the great trade lines will still be an unsolved problem.

The shipowner or charterer will undoubtedly use one route or the other, but there are factors to be considered besides those of the distance and the quality and price of fuel. One such factor and a most important one is the number of available markets *en route,* from point of origin to destination. On the Suez Canal route there are numerous markets which would give employment to steamers and abundant freights, while the Panama route from Europe will be a long sea voyage with no available markets for trading.

Another factor to be considered is the number and distances between coaling stations, an important item when freights are high. The article under discussion makes the following erroneous statement in this connection:

> If the route through the Panama Canal becomes that most generally used by the ocean-going ships of the world, the isthmus will in itself become **the greatest coal-distributing point** upon which the sun shines, and this fact will make the fuel of West Virginia one of the preponderating influences in the world of trade.

It is obvious that the Panama Canal route cannot be that most generally used by the ocean-going ships of the world, but only by those trading in certain ports and between the Atlantic and Pacific, and therefore cannot become the greatest coal distributing point, etc.

The Panama vs. the Suez Route

The fuel of West Virginia, good as some of it is (not by any means all), can never be more than a detail in the world's trade. The only West Virginia coals that can be used at Panama are the New River-Pocahontas, and their production is limited while their quality is not altogether uniform. Out of the 148 billion tons of West Virginia coal remaining unmined (as stated in the article under discussion), by far the greater portion is not suitable or available for the export trade, unless for special purposes.

Still another factor that must be taken into consideration on the use of the Panama route, will be the attitude of the underwriters. Will they stiffen rates on ships naming the Panama route, on account of the possible dangers from slides and earthquakes? Upon their decision on these matters the commercial aspects of the Panama Canal will and must largely depend. So far no collective action has been taken or decision arrived at, but the question must come up soon and is likely to be a deciding factor in the commercial success of the canal.

It is, of course, true that many, in fact most of the Far East ports, Australia and Asia, are nearer Europe by the Suez Canal than they will be by the Panama. The distances to various Pacific ports, as given in the article under discussion, are not altogether accurate, according to the latest English distance tables (Philips, 1913).

The article gives the following distance data (not tabulated):

	Distance, Miles	In Favor of	Miles
Liverpool to Adelaide via Suez...	11,142	Suez	23[illegible]
Liverpool to Adelaide via Panama	13,478		
Liverpool to Manila via Suez....	9,701	Suez	442[illegible]
Liverpool to Manila via Panama.	14,122		
Liverpool to Hong Kong via Suez	9,785	Suez	417[illegible]
Liverpool to Hong Kong via Panama	13,957		
Liverpool to Yokohama via Suez.	11,678	Suez	69[illegible]
Liverpool to Yokohama via Panama	12,372		
Liverpool to Wellington via Suez.	.....		
New York to Wellington via Panama	.....	Panama	413[illegible]

Distances between same ports, according to Philips' tables, are as follows:

	Distance, Nautical Miles	In Favor of	Miles
Liverpool to Adelaide via Suez...	10,710		
Liverpool to Adelaide via Panama	13,440	Suez	2730
New York to Adelaide via Panama	10,882	New York	172
Liverpool to Manila via Suez.....	9,554		
Liverpool to Manila via Panama.	13,973	Suez	4419
New York to Manila via Panama.	11,415	Liverpool	1861
Liverpool to Hong Kong via Suez	9,651		
Liverpool to Hong Kong via Panama	13,904	Suez	4253
New York to Hong Kong via Panama	11,346	Liverpool	1695
Liverpool to Yokohama via Suez.	11,113		
Liverpool to Yokohama via Panama	12,282	Suez	1169
New York to Yokohama via Panama	9,724	New York	1389
Liverpool to Wellington, N. Z. Suez	11,981		
New York to Wellington via Panama	8,510	New York	3471

The article then says:

> The use of the Panama Canal will give New York 4138 miles advantage over Liverpool on the journey to Wellington, New Zealand, and the distances will be about equalized, relatively speaking, on the journey from New York and Liverpool to the countries I have mentioned.

As a matter of fact, New York will have only 3471 miles advantage over Liverpool to Wellington, not 4138. Distances on trips from New York and Liverpool to

*Consulting engineer, 426 Real Estate Bldg., Philadelphia, Penn.

points mentioned above will not be equalized by use of Panama Canal, as is shown by the second table.

Again it is stated in the article that:

> The canal should allow this country largely to dominate by distance the coast of South and Central America.

As far as coal is concerned, the Panama Canal should enable us to dominate the coal trade of the *west* coast of South and Central America.

The article then states further that one advantage is possessed by the Suez Canal, namely, that coaling stations are located along the great English trade routes (why English alone?) and that if this country proposes to take any part of the "steaming demand" (meaning, it is presumed, the supplying of coals for ship bunkers) it must provide ample coaling stations for international commerce.

The Transportation Problem and the South American Markets

This is true, of course, but the building of large coaling stations at Panama alone is only partly filling this need. We should have a coaling station at the Azores, another in the West Indies (where there are now several private ones, carrying West Virginia coals in stock), and one at San Francisco, or otherwise the West Virginia product may be restricted to the Panama Canal stations or be dependent on private enterprise and strong competition.

There are, however, two possibilities that would alter entirely the conclusions arrived at by Mr. MacCorkle and which he seems not to know about or to have lost sight of.

First—If the statements of Government officials are true, it is the intention of the Government to build 12,000- to 15,000-ton colliers to carry coal to the Isthmus; it is estimated that coals can be carried by these colliers at about 90c. per ton.

Second—The building of 15,000-ton cargo ships for carrying iron ore between Chile and New York, for the Bethlehem Steel Co. may enable private shippers to compete with the Government-built colliers in carrying coal to Panama. These ships, to be operated under the Norwegian flag, is is said, will be able to carry coal as a return cargo very cheaply.

The United States has the coal, but cannot build ships in competition with England or Norway and Italy, nor can she operate them at less than 50% higher cost under the United States flag. What this country, under our present navigation laws, can and must do in order to ship coal into foreign markets, is to build ships abroad and run them under a foreign flag.

As regards coal and freight rates to the South American coasts, the coal used in the West Coast is British and Australian, because of the certainty of return cargoes, which tends to make low rates, but the British ships do not "control" the markets by any means; there is also a large tonnage of native coal used in Chile. The British coal owners, however, have other strong and active interests in South America, with which the West Virginia coals must reckon. Stock ownership in railroads and steam plants, organized and aggressive selling agencies, ownership of docks and handling facilities, and (strong factors in South American countries) custom, use, friendship and prejudice.

Take the British exports alone to South America in 1913:

Brazil	1,886,000	Chile	588,000
Argentine	723,000	Peru	60,000
Uruaguay	3,693,000	Ecuador	10,000
Total	6,302,000	Total	658,000

As will be noted, by far the largest coal markets in South America are those that will only be indirectly affected by the Panama Canal, Brazil, the Argentine and Uruguay, whose imports of coal are about five times as large as those of the whole west coast.

Fuel-Oil Competition and the American Marine

There is also no mention made of the strong competition that may be expected from the large and increasing use of fuel oils at Panama; yet even the U. S. Government is making preparations to meet the demand for oil as fuel. There is already a pipe line across the Isthmus and large storage tanks. The power plants on the canal work, with the exception of those at or near Colon, are now using oil, or were a short time ago, the Canal Commission having a contract with the Union Oil Co. for California oils.

The use of oil as a steamship fuel is growing rapidly and Panama is within easy reach of several oil fields, California, Texas and Peru, beside the developing fields of Venezuela, Ecuador and Trinidad. While the price of fuel oil is still high, it has decreased since January over 1 cent a gallon, and the West Virginia coals may look for strong and growing competition from its increasing use.

Moreover, if the carrying trade between the west coast of North America and Europe is made larger by the Panama Canal, then cargo-carrying space will become most important and the owners of motor ships using oil will be able to carry produce to Europe at a lower rate than can be made on coal-burning vessels.

Under the caption, "Need for an American Marine," the article says:

> If these markets become as important in American commerce as they should be, America must control the ships necessary for her trade. Let me illustrate my argument by showing that length of voyage and cheapness of fuel do not always settle the cost of transportation. The marvelous ability of the Englishman to ship his coal to every part of the world and sail his ship in every sea, despite the competition of the nations, is well exemplified on the coast of South America. At Valparaiso, Iquique, Antofagasta and other points on the Western coast of South America, the coal is largely Welsh and Australian, because of the low freight rates on vessels bound for Chili to secure nitrates. On the eastern coast of South America the same condition exists; British ships control the markets and are able to take coal cheaply to different coasts, as they can obtain the return traffic.
>
> In other words, American coals cannot obtain the markets to which they are entitled, unless American ships are more plentiful upon the seas and American trade is more diversified under new laws and new conditions. Only then may we send our products into every country and among every people.

By American is meant, of course, the United States. The factors that settle transportation costs are: 1. Length of voyage. 2. Cost of running the ship; fuel, wages, stores, machinery, interest and depreciation.

But the freight rates are governed by: Demand and supply, market and return cargoes, in addition to the actual costs, plus what profit the traffic will stand.

The ability of the Englishman to ship his coal to every port of the world is due to two facts: He has the coal, owns the ships and can operate them cheaply.

Cost of Coal at Panama

The article states that the prices paid for coal by the Government have been fixed for two and a half years. This period began Apr. 1, 1912, and on the new contract, which is nearly due, it is very doubtful if the present price of $2.70, f.o.b. Hampton Roads, will be renewed, because of the higher level now prevailing.

Bids opened recently for supplying coal to the Navy were on a basis of $2.90, f.o.b. Hampton Roads. The ocean freight transportation to Panama is also likely to vary, as it has in the past; it is now $1.39½ and not $1.29½, as stated by Mr. MacCorkle. The following are the ocean freight rates paid in the last nine years:

1905	$1.44½	1910	$1.34½
1906	1.65	1911	1.29½
1907	1.52	1912	1.39½
1908	1.49	1913	1.39½
1909	1.40	1914 to Oct. 1	1.39½

This would make the present *cost* of coal, c.i.f. Panama, $4.09½, to which must be added, handling, interest, depreciation and profit, easily $1.50 more, or a total of $5.59½.

The present *prices* for coal at the Isthmus, as sold by the Panama R.R., are:

Colon	$5.75 alongside to U. S. Navy 5.27 @ 7.62 on railroad cars 8.62 on lighters alongside
Panama	$10.12 on lighter alongside.

Under this caption: "Welsh Coal at Port Said," the article states: "In 1912 the contract price for Welsh coal at Port Said was $6.33 per ton." This was not the price of Welsh coal, but of Durham unscreened bunkers, and today this is being quoted at $6.95, f.o.b., which is $2.04 above c.i.f. cost.

What "Welsh" Coal Is

The term "Welsh" coal is loosely used throughout this article and in many other similar discussions on British coals. In South Wales, alone there are 22 seams of workable thickness and the coal varies considerably, the steam fuels alone ranging from 11 to 29 per cent. volatile, so that to speak of Welsh coals lumped together and as of the same character, is about as inaccurate as to refer to the Pennsylvania fuels in the same way.

Moreover, the Durham unscreened bunker coal is largely supplanting Welsh bunker fuels for use at foreign steamship coaling stations. At the Canary Islands, for instance, in 1913, out of the 827,000 tons supplied steamships at Las Palmas, 427,000 tons were Welsh and 257,000 Durham coals, while at Algiers, 48 per cent. of the coal used was also Durham.

A typical analysis of this coal from an actual shipment is as follows:

Moisture	1.50	Ash	6.10
Volatile	30.13	Sulphur	0.92
Fixed carbon	62.27	B.t.u.	14,413

The present price for this coal, f.o.b. River Tyne ports, is $3.16.

The attitude of the British coal shippers is indicated by the following extract from an editorial in the *Iron and Coal Trades Review* (London).

Possible Changes in Trade

Beyond the bunkering business it is difficult to see how the opening of the Panama Canal will benefit the American or injure the British coal trade to any great extent. It will not alter our position with regard to the Atlantic States, to which the great bulk of our South American coal exports is shipped. The Pacific Coast of South America will certainly be more vulnerable to American attack, but our exports to those markets are not very large, and, moreover, British firms have secured an excellent footing there; on the confession of the accredited consular representatives of the United States in the countries in question, it will be difficult to shake ou hold on these markets.

It is easy, therefore, to exaggerate the consequences of th opening of the Panama Canal so far as our coal trade is con cerned, and we feel sure that British exporters having con nections with markets likely to be affected at all are full alive to possible dangers and are taking steps accordingly In his paper on the Panama Canal, read before the Britis Association, Professor Kirkaldy seemed to suggest that i might enable the United States to displace British coa throughout the world, and he urged both the capital an labor interested to forget internal causes of difference an to unite against the common enemy.

This certainly appears to be an entirely alarmist view o the situation. For some years past now our American friend have been paying more attention to their coal-shipping trad which, while still small as compared with our own, has in creased rapidly of late. It is certain that they are not likel to miss any fresh opportunities which the opening of th canal may afford them, but why this impending event, im portant as it is, should deliver a mortal blow to the Britis coal-shipping trade, we cannot conceive. It is better to b warned, however, even in exaggerated terms, than to remai over-confident when a wealthy and enterprising rival is i the field and it will be well to keep an eye upon the activitie of our American competitors.

(*To be Continued June 13*)

Coal Mining Active in New Mexico

The production of coal in New Mexico in 1913 wa 3,708,806 short tons, with a value at the mines of $5 401,260, according to E. W. Parker, of the United Stat Geological Survey, who compiled the figures in coöper tion with the State Geological Survey.

In 1913, as in 1912, New Mexico outstripped all pr vious records in the production of coal. The output i 1912 was 3,536,824 short tons, valued at $5,036,82 compared with which that of 1913 showed an increase 171,982 tons in quantity and of $364,209 in value. Th average price per ton in 1913 was $1.33. Colfax Coun in 1913 produced 2,749,765 short tons.

The number of men employed in the coal mines New Mexico increased from 3928 in 1912 to 4329 i 1913. The average production per man decreased fro 900 tons in 1912 to 857 tons in 1913. This decrea was not due to any falling off in efficiency, but was or of the minor effects of an appalling disaster which o curred at Mine No. 2 of the Stag Cañon Fuel Co., Dawson, in October, 1913. This accident, one of th most disastrous of the year in coal mining and the wor in the history of the state, caused the death of 261 pe sons. It occurred in one of the mines of a company whic had spared no expense and had taken every precautio human intelligence could suggest to reduce the hazar of coal-mining operations. The other fatalities reporte to the United States Bureau of Mines outside of the e plosion at Dawson were 11, making a total of 272.

BY THE WAY

A sack is best tied before it is full.

Religion is the best armor, but the worst cloak.

It is not enough to run; one must start in time.

The rock that resists a crow-bar gives way to the roo of a tender plant.

He that will not sail until he has a full, fair wind, wi lose many a voyage.

The Colorado Strike

SYNOPSIS—The strike is largely over in Colorado, but is in strong evidence still in Washington and New York, where a determined effort is being made to create sentiment adverse to the operators, so that the troops will be ordered to close the mines. Lieut. K. E. Linderfelt denies that he struck Tikas, and charges the residents of the armed camp at Ludlow with many crimes.

The settlement in Colorado does not rapidly approach a conclusion. The mines are working, but the men, who are seeking to replace the present workers, are still undispersed, and trouble may at any time arise if their belligerent attitude to the employees of the coal companies is not kept in check by a strong hand, and rumors are even afloat that the strikers have received and buried some machine guns.

The bill in the legislature providing for a bond issue was finally passed. Some of the legislators desired that there should be incorporated in it a provision requiring that no payment should be made to those who were subjected to the attack of the strikers at Ludlow or were at any time employed by the companies as mine guards. It appears, however, that in the end the legislature took the position that even granting unlawful acts were committeed by the militia in repulsing the attack of the strikers, the pay for lawful service could not be refused and that the state could not repudiate its obligations to any militiaman who was engaged by the properly constituted authorities. Nor is the legislature a court of law to decide either the guilt of the militiaman or the authority of its agents, especially without a hearing.

Any other conclusion would be a folly of which many of the present legislature would doubtless be capable, but if the proviso were added to the bill, it would inevitably make it hard for the state in the future to engage the services of a militia. In fact, it is likely that when that body is next called for service, none may respond, for the men who would serve are heartily sickened not of military service but of unmilitary partisan criticism and condemnation.

THE ANXIETY OF THE PRESIDENT

As has been already stated, the bill providing the $1,000,000 bond issue to pay the militia for past and future services was finally enacted.

It seemed doubtful whether Governor Ammons would be able to secure its passage and the President wrote to him urging the necessity for such provision as the troops could not be kept for a lengthy period at the scene of war. Governor Ammons assured the President that acts had been passed for closing saloons, prohibiting the carrying and transporting of arms, providing for a committee on mediation and authorizing the million-dollar bond issue. The United Mine Workers expect to contest the validity of this last provision.

The President's insistence aroused considerable excitement. The Women's Peace Association, through Mrs. Alma Lafferty, and also E. Keating, the Congressman-at-large made vehement protests against a return of the militia, causing Secretary of War Garrison to declare that there was no intention to withdraw the troops. Governor Ammons is said to have made the stupid promise not to send out the militia until its presence might seem imperative even if the federal troops should be withdrawn.

THE LUDLOW CAMP

The Secretary of War is permitting the reëstablishment of the Ludlow tent colony, and a detail of men have been preparing the site and removing rubbish. A ban has been placed forbidding any man to move into the colony who was not employed at one of the neighboring camps prior to the beginning of the strike. The military will check this information by means of the operators' pay-rolls, and it is hoped by this move to keep out sojourners and a large percentage of the rough element, who had no right to be in the colony and who were responsible, in a large measure, for much of the trouble which occurring, ultimately caused the destruction of the camp.

The position of the administration is difficult. The property rights of the United Mine Workers of America cannot be denied, and the colony, though used as a hostile camp, is not on its face a menace to public order and, therefore, not subject to seizure like a gun. Only one member of the Military Commission, the major and judge advocate of the military district, urged in his report of the Ludlow battle that the colony should not be rebuilt.

There were doubtless many men and women in Ludlow of reasonably peaceful disposition who were much incensed at the leaders who brought war upon them by firing on the militia and retreating on the camp. It was significant that these men who thus drew the fight into the heart of the camp turned a deaf ear to the women and children when the tents began to burn and consume the noncombatants.

A fund of $25,000 is said to have been raised for the rehabilitation of the Ludlow camp. The new colony will be built in almost the same location as the old.

JUDGE LINDSEY

Judge Ben B. Lindsey, of Children's Court fame, visited the President, May 21, accompanied by Mrs. Lee Champion, chairman of the relief committee, which investigated the conditions in the strike district for 20 days, Mrs. Adolph Germer, wife of a strike leader, Mrs. Petrucci, Mrs. M. H. Thomas and Mrs. Pearl Jolly, the three latter being widows of men killed in their attacks on the militia. Mr. Lindsey endeavored to have the President close the mines till the settlement between the idle miners and the companies was completed. Apparently he has not succeeded in modifying the President's decision.

Judge Lindsey's trip has been condemned both by the Real Estate Exchange and the Chamber of Commerce, both of Denver. The Colorado Woman's Law and Order League has sent its vice-president, Mrs. Helen M. Grenfell, to urge the President not to accept Judge Lindsey's views of the situation. She strongly defends the action of the militia. On the other hand, the Woman's Peace Association is sending a representative to offset the action of the Law and Order League.

Mrs. M. H. Thomas and Mrs. Jolly have delivered their story before several organizations in New York City, and the former, after declaring that she loaded the guns of the Ludlow disturbers of the peace, added that she did not know why she was arrested.

LINDERFELT'S TESTIMONY

Lieut. K. E. Linderfelt in his testimony in the trial of Major P. J. Hamrock stated that he did not strike Louis Tikas and could find no evidence of Tikas' head having been smashed in. He said he did not tell his men to shoot Tikas, Rubino and Fyler if they tried to escape, but he assumed they knew their duties under military law. He denied that any tents were fired deliberately and stated that "spread" bullets and those with "percussion caps" were found among the ammunition of the strikers. He said such bullets would "cut a man in two" and were manufactured for killing "elephants, tigers and big game." He declares that two men in a buggy carrying a white flag fired on the militia as they passed. He repeated his story about the rescue of the women and children.

The trial of Major Hamrock closed May 20, the accused himself being the last witness. There are 30 others to be tried The report will be forwarded to Gen. John Chase and later to Governor Ammons. Linderfelt's trial commenced on the 20th inst.

UNION RECOGNITION NOT WAIVED

The prospect of arbitration has received a body blow from William Green, of the United Mine Workers. He stated to the union miners of Illinois at Peoria, that he was misrepresented as having said that the organization was prepared to arbitrate even if the recognition of the union was waived. He agreed with the Illinois miners that this recognition was the purpose of the strike and could not be compromised.

So the statement of Martin D. Foster to John D. Rockefeller, Jr., that it was possible to arrange such arbitration was premature, based as it was on the alleged statement of William Green only and he denies that he made any such declaration.

DECIDING WITHOUT HEARING

Attempts toward conciliation are being made by a general committee from every county in Colorado to meet June 6 in Denver. The legislative investigating committee is also trying to make progress and has been promised the cooperation of the operators. It is seeking to settle the strike without investigation, a very frank procedure to be commended to other would-be arbitrators. If you are seeking only to divide hostile claims in half, why waste time by find-

ing out whether the claims are just. The members of the "investigating" committee refuse to state whether the operators are willing to arbitrate. It is understood, however, that they are only desirious of supplying them with the facts.

DISSATISFIED WITH FEDERAL INTERVENTION

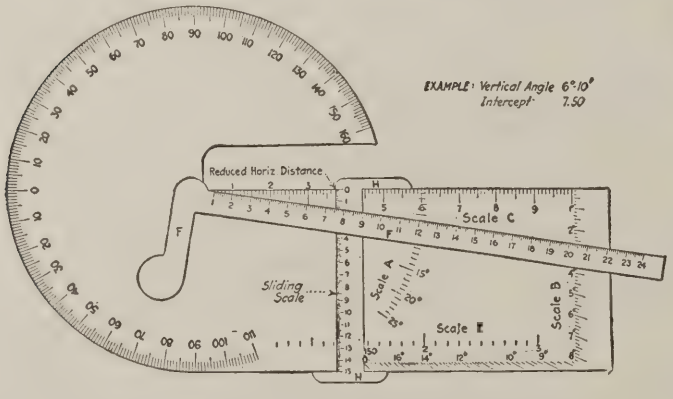
There are not a few signs that the action of the Army is losing popularity among the union officials. Speaking at Beethoven Hall, New York City, May 25, James Lord, the representative of the United Mine Workers of America in the American Federation of Labor said, according to the "New York Times:"

"We prayed to President Wilson for months in vain before he finally sent the troops. He dispatched them only when at last we were in a position to fight back. We do not know why he sent the troops, but if it was to drive us back to the old slavery, he won't be able to do it. If he tries or if he surrenders us to the militia, then it stands to reason that we will not again try to fight the hired gunmen of John D. Rockefeller. Instead we will go after the Rockefellers themselves.

A Rapid Stadia Plotting Apparatus

In the development of large tracts of land the preliminary work must be a good topographical map having all details and contour lines. For the preparation of such maps there is no method so rapid and convenient as the stadia survey by which the distance and elevation of any point can be ascertained by the reading of a vertical angle, and the space included between the horizontal wires of the instrument as seen projected on a level rod.

There has hitherto been delay in getting the desired results on the map, since the horizontal and vertical distances had to be obtained by calculation. The Averill



STADIAGRAPH INVENTED BY C. K. AVERILL FOR PLOTTING STADIA NOTES

stadiagraph overcomes this inconvenience and makes it possible to plot results as rapidly as the observations can be taken in the field. The instrument consists of a protractor turning on its center, and carrying a straightedge, also a revolving scale of the map, and a sliding scale showing elevations.

The operation is clearly shown in the illustration printed herewith. Some of the largest coal companies in the country have used this instrument, and their engineers are unanimous in their praise of its ability to accomplish what is claimed for it in reducing the cost and time of map-making in stadia work.

The apparatus is manufactured by C. K. Averill, Bridgeport, Conn.

American Mine Safety Association's Medals

Last year the American Mine Safety Association presented medals at Lexington, Ky., to the Wisconsin Steel Co.'s team, at Benham, Ky., and the Continental Coal Corporation's team of Pineville, Ky.; at Cresson, Penn., to the Pennsylvania Coal & Coke Co.'s team of Patton, Penn., and to the Hastings team of the same corporation; at Somerset, Penn., to the team of the Consolidation Coal Co., of Acosta, Penn.; at Oakford Park, Penn., to the Magee team of the Westmoreland Coal Co.; at Central City, Ky., to the Graham team of the W. G. Duncan Coal Co., and at Knoxville, Tenn., to the Briceville, Tenn., team of the Tennessee Coal Co., to the Westbourne, Tenn. team of the Westbourne Coal Co., and to the Mountain Ash, Ky. team of the Jellico Coal Mining Co., as well as a large number of prizes at its annual field meet in Pittsburgh, Penn.



MEDALS OF AMERICAN MINE SAFETY ASSOCIATION

The presentation of these medals has done a great deal to increase the interest in first-aid and mine-rescue work. There is no better way to increase that interest than by the award of medals by a national authority in the fairness of which all the contestants will have confidence.

The association gives (1) a first prize in bronze at any intercompany contest, (2) first and second prizes in silver and bronze at state-wide contests, and (3) first, second and third prizes in gold, silver and bronze at national contests. But in intercompany contests there must be not less than 5 teams representing 3 separate mining companies; in state-wide contests, 10 teams representative of the various mining districts in a state; and in national contests not less than 15 teams representing as many different mining companies from not less than 5 different states. A medal is given to each of the five members of each winning team.

Prof. W. H. McMillan in a lecture says the difficulties of deep mining can be placed under two heads: Mechanical and physical. The hoisting, owing to the strain on the rope, may have to be done in stages. Ventilation will have to receive serious consideration. Horses will probably have to be dispensed with and mechanical haulage sobstituted, while electric lamps will take the place of oil lamps. As the miner will be more subject to such diseases as pneumonia, bronchitis and anemia, baths and dress houses at the pit surface will be a necessity.

Editorials

The Purest of Human Pleasures

"God Almighty first planted a garden; and indeed it is the purest of human pleasures. It is the great refreshment to the spirits of man." Thus wrote Francis Bacon, three hundred years ago.

Three hundred years is quite a long time, and yet, in all that time, no one has given us a better description of a garden, nor one that is better calculated to start a man to digging in his own back yard. And so, now that springtime has arrived, we reprint it here, hoping that its message may have the desired effect, and that, forthwith, all our readers will go to gardening.

Many of the larger coal-mining companies have realized the advantage, to their employees, as well as to themselves, to be derived from private gardens and each spring they offer every possible encouragement to all who express any interest in such an undertaking.

In this connection, we have observed many interesting happenings. Superintendents, who, for selfish reasons alone, have offered prizes, to get their men interested in gardens, have unconsciously followed the progress of the gardens so carefully, that they soon were the best informed and most enthusiastic gardeners in their respective camps and, during the following years, have been known to enter the contests, of their own free will.

Pessimists who were "agin" the companies, tooth and toenail and consequently who disapproved the garden scheme, have been known to hanker after the vegetables in their neighbor's gardens later on, and eventually to have removed pickets in division fences and left suspicious trails winding about among the greens.

Getting in the Spotlight

The Colorado coal strike has afforded Judge Ben B. Lindsey, of Denver, a means to an end. His aim seems to be to secure publicity for Ben Lindsey rather than to obtain a solution of the labor troubles.

His method of approach smacked considerable of the plan pursued by a circus press agent. If he had hoped to be instrumental in aiding a settlement of the Colorado trouble, his interviews along his route of travel eastward were more than sufficient to render ineffective all his subsequent efforts.

One would expect dignity and logic rather than redfire and an appeal to class prejudice from a man holding an important judicial position such as is filled by Judge Lindsey. However, there is a greater lure to some men in a two-column headline on the front page than there is in maintaining a reputation for unbiased judgment in the face of mistaken public clamor.

Some of us are too prone to forget that other men have wives and children besides those few disaffected individuals who are always ready to lend an ear to foreign persuasion. Not a few Colorado women with babies have gone hungry and suffered because their husbands were prevented from working in satisfied employment by the violence and threats of a small majority of the miners in Colorado.

Sympathy to be helpful must be fair to all. We are, therefore, not surprised that the Law and Order League of Denver has started a petition for the recall of Judge Lindsey, for a man in his position must himself be a respecter of the law, if he is to administer it fairly.

The fight in Colorado is not a local affair, it is a national issue. The coal industry by chance rather than choice has become the battleground of a great social controversy. The questions are, can an employer exercise his own discretion in the selection or dismissal of his employees, or must he follow the bidding of his men? Must every man working at a trade become a member of the union, whether he wants to or not? In other words, must all industry in the United States be conducted on the closed-shop plan?

President Wilson and his administration are not dealing with the Colorado coal operators and miners alone, they are confronted with a great national labor issue, the solution of which is going to be a matter of vital importance to the conduct of all business in America.

Men like Judge Lindsey do not help things by stirring up class hatred at a time when all appeals should be based on a calm recognition of the absolute necessity of upholding the constitutional rights of both men and property.

An Application for a New Position

If at all times we only get what we deserve, then a lot of COAL AGE readers will never secure a new job through their written applications.

Three weeks ago the manager of a large coal corporation asked us to suggest a man for the position of mine superintendent, the job to pay $225 per month. We advised our friend to insert an advertisement in COAL AGE, as being the most likely way to get in touch with competent men. This was done and about 70 replies have already been received, and the inflow is undiminished. We now understand why recently a mine president wrote us saying: "Please stop ad, more than a hundred replies already."

But the interesting fact in the matter to us is the carelessness and lack of judgment exhibited by many of the applicants. Several men wrote brief notes, saying: "Please put me in touch with the parties." Two letters were not even signed, although one of the two was neatly typewritten. About one-third of the applicants failed to state their age or whether they were married; others made no mention of present employment and cited no references.

Now, is it likely when a hundred, or perhaps two hundred applications are before a manager or mine president, he is going to bother writing for further information if none is given in the man's original letter? The chances are he is going to pick out a half dozen, or maybe a dozen

of the most likely men and concentrate on them. His is a game of elimination, and the sooner he can get down to two or three possible candidates for the job, the better he will be pleased.

We have heard so much concerning brevity, conciseness, etc., we are apt to carry the idea to a ridiculous extreme. No one seeking an assistant or other subordinate wants to read all the details of the man's life; but he would like to know a few important facts concerning his age, education, experience, habits and present employment.

The Need of a Balanced Publicity

The situation in Colorado is of the utmost gravity because it shows on all sides the weakening of the elements of democracy, on which our national life is based. We are beginning to view the masses of the people with a decreased respect and the masses themselves are commencing to take a similar view.

No longer do they realize the importance of *their* part in maintaining the integrity of the national life. The prominent figures of society, the aristocracy if you will, are called upon to change discontent and a struggle into happiness and peace. A war arises in Colorado, obviously fanned by financial help from outside that state, admittedly subsidized by outside influences, and yet there is a call not to the many, but to the important outstanding figure, John D. Rockefeller, Jr. "What will *he* do about it?"

The cry of an enlightened democracy would be rather what *we*, the people, would do to still the artificially created discontent. A real democracy would not acknowledge supermen like Rockefeller from whom to demand a supernal virtue so self-sacrificing as to restore by concessions, a national trouble arising from intrigue.

Let us suppose Rockefeller saying of the strikers of Ludlow: "We will go after them. God being my witness, we will send them back to the hell from which they came." From end to end of the nation that statement would be printed. If the younger J. D. Rockefeller lived 30 years, it would still be quoted by the newspapers to his dishonor, as his body was borne to the grave. The word of shame would never die.

But James Lord, representative of the United Mine Workers of America, in the American Federation of Labor made that statement and can make it unrebuked *about Rockefeller*. No one regards it as deserving of the severest condemnation, for we have lost faith in the democracy. We now no longer expect anything better of it. It is useless any longer to condemn it for its follies, the false balance of its justice or its inhumanity. If anything is wrong, we look for a scapegoat and choose a prominent man, the moat in whose eye is the excuse for the beam in the eye of the people.

It is necessary that the democracy be reëstablished, that a renewed sense of personal responsibility be created and indeed it is time that the Rockefellers and others realized that we can no longer, with our large influxes of people, rely on the chances of our national life to illumine those who do not know our language or understand our spirit. There must be a strengthening of our schools, a deepening of our community and religious life and an attempt made to recreate social solidarity.

Political economy must no longer be taught only by the discontented youth of the country; the press must not depend solely on the pennies of the multitude. But a fairer economy and a nontechnical press which is frankly subsidized, but strictly honest, must be created. It must be confessed that this is a concession to our present undemocratic state, for a democracy should be self-educating, but it is obviously a necessity, if democracy is to be maintained.

Perhaps when the hordes of foreign workmen cease coming, demagogery may be at an end and an era of quiet, constructive effort may take its place. We may yet distinguish clearly between murder and a refusal to arbitrate, so that we will not pass over the recognized felony to visit with maledictions a fault of doubtful character, if fault it really be.

The coal companies may as well take warning now as later and endeavor to create better feeling, and a clearer understanding of the social issues. The democracy has in it the basis of good government, so long as it is not persistently mislead.

Do not let the operator forget that arguments made by him have their effect. Not even the wildest visionaries are wholly confident in the honesty of their leaders, yet they are swayed by their oratory. Similarly, much as the operator's logic may be doubted, there is little question that where it is truthful and honest, it will sink deeply into the minds of its hearers.

Because a few people laugh and sneer at the arguments of the operators and manufacturers, these latter usually resolve to say nothing whatever. But a moment's reflection will show that the diatribes of the socialist and labor leader are similarly treated, but they nevertheless sink home and do their work, sometimes helpful but more often pernicious. So will the arguments of the employers have their effect.

The operators, however, have always been ill-advised and have discussed public questions largely in their own organs and institutes. They must try to reach a wider field and do a broader work among the masses at large. Let them not be afraid to do it. It will not fall on unfruitful ground. The bulk of the American people, like the operators, are fair and may be relied on to give all sides an attentive hearing.

The time has come when real success means something more than the accumulation of money. Today we are commencing to applaud the man who does most for others, rather than the fellow who has made most for himself. Service rather than dollars is the new measure of manhood. The climate of America is becoming uncongenial for those who have fattened their purse by crushing ambition out of their employees. The big man of the future is to be the one who does most for mankind, not the one who takes most from mankind. Success will be a state of mind, not a state of pocket.

We have always believed that a little muckraking of corporations does no harm, because in the process we are raising up a high ideal, too high at present for ordinary mortals to reach, too exalted for Congress, but still very meet and right for big business to follow. Make the corporation toe a straight line; in time the "common people" in their private affairs and in their public concerns will try and learn the lessons of which they have been efficient teachers.

Who's Who in Coal Mining

John C. Reid

John Callum Reid is one of the influential personalities in Canadian coal mining. He is not a native of Canada, however, having been born at Sharon, Penn., in 1871.

Mr. Reid was educated as a mining engineer in the Missouri School of Mines at Rolla, Mo., and received the degree of E. M. from that institution in 1893.

His first experience in mining work was secured when he was mining engineer in the coal department of the M., K. & T. R.R. He served this corporation as an engineer from 1895 to 1900, when he was promoted to the position of mine superintendent in Oklahoma by the same concern.

In 1902, Mr. Reid severed his connection with the railroad company to become general superintendent of the Great Western Coal & Coke Co. and the Osage Coal & Mining Co., with headquarters at McAlester, Okla. In 1906 he became general manager of the Great Western and the Osage Coal companies. He continued in this position five years.

In 1911 Mr. Reid accepted a place as general manager of the Chinook Coal Co., Ltd., of Canada. He still holds that position with this corporation and has his headquarters at Lethbridge, Alberta.

He is an active figure in the councils of the coal-mine operators of Alberta Province, and is vice-president of the Western Coal Operators' Association. He is also a member of the Canadian Mining Institute.



JOHN C. REID

W. L. Moss

W. L. Moss, vice-president and general manager of the Continental Coal Corporation, Pineville, Ky., is a live wire of this progressive Kentucky corporation. He sure is a native of the sod and hasn't wandered very far from home, for he was born in Pineville, in September, 1883. The affection of Mr. Moss for his native state is reciprocated in kind, for he is one of the most popular of the younger men in this wonderful new field.

Mr. Moss received his education at Valparaiso University, graduating in 1902 as a Doctor of Pharmacy. On entering the coal business, he became secretary and general manager of the Straight Creek Coal Mining Co., and remained with this concern until it was consolidated with several other mining companies to form the Continental Coal Corporation, operating in Kentucky, but incorporated in Wyoming. Mr. Moss was later advanced to the position of vice-president and general manager of the Continental company and still retains that position. He is the retiring president of the Kentucky Mining Institute.

Among other positions, Mr. Moss is president of the Moss & Sons Coal Co.; president of the Straight Creek Fuel Co.; vice-president of the Moss Coal Mining Co.; director of the Wilhoit Coal Co., and director of the Pineville Building & Amusement Co.

Mr. Moss has served as mayor of the city of Pineville, and is a member of the Kokoals and Southern Appalachian Coal Operators' Association.



W. L. MOSS

Legal Department

Recent Decisions

By A. L. H. STREET*

Reformation of Contract on Ground of Mistake—In order to entitle a person to maintain a suit to reform the language of a written contract on the ground of mistake, there must be clear and satisfactory proof that a mistake has been actually made. (Kentucky Court of Appeals, Rockport Coal Co. vs. Carter, 163 Southwestern Reporter 734.)

Liability Concerning Vicious Mules—If a mine operator knows that a particular mule used in a mine is vicious and dangerous, he will be liable for any injury resulting from that cause to a miner who does not know the danger, notwithstanding any inherent unreliability of mules. (Kentucky Court of Appeals, Gatliff Coal Co. vs. Wright, 163 Southwestern Reporter 1110.)

Recovery of Taxes Unlawfully Assessed—"Taxes voluntarily paid or paid under protest cannot be recovered without some statute authorizing the recovery." The laws of Indiana require refund of taxes voluntarily paid under an erroneous assessment, if proof of such payment and of the improper assessment is made before the board of County Commissioners. (Indiana Supreme Court, Jackson Hill Coal & Coke Co. vs. Board of Commissioners of Sullivan County, 104 Northeastern Reporter, 497).

When Operator Is Not Liable for Falling Slate—At last here's a case where a coal-mining company has been declared not to have been responsible for injury to a miner, caused by falling slate: A miner cannot recover for injury sustained through a fall of slate at his place of work, if he knew the necessity for propping the roof, but failed to do so, although props were provided for his use. (Kentucky Court of Appeals, Branson vs. Clover Fork Coal Co., 164 Southwestern Reporter 304).

Warning Miners against Unsafe Roofs—When miners are directed by their boss to work at a certain place, they are entitled to assume that the place is safe in the absence of knowledge to the contrary. In a suit for injury to a miner caused by rock falling from a roof, it is no defense to show that the nature of the work contributed in some degree to the accident. But, if the place was reasonably safe, and the fall was caused merely by carrying on the work, the employer is not liable. (Kentucky Court of Appeals, Jellico Coal Mining Co. vs. Hilton, 163 Southwestern Reporter 744.)

Right to Rescind Purchase of Coal Lands—One who has contracted to purchase lands supposed to contain valuable beds of coal is entitled to rescind his agreement on discovering the falsity of willful or reckless misrepresentations as to the character of the land, made by representatives of the seller. Even though the owner did not authorize the perpetration of the fraud, he ratifies his representatives' acts in making the misrepresentations, by retaining payments made on the price by the purchaser. (Missouri Supreme Court, Morgan County Coal Co. vs. Halderman, 163 Southwestern Reporter 828.)

Instruments Which Must Be in Writing—An owner of land is not bound by a contract to sell it made by a third person as his agent, unless the agent's authority to make the contract was conferred by a writing signed by the owner, or unless the owner afterward signed an instrument ratifying the agreement. A receipt for a payment made on the purchase price of a tract of land is ineffectual as written evidence of the owner's contract to sell, if it does not describe the land nor disclose the parties to the agreement and the terms of sale. (Pennsylvania Supreme Court, Llewellyn vs. Sunnyside Coal Co., 89 Atlantic Reporter 575.)

Coal Not "Material" for Improvement—A seller of coal to be used by a State highway contractor in producing steam in road rollers and traction engines, utilized in performing a contract, is not entitled to the protection of the New York law, which gives a lien against funds in the hands of a contractor to secure payment for "materials" furnished him for the construction of a public improvement. (New York Court of Appeals, Shultz vs. C. H. Quereau Co., 104 Northeastern Reporter 621). In reaching this decision the New York Court cities similar holdings by the Massachusetts Supreme Judicial Court.

Safety of Mine Room Neck—Damages Recoverable for Personal Injury—A miner can recover against his employer for injury sustained through fall of rock from a room neck through which he was required to pass, if the employer failed to take reasonable precautions to make the place safe. Four thousand five hundred dollars is not excessive recovery for such an accident, it appearing that the injured miner is 43 years old and has previously earned from $50 to $70 fortnightly, that his leg was broken, his ankle badly crushed and he has been unable to work for more than two years. (St. Louis Court of Appeals, Gambino vs. Manufacturers' Coal & Coke Co., 164 Southwestern Reporter 264).

Damages for Breach of Mining Contract—Under a contract whereby a party undertakes to mine coal for agreed compensation, according to the quantity mined and the length of entries and breakthroughs driven, he is entitled to treat the contract as broken by the mine owner, and sue for damages for the breach, as well as for compensation due on showing that the owner refused to pay sums due or to permit further performance. The measure of damages for breach of such a contract is the difference between the cost of performing the contract and the agreed price. (West Virginia Supreme Court of Appeals, Bare vs. Victoria Coal & Coke Co., 80 Southeastern Reporter 940.)

Excessive Freight Charges as "Extortion"—Under the statutes of Kentucky, charging by a railway company of an unreasonably high freight rate on interstate shipments of coal constitutes extortion, and, on a finding of such extortion the State Railroad Commission is authorized to fix a reasonable rate. When the Commission finds that an existing rate is unreasonable, an aggrieved shipper need not prove actual damages, in order to be entitled to recover the difference between the rate charged and that fixed by the Commission as being reasonable. (Kentucky Court of Appeals, Illinois Central R.R. Co. vs. Paducah Brewing Co., 163 Southwestern Reporter 239.)

Effect of Wyoming Mine-Foreman Law—The Wyoming statute which provides for the inspection of coal mines by licensed foremen does not relieve operators of the duty of using a reasonable degree of care to provide a safe place of work for the miners. In entering upon employment, a miner assumes all risks of injury of which he knows or which he would discover by exercising ordinary prudence for his own safety. The burden of inspecting appliances and places of work may be placed on the employees using them. Thus an operator may impose on a machine runner the duty of assisting in cleaning up coal after a blast and in taking down loose coal near his place of work. (United States Circuit Court of Appeals, Eighth Circuit; Owl Creek Coal Co. v. Goleb; 210 Federal Reporter 209.)

Penalty for Refusing to Permit Survey of Mine—A statute in force in Indiana authorizes an owner of land adjoining a tract on which a coal mine is being operated, and his surveyors, to enter the mine to make surveys in order to determine whether coal is being removed from beneath his land, and prescribes a penalty for refusal of the owner, lessee or operator of the mine to permit such survey. Held: "Penal statutes are always strictly construed, and to enable appellant to recover the penalty sued for he must make it appear that the substantial provisions contained in the foregoing statute have been violated. That is, he would be required to show not only that he owned land coterminous with the land in the possession and control of appellee, either as owner, tenant, occupant, or agent, and that the coal mine sought to be surveyed was one that was open and being operated, such as is contemplated by the statute, but that some request had been made of appellee for a permit to enter his mine for the purpose of making such exploration, survey and measurements, and that such permission had been refused." (Indiana Appellate Court, Rowell vs. Snoddy, 104 Northeastern Reporter 104.)

*Attorney-at-law, 317 Commercial Bldg., St. Paul, Minn.

Discussion By Readers

Calorific Value and Volatility of Coal Dust as Affecting the Violence of Explosion

In connection with the question of the explosibility of anthracite dust, I note that a recent editorial writer takes exception to the statement in COAL AGE, Jan. 24, p. 172, which is as follows:

> The scientific conclusion, therefore, is that the violence of a dust explosion depends not on the volatility of the coal, but on the calorific value of the dust. If this is true, anthracite dust, though difficult to inflame, will ultimately produce an explosion as violent as those produced by high-grade bituminous coals.

The criticism of this statement speaks of it as a fallacy," basing the opinion on the recent experiments with anthracite dust at Bruceton. I want to say, that all that the Bruceton experiments show is that anthracite dust, under the conditions of the experiment did not ignite. There is no warrant for the categorical conclusion being drawn that such dust cannot be ignited and burned explosively under other conditions than those that existed in that experiment.

The writer of this criticism did not apparently analyze the statement in COAL AGE sufficiently, since he failed to recognize that the *inflammation of the dust* and the *violence of the explosion,* should one occur, are two different propositions. Anthracite dust may be difficult to inflame, which explains the fact that the anthracite mines have been free from true dust explosions in the past. But this fact and the fact of the difficulty of its inflammation cannot affect, in the slightest degree, the statement in COAL AGE, that "the violence of a dust explosion depends on the calorific value of the dust."

It is worthy of note, moreover, that this statement does not say that the violence of a dust explosion depends *wholly* or *alone* on the calorific value of the dust. The statement simply draws attention to the fact that the calorific value of the dust is an important factor in respect to the violence of the explosion, should one occur.

In this connection, it is worthy of note that the percentage of volatile matter present in Iowa coals is as great or greater than the percentage of volatile matter in the coals of Pennsylvania or West Virginia; but the calorific value of the Iowa coals, per pound of coal, is far less than that of the other coals mentioned. Now observe that while there have been many ignitions in the mines of Iowa, the violence of the explosion has invariably been less than that of similar explosions in Pennsylvania or West Virginia. This fact has an important bearing on the question of the relative importance of the *calorific value* and the *volatility* of coal dust, as affecting the *violence* of the explosion, should one occur.

In closing, I want to call attention to what may rightly be considered the essential factor in developing the full calorific value of any combustible substance, whether anthracite, bituminous coal, methane or other gas. The answer is obviously *the presence of available oxygen in sufficient quantity to produce complete combustion.* For example, a firedamp mixture (methane and air) develops its maximum violence in explosions when the proportion of gas to air is 1 : 9½, which is practically the proportion of gas and air required to produce complete combustion.

Anthracite dust under ordinary mining conditions has not proved to be explosive, and, in my judgment, under ordinary mining conditions, it cannot be exploded. But that is not to say that it *may* not be exploded under conditions of heat and air supply favorable for its combustion. It has been rightly stated that the magnitude of a dust explosion depends on the air supply. I believe it is this fact that limits the extent and violence of many mine explosions, because the air supply is limited by virtue of the environment.

The fact is well known that it requires more air to burn the same amount and grade of anthracite than to burn a like amount of bituminous coal. Then, if the air supply is generally insufficient to support the explosive combustion of dust in a bituminous mine, it will be still less sufficient for an explosion of dust in an anthracite mine. Again, inasmuch as anthracite dust is nonflaming, it may be assumed that the dust cloud must be of greater density than that required in the case of bituminous dust, in order to produce the same explosive effect. To burn this comparatively dense cloud of anthracite dust would require an unusually hot and lasting flame and an oxygen supply far above what can be obtained in any mine, under ordinary conditions.

JOHN VERNER,
Former State Mine Inspector.

Chariton, Iowa.

Weak Links in Coal Mining

Letter No. 1—I was interested in reading the article on this subject, COAL AGE, May 9, p. 756, as it calls to mind another weak link in the operation of coal mines that the writer has failed to mention. I refer to the misuse and reckless handling of mine motors by motormen in the mines. Motormen, as a class, like mule drivers, are a fearless and often reckless type of men. The spirit that mostly animates these fellows often leads them to a misuse of the electrical power and unduly overloads the motor, especially in starting a heavy trip when great caution should be used. In making the run to the shaft bottom, they often exceed the speed limit, causing cars to jump the track and even endangering their own lives by taking a sharp curve too fast or when passing a known piece of bad track.

The mine electric locomotive, unlike a railway engine, has a low center of gravity, which gives the motorman greater confidence, and he takes the curve at too high a speed, forgetting that the great strain thrown on the rails may cause them to spread and derail the trip.

The greatest trouble, however, arises from the tendency of motormen to use little or no caution in starting a trip of loaded cars. A careful man will sand the rail before

taking the slack out of his train. This puts the motor on a sanded rail before the full load is started and enables the motorman, by working the controller, to operate the locomotive to the best advantage, giving the motor more or less current according as the wheels hold the rail or slip.

Too often, a careless motorman will turn on the full current before slack is taken in the attempt to jerk the slack out of the train, which he believes will start the load better. Having started the load in this manner, he will often sit quiet and control the speed of the train by use of the motor brakes. If the wheels slip, he applies the motor brake to overcome the difficulty, instead of regulating the current, loosening them again to gain speed.

It seems hard to accuse competent men of such practice, but too often I have witnessed the trick while hidden from sight in the gob. I have frequently surprised a motorman in the act.

Many mines using electric haulage are troubled with excessive repair bills when there is no apparent reason for the breakage of axles, wheel flanges and other parts. The reason for these unnecessary breakages would often be discovered if the person in charge would make frequent trips of inspection in the mine, at times when he is not expected to be there. If a broken axle shows no flaw in the fracture and there is no defect visible in its mounting, the trouble is either due to an unwarranted strain caused by such practices as I have mentioned, or, which is possible, there may be too much lateral motion across the track, which causes the motor frame to bump hard against the hub of the wheel, producing, finally, "fatigue" or crystallization in the metal. In mining practice, the wear and tear on the locomotive, due to this cause, are apt to be great, under the best conditions, owing to frequent change in the level of the track, which causes the locomotive to swing from side to side with great frequency. Such a side swing, at a high speed, results in a solid, heavy hammer-blow on the axle. Where there is much end-play in the journal, collars or washers should be used to take up this play. I have seen several cases where the journal box was worn clear through next to the wheel hub and allowed the oil to ooze out of the bearing. The same cause results in broken wheel flanges also.

ASSISTANT SUPERINTENDENT.

————, Ala.

Double-Neck Rooms

A recent reference in COAL AGE calls to mind a good practice that I observed in the Alabama coal field, about a year ago, which I desire to commend.

The coal seam, in the mine in question, was about four feet in thickness and dipped at an angle of about 8 or 10 deg. with the horizontal. The rooms were turned straight up the pitch and driven with a width of about forty feet. Each room had two necks or openings, with a pillar stump between them. The waste resulting from the partings or clay seams, which occurred in the coal, was used to build a solid wall along each roadway. The entire space between the two roadways, from floor to roof, was filled with the waste of the seam, extending from the entry stump at the mouth of the room, to within about 5 ft. of the face.

A canvas sheet was hung across the entry between the two room-necks; and the air current thus carried up to the face of the room swept the gas away as fast as it was generated. By this method, all the dirt was stored in the mine, where it belonged, and was not hauled to the surface, which saved a considerable expense. Moreover the method served to aid the ventilation of the rooms. This system could be used to great advantage in other coal seams that present like conditions. It has the advantage of being automatic, and with proper attention from the mine foreman and fireboss, no accumulation of gas can occur in the rooms.

J. J. RUTLEDGE.

McAlester, Okla.

The Mine Foreman

Letter No. 7—The discussion, in COAL AGE, of the somewhat anomalous position of the mine foreman in the coal-mining industry has been interesting. The question is one of such vital importance to all mine foremen that it should receive serious consideration. It is to be hoped that, by thus drawing attention to certain prevailing features, this discussion may be the means of improving conditions and giving to honest mine foremen a greater degree of prestige, security and justice than is accorded them under the present system and statutory laws.

It is quite generally acknowledged that the mine foreman today occupies an onerous position. In most cases, he is held to a strict accounting by three masters—the state law, his employers and the miners, for whose safety he is responsible. Let us consider each of these in order.

First. In most coal-mining states the mine foreman is held legally responsible for the safe operation of the mine in compliance with the requirements of the mining law. In some cases, these requirements place him in a very difficult situation. For example, the bituminous mining law of Pennsylvania (Art. 4) reads as follows:

> The mine foreman shall have full charge of all the inside workings and of the persons employed therein, in order that all of the provisions of this act, so far as they relate to his duties, shall be complied with and the regulations prescribed for each class of workmen under his charge carried out in the strictest manner possible. * * *
>
> When the mine workings become so extensive that the mine foreman is unable personally to carry out the requirements of this act pertaining to his duties, he shall have the right to employ a sufficient number of competent persons to act as his assistants, who shall act under his instructions in carrying out the provisions of this act. * * *
>
> The mine foreman shall notify the superintendent in writing, whenever, in his opinion, the mine is becoming dangerous through the lack of ample ventilation * * * or from any other cause, etc.

The foreman is further required to remove all dangers found or reported to him as existing in the mine, or withdraw the men working therein. Consider the dilemma the mine foreman must face when his reports do not meet with the approval of the superintendent. As foreman, he is liable to prosecution by the state inspector, for a violation of the law, if he fails to see that all its requirements are fulfilled. As was remarked incidentally by a state mining official, at the time of the Harwick mine disaster, Jan. 25, 1904, "the foreman is certainly between the devil and deep sea."

The question may well be asked: Can a mine foreman be conscientious and, at the same time, be assured of his position, under these conditions? Any prevarication

will render him liable to prosecution, in the event of serious consequences. On the other hand, the law provides no redress for loss of position through the faithful performance of his obligation to the state; it considers no extenuating circumstances as an excuse for any violation of its mandates. The mine foreman may have used every moral suasion in his power to secure compliance of the company who employs him, with the requirements of the law; but the law takes no cognizance of such fact. It holds the unfortunate foreman legally responsible for any nonconformity to legal requirements in the operation of the mine in his charge.

Second. By his employer, the mine foreman is regarded in the light of a "coal-getter." He is held responsible by him for the daily output of coal and the cost of its production. On this basis, it would naturally be supposed that the foreman's practical knowledge would be worthy of the first consideration; but how often are his suggestions and requests set aside, in respect to even minor details dictated by his more intimate acquaintance with the actual practical need.

The superintendent's eye is ever on the cost sheet, and while this is a very important item and is indisputably his province and duty, it often transpires that a too prolific use of the pruning knife may prove unwise economy. But the mine foreman is still required to produce the goods and, in many cases, it is not only a case of "making bricks without straw," but the hands of the foreman are practically tied by other curtailments that render him virtually helpless. Of course, the foreman "need not submit to these conditions"; he is at liberty to quit, but how often is he in a position to do so?

Third. In respect to the third master—the miner—little need be said, as the relations between the foreman and his men are too well known to need further comment.

In closing, I would ask: Is it justice to make the mine foreman responsible for affairs over which he has no control, except by jeopardizing the position he holds? A solution to this question (which justice to a large class of faithful, conscientious foremen demands) might be found, as was suggested in COAL AGE some time ago (Vol. 1, pp. 190 and 717), in reference to the fireboss, by making the mine foreman a state official. Under present conditions, the mine foreman has neither social standing nor professional prestige. In some respects, he is debarred from full association with the miners whom he employs, while his rank seldom insures recognition by his superiors. The situation certainly needs to be carefully studied, with a view to improving present conditions.

I. C. PARFITT.

Jerome, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Example—An air current of 60,000 cu.ft. per min. is passing in an airway 8x10 ft. in section, to a point 1500 ft. distant from the foot of the downcast shaft, where it divides naturally between the following four airways or splits:

Split A, 5 × 6 *ft.*, 900 *ft. long*
Split B, 6 × 6 *ft.*, 825 *ft. long*
Split C, 4 × 6 *ft.*, 840 *ft. long*
Split D, 4 × 5 *ft.*, 720 *ft. long*

What is the quantity of air passing in each split; and what will be the water-gage reading for the entire mine and power on the air, at the foot of the downcast shaft?

Solution—Since the water gage is required in this case, the relative potential values cannot be used; but, instead, the part potential value (omitting k) is found for the main airway and for each split separately; thus, taking the length of the main airway including the return as 2 × 1500 = 3000 ft.:

Main airway, $a = 80;\ o = 36;\ l = 3000;\ X_1 = 80\sqrt{\frac{80}{3000 \times 36}} = 2.177$

Split A, $a = 30;\ o = 22;\ l = 900;\ X_a = 30\sqrt{\frac{30}{900 \times 22}} = 1.168$

Split B, $a = 36;\ o = 24;\ l = 825;\ X_b = 36\sqrt{\frac{36}{825 \times 24}} = 1.531$

Split C, $a = 24;\ o = 20;\ l = 840;\ X_c = 24\sqrt{\frac{24}{840 \times 20}} = 0.907$

Split D, $a = 20;\ o = 18;\ l = 720;\ X_d = 20\sqrt{\frac{20}{720 \times 18}} = 0.786$

The general split potential (X_{∞}) is equal to the sum of the potentials for the four splits; thus,

$$X_{\infty} = \Sigma X_{abcd} = 4.392$$

The quantity of air that will pass in each of these splits is proportional to the corresponding split potential, assuming that no regulators are employed but all the airways are free and unobstructed. The natural division of the air between the four splits is therefore calculated in the usual manner, as follows:

Split A, $q_a = 60{,}000\frac{1.168}{4.392} = 15{,}950$ *cu.ft. per min.*

Split B, $q_b = 60{,}000\frac{1.531}{4.392} = 20{,}920$ *cu.ft. per min.*

Split C, $q_c = 60{,}000\frac{0.907}{4.392} = 12{,}390$ *cu.ft. per min.*

Split D, $q_d = 60{,}000\frac{0.786}{4.392} = 10{,}740$ *cu.ft. per min.*

Total circulation, 60,000 *cu.ft. per min.*

The Coal Age Pocket Book

In order to find the water-gage reading at the foot of the downcast shaft, for this circulation, it is necessary to calculate the general mine potential X_0 by combining, in tandem, the main-airway potential (X_1) and the general split potential (X_{∞}) previously found, using the formula

Mine water gage, $w.g. = \frac{kQ^2}{5.2}\Sigma\left(\frac{1}{X^2_p}\right)$

Substituting the values previously found,

Main airway, $\frac{1}{X^2_1} = \frac{1}{2.177^2} = 0.2109$

Split section, $\frac{1}{X^2_{\infty}} = \frac{1}{4.392^2} = 0.0518$

Sum of values, $\Sigma\,(1/X^2_p)$ 0.2627

Finally, substituting this value in the above formula for finding the mine water gage,

$$w.g. = \frac{0.00000002 \times 60{,}000^2 \times 0.2627}{5.2} = 3.64\ in.$$

In like manner, the power on the air, at the foot of the shaft is calculated by the formula

Power on the air, $H = \frac{kQ^3}{33{,}000}\Sigma\left(\frac{1}{X^2_p}\right) = \frac{0.00000002 \times 60{,}000^3 \times 0.2627}{33{,}000} = 34.39\ hp.$

Increase of Quantity Due to Splitting—The quantity of air in circulation is proportional to the general mine potential or, in other words, the quantity is always equal to the mine-potential ratio; the power potential being used for a constant power, and the pressure potential for a constant pressure; always remembering, however, that the cube of the power potential is equal to the square of the pressure potential. Denoting the original quantity of air in circulation, by Q_1 and the original mine potentials for power and pressure by Xu_1 and Xp_1, respectively; and designating these factors after splitting, by Q_2, Xu_2 and Xp_2, respectively, gives the following formulas:

Power constant, $Q_2 = Q_1\frac{X_{u2}}{X_{u1}};\ \text{or}\ Q_2 = Q_1\sqrt[3]{\left(\frac{X_{p2}}{X_{p1}}\right)^2}$

Pressure constant, $Q_2 = Q_1\frac{X_{p2}}{X_{p1}};\ \text{or}\ Q_2 = Q_1\sqrt{\left(\frac{X_{u2}}{X_{u1}}\right)^3}$

An illustration of the use of these formulas is to be found in the solution of the first example under Secondary Splitting, on a previous page. In that example, the power remained constant before and after splitting the current. The pressure potential was used, which before splitting was $Xp_1 = 0.6708$, and after splitting, $Xp_2 = 0.8554$:

Hence, $Q_2 = Q_1\sqrt[3]{\left(\frac{X_{p2}}{X_{p1}}\right)^2} = 120{,}000\sqrt[3]{\left(\frac{0.8554}{0.6708}\right)^2} = 141{,}100$ *cu.ft. per min.*

Inquiries of General Interest

Study Question--Ventilation

The following question, which appeared in one of the recent examinations in British Columbia, has excited a great deal of interest. We have been studying the question carefully and would very much appreciate an answer in COAL AGE. The question assumes that, with a constant power, the circulation is to be increased by dividing the air into three separate currents. It is as follows:

Suppose that a given power circulates 75,000 cu.ft. of air per minute through a certain airway, in a continuous current; and it is decided to divide the air into three splits as follows:

Split A, 6×6 ft., 5000 ft. long;
Split B, 5×6 ft., 4500 ft. long;
Split C, 6×7 ft., 4000 ft. long.

Calculate the quantity of air that will pass in each split, assuming that the power on the air remains unchanged.

DAVID MURRAY.

Blairmore, Alta., Canada.

The first step in the solution of this question is to find the power that will circulate 75,000 cu.ft. of air per minute in the given airways, in a continuous current or a "tandem" circulation.

The area (a), perimeter (o) and length (l) of these three airways or sections are, respectively,;

Split A, $a = 36$; $o = 24$; $l = 5000$;
Split B, $a = 30$; $o = 22$; $l = 4500$;
Split C, $a = 42$; $o = 26$; $l = 4000$.

The part potential values of the airways are then found as follows:

Split A,

$$X_{p_1} = 36\sqrt{\frac{36}{5000 \times 24}} = 36\sqrt{0.000300} = 0.6235$$

Split B,

$$X_{p_2} = 30\sqrt{\frac{30}{4500 \times 22}} = 30\sqrt{0.000303} = 0.5222$$

Split C,

$$X_{p_3} = 42\sqrt{\frac{42}{4000 \times 26}} = 42\sqrt{0.000404} = 0.8440$$

Sum of part potentials, ΣX_p 1.9897

Setting aside this value of the sum of the part potentials for use, later, in the calculation of the split circulation, we next find the reciprocal of the squares of each of the above potential values and take their sum for the calculation of the power in the tandem circulation. Thus,

$$1/X^2p_1 = 1/0.6235^2 = 2.5721$$
$$1/X^2p_2 = 1/0.5222^2 = 3.6668$$
$$1/X^2p_3 = 1/0.8440^2 = 1.4037$$

Sum of tandem values, $\Sigma\,(1/Xp^2)$ 7.6426

The general formulas for calculating the power on the air from the mine-pressure potential, for tandem and split circulations, respectively, are as follows:

Tandem circulation, $U = kQ_1^3\,\Sigma\left(\frac{1}{Xp^2}\right)$

Split circulation, $U = kQ_2^3\left(\frac{1}{\Sigma Xp}\right)^2$

The power on the air can, now, be calculated by substituting the necessary potential values in the first of these two formulas; and, then, by substituting this result for U, in the second formula, the total quantity of air in circulation in the splits can be calculated. The distribution of this total quantity between the three splits can then be calculated in the usual manner.

Much time and labor in calculation, however, is saved by equating the two equations given above, which is possible because the power on the air remains constant. Doing this and then canceling the common factors and solving with respect to Q_2 gives, for finding the total quantity of air circulated by the same power, in the splits, the following formula:

$$Q_2 = Q_1\sqrt[3]{(\Sigma Xp)^2\,\Sigma\,(1/Xp^2)}$$

The total quantity of air circulating in the splits, as found by this formula, is then,

$$Q_2 = 75{,}000\sqrt[3]{1.9897^2 \times 7.6426} = 233{,}710\ cu.ft.\ per\ min.$$

The distribution of this air between the three splits can then be calculated in the usual manner. A shorter method still, however, is to calculate the quantity of air passing in each of the several splits directly, by use of the following formula:

$$q_1 = Xp_1 Q_1\sqrt[3]{\Sigma\,(1/Xp^2) \div \Sigma Xp}$$

For example, substituting, in turn, the respective potential values, previously found, and making $Q = 75{,}000$, the quantity of air passing in each of the three given splits, under a constant power, is as follows:

Split A,

$$q_1 = 0.6235 \times 75{,}000\sqrt[3]{\frac{7.6426}{1.9897}} = 73{,}240\ cu.ft.\ per\ min.$$

Split B,

$$q_2 = 0.5222 \times 75{,}000\sqrt[3]{\frac{7.6426}{1.9897}} = 61{,}340\ cu.ft.\ per\ min.$$

Split C,

$$q_3 = 0.8440 \times 75{,}000\sqrt[3]{\frac{7.6426}{1.9897}} = 99{,}130\ cu.ft.\ per\ min.$$

Total circulation, 233,710 cu.ft. per min.

This is an extremely difficult question for an examination question, because the method of its solution is not generally understood. Many students of mine ventilation, will, no doubt, prefer to work this example by the customary long and tedious process of calculating the power on the air in the first circulation, using the coefficient of friction $k = 0.00000002$; and then, by the use of the same coefficient, find what quantity of air the same power will circulate in the splits. The last two formulas eliminate k and shorten the solution.

Examination Questions

Pennsylvania Bituminous Mine Foremen's Examination, May 5 and 6, 1914

(Continued from last issue)

Ques. 7—(a) What is a permissible explosive? (b) What conditions make their use necessary in a mine? (c) What charge limit has been established by the U. S. Bureau of Mines, for such explosives?

Ans.—(a) Miners' Circular No. 6, of the Federal Bureau of Mines, p. 8, defines a permissible explosive as one that is in all respects similar to the sample that passed certain tests made by the U. S. Bureau of Mines, and when used in accordance with the conditions prescribed by that bureau.

(b) The presence of gas in sufficient quantity to be detected on an ordinary safety lamp, in a dry and dusty mine, makes the use of a permissible explosive advisable, if not absolutely necessary to avoid the danger of an explosion being produced by the flame of black powder so commonly used for blasting coal.

(c) The charge limit for a permissible explosive, as stated in the fourth condition of its use, on p. 9, of Miners' Circular No. 6, is 1½ lb. (680 grams); and this must be properly tamped with clay or other noncombustible stemming.

Ques. 8—What are the legal requirements as to cut-throughs in rooms, and what supplies should be kept at the face of working places?

Ans.—Art. 9, Sec. 3, of the bituminous (Penn.) mine law, requires that cut-throughs shall be made in all room pillars, at such distances apart as the judgment of the inspector may deem requisite, not more than 35 nor less than 16 yd., for the purpose of ventilation. The law provides that every miner shall order all the props, cap-pieces and other timbers required to keep his place in safe condition, at least one day in advance. It is important to keep a good supply of such timbers and cap-pieces constantly on hand, ready for use when required.

Ques. 9—What provision should be made for safety on haulage roads, and what appliances should be used in connection with the different mechanical systems of haulage, including the hoisting equipment?

Ans.—The bituminous (Penn.) mine law, Art. 4, Sec. 8, provides that all entries hereafter driven shall have a clear space of 2½ ft. between the side of the car and the rib of the entry, continued throughout on one side of the entry, provided the roof will permit such a width. On other haulage roads, the law requires that shelter holes 2½ ft. deep and 4 ft. wide shall be cut in the rib on one side of the entry, at distances apart not exceeding 30 yd., where animal haulage is employed, and not exceeding 15 yd. where the hauling is performed by machinery. Such shelter holes must be kept whitewashed and free of all obstruction. They are not required on entries where rooms are turned off on one side of the road, at intervals not greater than the distances mentioned in the law.

Art. 3, Sec. 6, provides that a safety catch, or other safety device, be attached to the rear end of the rear car of full trips that are to be hoisted up slopes; also, that suitable signals be placed on the rear end of the rear car of all trips hauled in the mine by locomotives of any kind. Art. 6, Sec. 4, provides that where the main intake airway is used for mechanical haulage, a separate traveling way shall be provided or the employees shall be hauled in and out of the mine at the beginning and end of each shift.

Art. 6 provides for stairways on an angle not to exceed 45 deg. and equipped with handrails, in all shafts less than 100 ft. in depth. Art. 7 provides for the lowering and hoisting of employees by means of machinery, in shafts exceeding 100 ft. in depth, except where the second opening is a drift or slope. In such mines, if the second opening is a shaft, the same must be provided with a stairway, as described in Sec. 6. Sec. 8 provides that employees shall be lowered and hoisted from the mine, at the beginning and end of each shift, at a speed not to exceed 6 miles per hour, in all slopes exceeding 15 deg. inclination and 1000 ft. in length. The same provision is made for slopes whose average inclination is from 5 to 15 deg. when the length exceeds 3000 ft., except where a separate traveling way is provided, when the hoisting of employees is optional, provided the angle of inclination does not exceed 20 deg.

Art. 8 provides for the installment of suitable signal apparatus and communication by speaking tube or by telephone, between the top and the bottom of every shaft or slope where persons or material are lowered or hoisted. It is also provided that every cage for lowering or hoisting men shall be equipped with handrails at the sides or overhead, and with chain, bar or gate at ends of cage, and a sufficient covering overhead to protect persons thereon; also, safety catches to be tested every two months, and a record of each test sent to the inspector and recorded in ink in a book at the office.

The hoisting rope shall be attached securely to the sides of the winding drum, which must be provided with flanges having a clearance of not less than 4 in. after all the rope is wound on the drum. An adequate brake must be attached to each drum and an indicator provided to show position of cage in shaft; also, an efficient safety device to prevent overwinding. All shafts shall be provided with safety gates at the top and intermediate landings.

Secs. 2 and 3 provide for the strength of coupling chains, bridle chains, ropes and links required in the hoisting equipment. All machinery (Sec. 4) must be properly fenced with a suitable guardrail. The number of persons that may be hoisted (Sec. 5) at one time shall be determined by the mine inspector and posted in a conspicuous place; the speed of hoisting not to exceed 900 ft. per min. Art. 4, Sec. 21, provides for the use of safety blocks, safety switches, drop logs or other device, at the top of all slopes and shafts, to prevent cars from running into the opening.

Coal and Coke News

Washington, D. C.

As a result of the constant agitation during the past two or three sessions of Congress for the establishment of mining experiment and mine safety stations practically identical bills providing for the creation of a number of such stations have been reported to the Senate and House by the mining committees of those bodies.

It is believed that the bill will be adopted before the expiration of the present Congress. Under its terms there would be 10 mining-experiment stations in public-land states and 15 safety stations on the rescue cars designed to carry out the educational work of the Bureau of Mines with reference to accident prevention, as well as to afford facilities for the actual relief of those suffering from mine accidents. In addition the provision is made for the operation of the 8 mine-rescue cars now in commission, upon a new basis.

The committee in making its report to the House says that the bill has been prepared with considerable care and that it is not based upon the plans or wishes of any one person or organization, but has been drawn up as the result of a series of conferences among mine owners, operators, miners, engineers and surgeons from different parts of the country.

Conditions showing the need for this legislation are stated and much is made of the reduction in the number of men employed in the different metal-mining industries in the public-land states. The average number of employees, it is pointed out in the metal-mining and metallurgical industries in Colorado, for instance, for the four-year period 1900-1903 was 36,189. In the period 1908-1911 this number was reduced to 22,560.

In the opinion of the committee something is the matter with mine development, and it says in its report:

Among the causes of this lagging behind of mine development are the following: (a) The exhaustion now under way of the more easily discovered and richer ore deposits and the fact that other similar deposits are not now being discovered to such an extent as to replace those now being worked as they become exhausted; (b) the absence of known methods through the use of which many existing low-grade ore deposits can be profitably worked; (c) the wasteful methods now followed in many of the mining and metallurgical operations, which, while in many cases still bring temporary profits to mine operators, are reducing the national wealth in a manner which can be remedied only by the discovery and use of more efficient methods of treatment.

No one likes to estimate the money value of a human life, but at times it becomes necessary to do this, especially in working out the economics of compensation acts. It is a reasonable estimate that during the past 10 years more than 30,000 men have been killed and more than 100,000 seriously injured in connection with the accidents in the mining industries of this country.

It is impossible to estimate the number who have suffered from unhealthful conditions in many metal-mining, tunneling, quarrying, metallurgical and other mineral-industry plants. It is impossible to estimate the number of men with health shattered through these conditions who have had to give up their work years before their natural time or the number of dependents who have suffered thereby.

If it be assumed that each human life is valued at $3000, it will be seen that the deaths alone in the mines have cost in 10 years $90,000,000.

If each of the 100,000 seriously injured lost 20 days at $3 per day, a reasonable assumption, this represents $6,000,000 lost from this cause.

It is important from both the humanitarian and economic standpoints that the investigations by the national Government with a view to better safeguarding the lives of the men connected with the more hazardous branches of the mining industry should be conducted as thoroughly and as rapidly as the work can be done effectively, in order that improvements may be inaugurated without delay and to the fullest possible extent.

It is equally important that after the inquiries and investigations have been coducted and reasonable conclusions formed that information should be disseminated promptly and effectively among the miners and those who manage the mines.

The Leasing System in Alaska

Complying with a Senate resolution, a document relating to the leasing of coal lands in foreign countries by T. P. McDonald has been published by the Government Printing Office. This document reviews the situation of the purchase system for coal lands in the United States and the experience in leasing coal lands here and abroad. The general tenor of the document is in favor of leasing and at the close the following statement is made:

The history of the coal-mining industry in all these countries operating exclusively under the leasing system proves that the investment of the coal-mine operator is far safer than under our system of a wide distribution of ownership and the keen competition that is inevitable under our present laws.

The title to the coal land being vested in the Government, it is thereby able to prevent overdevelopment and overproduction, which overproduction in turn produces destructive competition. Under this system the Government will only lease sufficient coal land to supply the existing market and provide for its effective extension and will be able to protect the coal operator against destructive competition. Under such a law, there is no question but the capital to develop Alaska coal lands will be available.

The experience of the coal producers in our great bituminous fields for the past 20 years demonstrates the necessity of some power to prevent the destructive competition that has so demoralized coal-mining investments during that time. In Australia, New Zealand and Nova Scotia the price of coal at the pit mouth during the past 20 years has ranged from $1.75 to $2.25 per ton, while in our great bituminous districts the price of coal at pit mouth has ranged from 90c. to $1.11 per ton. We are exhausting our great fields of high-grade fuel at almost actual cost of production.

Here are the figures taken from the report of the United States Geological Survey for 1911, for the states mentioned, showing the tonnage and selling price at mine:

States	Tons	Price At Mine
Illinois	53,679,118	$1.11
Indiana	14,201,355	1.08
Pennsylvania	144,754,163	1.01
Ohio	30,759,986	1.03
West Virginia	59,531,580	0.90

These figures illustrate the evil inherent in a wide distribution of ownership of coal lands. It results in such keen competition that the profits of the operator are reduced to the minimum, and where mining conditions are at all adverse are often extinguished.

The leasing system for Alaska, to encourage the development of the coal-mining industry, should provide that the coal producers may combine to fix a reasonable selling price for their coal. Possibly it should provide that such agreed price should, after a proper showing, be approved by the Alaska Development Board. Certainly some provision should be made to protect the investor from ruinous competition, either by permitting a selling price to be fixed by mutual agreement between the operators, as is done in other countries operating under lease, or the Government should protect the operator by limiting the number of leases in any particular field, so that a market may be assured for a reasonable tonnage. Some inducement must be extended to the operator with capital to justify him in developing those coal fields.

HARRISBURG, PENN.

The Supreme Court on May 23, in an opinion handed down by Justice Elkins, affirmed the Luzerne County Court in the 1913 assessment made by the Board of County Assessors which was attacked by the Delaware, Lackawanna & Western R.R. Co. The lower court held that equity had no jurisdiction and that the question of valuation should come up on appeal. An appeal is now pending in the lower court, which will have to be disposed of before the valuation question is finally settled.

The attack upon the assessment was brought by the Lackawanna company against the Luzerne County Board of Assessors, Plymouth Township. Had the court held that equity had jurisdiction, the question would tie up the taxes in all municipalities of the county.

The company objected to paying a special tax levied in Plymouth Township, claiming that the assessment was illegally made. The attack of the coal company was not merely to evade paying the tax in the township, but to test the validity of the county assessment, which increased the valuation many millions of dollars, the coal land being almost doubled in assessed value. The company claimed the assessment was illegal, because it was a blanket one and that the per-foot-acre method was used: also that land was assessed in bulk, the noncontiguous coal land being assessed and bulked together. One of the chief contentions, also, was that the subassessors did not make the assessment.

The company asked the lower court to grant an injunction, restraining the tax collector of Plymouth Township from collecting the tax complained of.

The Embarrassment of Industrial Railroads

The Public Service Commission on May 21 and 22 took up several new phases of the Industrial R.R. situation when it heard testimony from several steel companies and the Philadelphia, Bethlehem & New England R.R., which alleges that

before Apr. 15, 1914, it participated in through rates and division on all traffic except coal and coke.

The Interstate Commerce Commission has ruled differently from the State Commission, in the case of the Union and Monongahela Connecting railroads in the Pittsburgh district, which adds no small amount of interest to these hearings.

The state commission has followed the commission of New York in ordering the railways to continue their allowances to short industrial lines, which allowances in most cases have been declared by the Interstate Commerce Commission to be exorbitant and illegal, and which, so far as concerns the United States Steel Corporation and a few other large plants, have been discontinued on interstate traffic.

The apparent conflict between the views of the Federal and the state authorities on this matter is being closely watched by the bituminous operators. The essential point is the reasonableness of the compensation for the service of the industrial roads, and the Interstate Commerce Commission itself has postponed judgment in many cases. Evidently there is a long legal contest ahead, for not only the confusion of state and Federal authorities, but also that incident to all complicated freight-rate puzzles seems to afflict this controversy in a marked degree. The state is, however, committed irrevocably to the duty of making all transportation rates everywhere reasonable and just.

PENNSYLVANIA

Anthracite

Plymouth—The strike inaugurated on May 16 at Nottingham No. 15 colliery, of the Lehigh & Wilkes-Barre Coal Co. has been settled, and work has been resumed. The miners quit on account of the discharge of two drivers for violating the rule of the company in riding mules underground.

The settlement in the Red Ash vein Gaylord colliery, Kingston Coal Co. continues, but every effort is being put forth to counteract its effect. Timbers of large size are being placed, as well as concrete pillars. Thus far, surface property has not been affected. Work at the breaker, however, has been suspended until further notice.

Mocanaqua—The fire, which caused considerable excitement at the West Coal Co.'s mine at this place, has been conquered after some hard fighting. It was caused by a slight explosion of gas, and a number of men had a narrow escape from being burned.

Larksville—The second cave in the surface of Luzerne Ave. within two weeks occurred on May 23, and residents of the vicinity are somewhat alarmed. This last cave was caused by working in No. 2 colliery of the Kingston Coal Co. The large water main running through the town burst, causing the residents considerable inconvenience from lack of water.

Locust Gap—The employees of the Locust Mountain Coal Co., some 15,000 men and boys, on May 22, struck because of the discharge of two commiteemen of the United Mine Workers of America and through dissatisfaction in the way the men are compelled to register daily on a new time clock.

Bituminous

Altoona—In an amicable proceeding begun by the state against the Alton Coal Co., a decree in quo warranto has been handed down by the Dauphin County Court, in which it was set forth that the company, because it is no longer doing business, be ousted of its charter privileges.

Connellsville—It is stated that, during the week ended May 21, three thousand coke ovens in the Connellsville region were blown out; 2200 of these were owned by the H. C. Frick Coke Co., a subsidiary of the United States Steel Corporation. Production throughout the region declined 17,000 tons, and it was reported that coke for delivery the second half of the year was being sold at a recession from the prevailing price of $2.

WEST VIRGINIA

Moundsville—Following an examination of the mines in this vicinity, deputy state-mine inspectors have ordered that the working forces of the Parr's Run and Panama mines be reduced to 20 men, owing to the fact that the air shafts are not equipped with air gages. It is said that the whole plant of the Mound mine was ordered closed down, pending compliance with state laws.

Charleston—The records of the State Mining Department just published by Earle A. Henry, chief inspector, show that in the month of April there were 31 fatal accidents in the coal mines of West Virginia, being a gain of one over the previous month. The deaths resulting from the explosion in Mine No. 5 at Eccles are not considered in the regular casualty list. In this disaster there were 180 deaths, which brings the total up to 211 for the month.

Colliers—The striking miners at Colliers, where several riots have occurred, held a parade recently and marched about the streets of the village. Contrary to expectations, no disorder was noted. The mine at this place is working, about 50 men being employed, and is furnishing sufficient coal to fill orders.

Fairmont—The West Virginia State Federation of Labor brought its seventh annual convention to a close May 21 by adopting a resolution asking that Governor Hatfield appoint a committee to revise the mining laws of the state. Charleston was chosen as the place for the next meeting.

Panther—The first car of coal to be shipped from the Panther Coal Co. was sent out on May 20. All the directors of the company, as well as some of their relatives and friends were present. This car was said to be one of the finest in appearance ever sent from this region.

ALABAMA

Birmingham—The Black Diamond Coal Mining Co., with offices in the Jefferson County Bank Building of Birmingham, will develop a new mine at Benoit, Ala. in Walker County. The mine will be operated electrically, and the company expects to install shortly motors, coal cutters, and a 150-kw. direct connected generator.

Russellville—The No. 7 washery of the Sloss-Sheffield Steel & Iron Co. at Russellville was put into operation on May 15. This is one of the two new washers which have just been built at a cost of about $125,000. The other new one No. 6 washer was put into operation about the last of April.

KENTUCKY

Lexington—Announcement has been recently made that after a year's negotiation a deal has been consummated by which the East Jelico Mining Co. takes over all holdings of the East Jelico Coal Co. in Bell and Knox counties comprising 2800 acres of coal and timber land. The consideration paid was $300,000 in cash. The present output of the mines is 1100 tons daily, and it is proposed to acquire, lease and develop new mining properties in that section of the state.

Morganfield—Local opinion is that the projected amalgamation of coal operations of Union County is about to be realized. A party of representatives of an English syndicate which is said to be interested in the project, has just paid a visit to the county and followed up the reports of the engineers as to the land and the mines. The chief engineer, who is 72 years of age, is as vigorous as a man of half his years.

Madisonville—Ten of the coal companies operating in this county have been fined a total of $750 on their pleas in abatement to indictments charging that they polluted streams with copperas water from the mines. Fines were assessed without trial and the cases will be appealed.

Some twelve of the families of the striking miners of the Kingston Coal Co., at White City, have been evicted from their homes by the company. Fears that the miners would resist proved groundless.

OHIO

New Philadelphia—Leases have been closed by the Goshen Coal Co. to the Horger-Heldt Coal Co., the East Goshen Coal Co., and the Midvale Coal Co., by which the latter named concerns take over three separate coal properties. These leases provide for the payment of 6c. per ton mine run royalty, and each company must mine at least 30,000 tons yearly.

Columbus—The new mine rescue car purchased by the Ohio Commission some time ago, has arrived and is being equipped. It is an old Pullman furnished with a hospital and kitchen and will be placed in service when Ohio mines resume operation.

It is announced by Ohio operators who are backing the litigation, to have the new mine-run law declared unconstitutional that the case will be carried to the U. S. Supreme Court. Since the decision of the Federal Courts of Toledo refusing an injunction asked for by the operators, the only course is an appeal, and it is the intention to fight the case through the highest tribunal.

At the close of a conference between miners' representatives and coal operators in the office of Governor Cox, on May 22, it was announced that the operators and representatives of 45,000 idle miners in Ohio had agreed to meet in a mine-wage conference on June 2.

Toledo—A decision handed down from the U. S. Federal Court on May 19 upholds the constitutionality of the mine-run law. This measure became effective May 20, and will be enforced as soon as the mines resume operations.

Martins Ferry—Officials and members of the 12th district executive board of the United Mine Workers of America re-

cently began paying the first benefit since the strike was declared May 1. These benefits will amount to approximately $90,000 per week.

Canal Dover—The Goshen Coal Co., of Cleveland, the largest operator in Tuscarawas County, retires from the field on account of the anti-screen law. Its properties will be leased to local parties.

INDIANA

Terre Haute—The average work in this field is now only about two days per week and several of the larger mines are idle. The Bunsen mine, one of the costliest plants in the state, is shut down indefinitely. It is believed that there is some strengthening of the demand for steam coal and that this will improve from now on. As yet there has been no material increase in the output of Indiana coal because of the strike in Ohio, but should this continue some weeks there must be a larger demand for the Indiana product.

ILLINOIS

Wasson—John Kay, County Mine Inspector of Saline County, recently made an investigation of Wasson mine, and found the drum on the hoisting engine in a dangerous condition. The miners refused to go to work until the defective drum has been replaced, and, as a consequence, the mine will be idle for about three weeks. John Kelley, Vice-President of the 7th Sub-District, was called on, but sustained the action of the men.

Murphysboro—The two Murphysboro mines of the Big Muddy Coal & Iron Co., with head offces in St. Louis, recently resumed operations, after having been closed since Mar. 31. These two mines employ about 500 men.

Chicago—The O'Gara Coal Co., in nolo contendere proceedings recently accepted a fine of $5000 in two cases which remained of the Federal suit based on the shipment of coal from the Illinois field in Saline County to the East under preferred rates.

East St. Louis—With the settlement of the controversy between the coal miners and operators of Illinois a number of mines have reopened and coal is commencing to move once more. This settlement is of great importance to the Chicago & Alton and other coal-carrying railroads which depend upon the mines for a large proportion of their freight traffic. With the suspension of the mines the freight business dropped to the lowest degree reported in many years, with a corresponding decrease in forces of train, engine and yard men.

The Vandalia R.R. Co. was recently found guilty of granting a rebate of approximately $36,400 to the Lumaghi Coal Co. in the United States district court of East St. Louis. Attorneys for the railroad filed a motion for a new trial. The specific offence was that the road borrowed $260,000 and lent it to the coal company at 2 per cent. interest. The difference between this rate and the ordinary rate of interest was considered as a rebate by the Government attorney. In return for the loan the coal company is alleged to have promised to ship its coal over the Vandalia road, giving that company an income of about $182,000 a year as freight revenue.

Urbana—The senior class in mining engineering at the University of Illinois has recently returned from a trip of inspection, including the cement quarries, underground mines and manufacturing plants near Oglesby, Ill. The longwall mines near LaSalle were also visited and the geology of the region studied. The party also visited the steel works in South Chicago and Gary, Ind., and various plants in Chicago, where mining machinery is made, and thoroughly inspected the accounting systems of some of the large coal companies, whose offices are in Chicago.

MISSOURI

Kansas City—The Fidelity Trust Co. of Kansas City, purchased the stocks and bonds of the Osage Coal & Mining Co., and the Great Western Coal & Coke Co., at a sale on May 19. This stock was held by the Fidelity company as collateral on loans aggregating $866,300.

A meeting will be held in Kansas City early in June for the purpose of renewing the agreement between miners and operators in districts Nos. 14, 21 and 25, comprising the coal fields of Missouri, Kansas and Arkansas. The various districts and the Southwestern Interstate Coal Operators Association have already appointed scale committees.

IOWA

Mason City—The Iowa State Manufacturers Association in its annual convention at Mason City, appointed a committee to attend future meetings of operators and miners and there present the views of the association as laymen.

ARKANSAS

Ft. Smith—Charging wholesale violation of the mining laws, Mrs. J. B. Harry, of Hereford, recently filed suit against the Mammoth Vein Mining Co. and subsidiaries, as the result of the death of her husband, a shotfirer. The amount asked is $32,626 being the largest ever claimed in Arkansas in a similar case.

OKLAHOMA

Oklahoma City—All the coal mines and wholesale dealers in the state are ordered to sell coal to farmers' unions, lodges and all other organizations at the same prices charged local dealers for like quantity and quality of fuel, in an order issued by the Oklahoma Corporation Commission. This mandate becomes effective in June. The commission holds that the Oklahoma Anti-Trust Law applies to the coal operators and dealers, requiring them to sell without discrimination to organizations, as well as to local dealers when money for payment is deposited in a bank.

NEW MEXICO

Santa Fé—If present plans are carried out, New Mexico will soon have a state-owned coal mine, producing fuel for use at the capital and executive mansions, at the penitentiary and the state school for the deaf and dumb. On a section of state-owned land was discovered a vein of coal, which, it is believed, can be easily worked by drifting. It is proposed at once to develop this deposit with convict labor. A tipple, buildings, etc., together with a camp, will be established and mining carried on systematically under the supervision of experts.

COLORADO

Denver—The members of the coal consumers legislative league are circulating petitions for the initiating of an amendment empowering the state to mine and sell coal in competition with private operators. This measure if adopted will reserve to the state all the rights beneath the surface of all state lands whether leased or sold. It makes some provision for the creation of workmen's insurance funds, and also authorizes the sale of $500,000 in bonds as the initial capital for the equipment of the proposed state coal mines.

PERSONALS

J. W. Jeffrey, a son of J. E. Jeffrey, founder of the Jeffrey Mfg. Co. has been made vice-president of the concern.

H. V. Croll has been appointed sales manager for the American Concentrator Co., with main office at Springfield, Ohio. Mr. Croll has been located with the above company at its Philadelphia office for the past two years.

A. H. Wood, of Petros, Tenn., has decided to go into consulting engineering in the coal field. A long experience and study of the economic posibilities of the southern Appalachian coal field, from West Virginia to Alabama, should admirably fit him for this kind of work.

John M. Roan, formerly state safety superintendent, through a reorganization of the Mining Department of the Ohio Industrial Commission, becomes Chief of the Mining Department, and J. C. Davies, the former incumbent, becomes his first assistant. The new chief has had a varied experience in the coal business.

W. J. Richards, president of the Philadelphia & Reading Coal & Iron Co., on May 21, was elected president of the five subsidiaries of the Reading system, succeeding the late Geo. F. Baer. These subsidiaries are: The Delaware Coal Co., the Locust Gap Improvement Co., the Preston Coal & Improvement Co., the Tremont Coal Co. and the Fulton Coal Co. These properties are all operated by the Philadelphia & Reading Coal & Iron Co.

CONSTRUCTION NEWS

Cairnbrook, Penn.—It is understood that the Loyalhanna Coal & Coke Co. will shortly build a superintendent's house and a number of miners' houses. This work is to be begun as soon as possible.

Slemp, Ky.—The Leatherwood Coal Co. has been organized by A. C. Cornett and others with a capital stock of $40,000, and will develop an area of about 2000 acres on Leatherwood Creek. A short branch from the Louisville & Nashville will be built into the property, and the development work is to start at once.

Toledo, Ohio—Contractor George Mercer, of Bowling Green, Ohio, has started work on a new coal yard for Samuel Davis on the Terminal R.R. at Elm and Utica Sts. The yard will be 400x160 ft., and will be equipped with the latest machinery for handling coal. According to the contract, it is to be finished in 90 days, and will be the largest yard in Toledo.

Whitesburg, Ky.—The Slemp Consolidated Coal Co. has purchased a large boundary of coal land from the Letcher County Coal & Improvement Co. in Letcher County, and will open the property for early development. It will be necessary to build two short branches of the Louisville & Nashville R.R. in order to make these developments. Thousands of dollars will be expended in this work.

Kittanning, Penn.—It has just been announced that the giving of a mortgage for $4,500,000 by the Shawmut interests is to enable the company to extend the Pittsburgh & Shawmut R.R. from Kittanning to Freeport in the Allegheny Valley. Work has already been begun. Several new mines will be opened as the railroad reaches convenient points in the district, and at Freeport connection will be made with the Pennsylvania R.R. The extension enables the Shawmut to ship on the river southward. The road extension will be finished this season, a distance of about 20 miles.

NEW INCORPORATIONS

Pittsburg, Kan.—The J. J. Stephenson & Sons Coal & Mining Co., of Pittsburg, has been organized with a capital stock of $25,000.

Roosevelt, Ky.—The Wolf Coal Trading Co. has been incorporated with a capital of $10,000. W. H. Soper, C. H. Whitlaw and T. C. Louks are the incorporators.

Beech Creek, Ky.—The Kirk Coal Co. has been incorporated in this county with a capital of $10,000. The incorporators are L. Z. Kirkpatrick, H. L. Kirkpatrick and C. Kirkpatrick.

Owensboro, Ky.—The W. F. Overstreet Coal Co., recently filed articles of incorporation in the office of the County Clerk. The capital stock is fixed at $2000, divided into 40 shares of $50 each.

Fairmont, W. Va.—The Price Coal Co., the Manitoba Coal Co. and the Ferndale Coal Co., incorporated under the laws of West Virginia, have dissolved. C. E. Hutchison, of Fairmont, was president.

Terre Haute, Ind.—The Indiana-Hocking Coal Co. has been organized with a capital stock of $5000, for the purpose of mining coal. The directors are Walter Bledsoe, Earle Shagley and A. T. Bennett.

Huntington, W. Va.—The Seakay Coal Co. has been organized to operate mines in Logan County. It has an authorized capital of $50,000, and its incorporators are F. D. Clifford, E. M. Jackson, C. F. Boyers, C. M. Roehrig and O. B. Casco, all of Huntington.

Kansas City, Mo.—The Farmers' Fuel Co. has filed articles of incorporation, the capitalization being placed at $62,500. The incorporators are H. C. Snider, V. K. Tuggle, J. H. Bovard and others. This firm will take over a mine at Higginsville, Mo., which has been operated by receivers for the defunct Farmers' Coal Co.

INDUSTRIAL NEWS

Birmingham, Ala.—The suit between Dosenbach & Son, of St. Louis, holders of $67,500 of the bonds of the bankrupt De Soto Mining and Development Co., and R. A. Porter, trustee, was decided in favor of Dosenbach & Son by the referee in bankruptcy on May 21.

Dante, Va.—The Clinchfield Coal Corporation will shortly place in operation in its mines a number of new General Electric mining locomotives, comprising three 5-ton, seven 6-ton, and five 16-ton machines. All of these motors will be 48-in. gage, and built for a 250-volt circuit.

Albany, N. Y.—The up-State Public Service Commission recently refused to allow the New York Central Ry. to substitute coal for oil as fuel on the trains running through the Adirondack forest reserve. The use of oil was ordered originally because of the danger of sparks from coal causing forest fires.

Montgomery, Ala.—Consideration of citations to all Alabama railroads to show cause why the State Railroad Commission should not order a general revision in rates on coal from the mining districts to all points in the state has been postponed until June 22. This order was issued at the request of complainants from several cities.

Pittsburgh, Penn.—The banquet of the Mine Inspector's Institute of the United States of America will be held at the Monongahela House, Pittsburgh, Wednesday evening, June 10, 1914, at 7 o'clock. After the dinner a number of prominent speakers will address the assembly on important mining topics. Good music will also he rendered.

Baltimore, Md.—Stockholders of the Elkhorn Fuel Co. were recently notified of their rights subject to allottment to subscribe to the unsold preferred and common shares of the Elkhorn Mining Corporation, which has leased from the first named company 20,000 acres of coal land in the Elkhorn field of Kentucky, which is now being developed.

Frackville, Penn.—The State Highway Department in its interpretation of the state law has ruled that the cave-in along the state road to Frackville will have to be repaired by the coal company which operates its plant near there, as it was the workings of this company Thorn & Neal by name that caused the cave-in along the road mentioned.

Cleveland, Ohio—Railroads entering Cleveland are storing up thousands of tons of coal just outside the city limit. This is being done so that the roads will not be affected by any shortage of fuel if the operators keep the mines closed or the miners continue their strike. The Lake Shore R.R. alone is unloading from 20 to 30 carloads of coal each day.

Birmingham, Ala.—The Tennessee Coal, Iron & R.R. Co. has received an order for 5000 tons of steam coal for one of the United States war vessels for delivery through Pensacola. This coal will be shipped within a few days. It is probable that a standing order will be placed with this company for delivery through Pensacola, Mobile, New Orleans and Galveston.

Des Moines, Ia.—On May 19 the Christey Box Car Loader Co. shipped the largest box-car loader in its history. This machine was consigned to the Northwestern Fuel Co., at Superior, Wis., for use on the coal docks. Coal is transferred from lake freighters into hoppers or bins by clam-shell buckets, from whence it is fed by this box-car loader into box cars. The machine is capable of handling 3000 tons per day.

Washington, D. C.—According to the U. S. Geological Survey, all records for the production of coke in the United States were broken in 1913 when the total output was 46,311,369 short tons valued at $128,951,430. Last year's production exceeded that of 1912 by 2,327,000 short tons. Of the total output in 1913, 33,596,669 short tons were made in beehive ovens, while 12,714,700 short tons were made in retort or byproduct ovens.

New Orleans, La.—Options have been renewed on yard property held here by Pittsburgh and Kentucky companies. This land is being held awaiting possible business expension after the opening of the Panama Canal. It is announced that plans in regard to this venture have not taken form as yet. There is reason to think, however, that this will be made a point of distribution for cargoes for the west coast of both North and South America.

London, England—The steam collier "Turret Hill" was recently sunk in the North Sea, owing to the shifting of her cargo. The chief engineer who was picked up by a passing steamer said that the vessel turned turtle, going over so rapidly that there was no chance to launch a boat. The captain was also rescued by another vessel, after he had clung for several hours to a lifebuoy. The remainder of the crew numbering 12 are believed to have been drowned.

Louisville, Ky.—The North Jellico Coal Co. will shortly install considerable new electric equipment at Woodbine and Pineville, Ky. The equipment in the station includes a 500-kw. Curtis turbo-generator with a 7-kw. exciter, two 200-kw. rotary converters, three 65-kv.a. transformers, and a switchboard. There will also be installed in the mine five 6-ton electric mining electromotives. The contract for all of the electrical equipment above mentioned has been placed with the General Electric Co.

Whitesburg, Ky.—Since the recent visit of a party of 60 capitalists, bankers, railroad men, and coal operators through the coalfields of Boone's Fork and Elkhorn Creek, in this county, new development work has been announced besides vast increases in the plant of the Consolidation Coal Co., the Elkhorn Mining Corporation, and the Mineral Fuel Co., in which much capital will be expended. It is said that new stock was taken by the financiers in the old operating companies, and that arrangements were practically perfected for the opening of other plants.

Coal Trade Reviews

General Review

Anthracite gradually slowing down. Bituminous demand less than output, but there are indications of a stronger undertone. Much surplus coal still in evidence. Lake trade proving a sharp disappointment.

The anthracite market is being maintained with some difficulty. Full-time operations continue the rule with the large companies, all of which rounded out the current month with plenty of orders for the prepared grades still on hand. Individuals, however, are offering concessions all along the line with the possible exception of stove coal which is in moderately short supply. The steam grades are particularly long, and are being stocked heavily. Dealers generally are seeking business aggressively. The market is firmest at down east New England points, and in the Western all-rail trade.

The bituminous demand has still failed to catch up with the supply, even under the heavily curtailed production. Large demurrage bills are accumulating at tidewater, and producers who have persisted in shipping down on consignment received a severe setback during the week; some important tonnages have been negotiated at less than enough to cover freight charges alone. But even in the face of the many adverse conditions, there are well informed and conservative observers who see indications of a stronger undertone, and are of the opinion that the trade is gradually shaking out the uncertainties of the past two months and getting down to a normal basis.

Moderate concessions on both contracts and spot business, together with a small consumption and a light demand in all directions, particularly in the lake trade, are the predominating features of the Pittsburgh market. Junction and terminal points seem to be less congested, and operators are apparently restricting shipments of consignment coal, but it is generally agreed by all that the consumer is in firm control of the situation.

The two months' complete shutdown in Ohio is beginning to develop a strained situation as regards both the employer and employee, particularly the latter, and vigorous actions toward a settlement are now under way. As regards the market situation, the effects have been nil. Stocks generally are lasting longer than was anticipated, while brokers are filling their contract obligations with higher grade West Virginia fuel, but at lower figures than the Ohio product. As a result of the excessive stocks at the upper lake ports, together with an almost complete absence of the vessels, the lake business is proving a sharp disappointment to the trade. River points have all been heavily stocked during the recent high-water stage. Concessions on the regular circular, involving small tonnages, are reported in Hampton Roads where the movement continues at about the average, though confined mostly to contracts.

The Southern markets are reported rather strong, May shipments showing a decided increase. Some slight improvement is also noted in the Middle Western fields, due to larger requisitions on railroad contracts, and an increased steam demand.

EASTERN MARKET

BOSTON

Delivered price for Pocahontas and New River very weak. Pennsylvania demand practically nothing. Anthracite remains quiet with shippers soliciting orders. Marine freights continue low.

Bituminous—At Hampton Roads there is a large accumulation of New River and Pocahontas. The $2.85 f.o.b. price has not been openly shaded on f.o.b. sales but there can be no doubt that the return on cars at Mystic Wharf do not net back anything like that figure. The consumers all over New England have not only ample stocks but in many cases more water power than they can use with the result that even contract demand is extremely light. In some cases the fear of a light fall business is another deterent to the taking on of summer coal. Pennsylvanias, which are largely dependent on the condition of the Southern coal market, are naturally light in demand.

Marine Freights remain low, due to the record dispatch prevailing at all loading ports and to the light tidewater business. The usual rate, Hampton Roads to Boston, is 60c. but large bottoms can be had at 55 cents.

Anthracite—The companies are soliciting orders for everything but stove size. The May circular continues to be maintained in this section.

Bituminous prices at wholesale are about as follows:

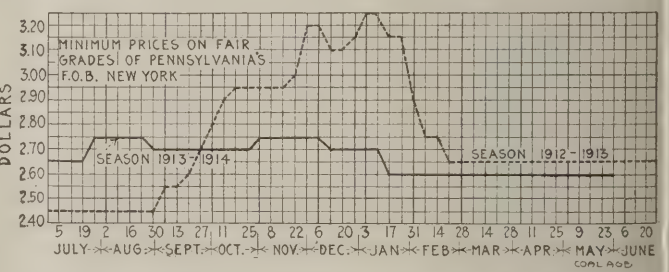
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.90@1.50	$1.20@1.65	$1.67@1.77	
Philadelphia*.....	2.15@2.75	2.45@2.90	2.92@3.02	
New York*.....	2.45@3.05	2.75@3.20	3.22@3.32	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	.....	$2.80@2.85
Boston†.....	.....	.....	.....	3.40@3.70
Providence†.....	.....	.....	.....	3.50@3.78

* F.o.b. †On cars.

NEW YORK

Bituminous shippers of consignment coal receive a severe setback, but a more hopeful feeling prevails. Concessions obtainable on all anthracite grades except stove coal. But large companies report plentiful orders.

Bituminous—Soft-coal operators who persisted in shipping coal to tidewater without specific orders, were taught a severe lesson during the past week. Stocks are very heavy in all directions, one company reporting some 200 tons on demurrage at Port Reading. Many of the large consumers are said to have all the way from one to three or four months' supplies on hand, although the fact that there was rather more inquiry than usual during the week indicates that others are beginning to run short. The generally depressed condition of the market has been further accentuated by an unusually poor demand for steamship fuel for the time being; this business is generally erratic, but has been consistently hanging around the low point for the past two weeks or more.



On the bull side of the market there are well informed and conservative observers who believe they see indications of better conditions. There seems to be no tangible evidence of such, aside from the fact as already mentioned, that there have been a few more inquiries; but it is nevertheless a fact that some members of the trade are assuming a more hopeful attitude over the future.

About 750 tons of Cambria County, Penn., coal was offered during the week at $1.70 alongside, or 5c. less than the freight, while sales have been negotiated on the basis of 60 to 65 cents f.o.b. mine on distress coal, with the sellers believing that they had obtained a good bargain. However, the nominal market continues on the same basis as before, as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—The large hard-coalers report that they are still behind on the prepared grades and that a great many orders will be carried over into next month. The steam grades are generally reported easy, with many of the companies putting them back into storage.

But with the individuals, conditions are radically different. No premiums whatever are to be had, and stove coal is the only grade selling at the full circular. Of the other

prepared grades. egg is selling at 15c. off the circular, with chestnut heavy at 20c. off, and pea in long supply, at 25 to 30c. less than circular quotations.

In the steam department, low-grade buckwheat can scarcely be moved at any figure, while off-quality rice, which was in good demand a few weeks ago, is also beginning to feel the effects of the heavy pressure. The individuals are beginning to curtail shipments of barley to tidewater, but the off grades are still selling at low figures; the high grades continue active at the full circular, though occasional odd lots on demurrage are selling at a concession of 30c. The better qualities of buckwheat are hardly moving at 10 to 15c. off the circular, and individuals are holding tonnages on boats awaiting a better price.

We quote the New York hard-coal market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.70	$4.55@4.70	$4.65	$4.50@4.65
Egg	4.95	4.85@4.95	4.90	4.75@4.90
Stove	4.95	4.95@4.95	4.90	4.90@4.90
Chestnut	5.20	5.00@5.20	5.15	4.95@5.15
Pea	3.55	3.40@3.55	3.45@3.50	3.20@3.45
Buckwheat	2.80	2.65@2.80	2.50@2.75	2.10@2.75
Rice	2.30	2.25@2.30	2.00@2.25	1.70@2.25
Barley	1.80	1.55@1.80	1.70@1.75	1.20@1.70

PHILADELPHIA

Prospects not good for anthracite trade in June. Curtailed mining anticipated. Retail trade very inactive. Bituminous situation still disappointing, with little or no improvement in the outlook.

Anthracite—The month of June is not likely to hold much in the way of extensive trade, for the anthracite business. Outside of New England, where the market is still normal, all other sections of the country seem to be on the verge of a slump. Curtailed mining is freely predicted. The local retail market is far from being satisfactory. Solicitations by the dealers meet with the response that the taking on of coal into cellars will be postponed until the fall. In fact, it is doubtful if retailers ever went after business as diligently as has been the case this year, but their efforts have been generally abortive.

As previously indicated, this is undoubtedly due to the industrial inactivity. The lack of cash to buy does not appeal to the average dealer, and he prefers to wait for the business later, rather than run the chance of losing not only the fuel, but the investment also. The bright spot in the situation is the New England market. The large fleets of barges trading to this terrieory, still continue to be well taken care of, filling orders, which embrace all sizes from broken to chestnut, with the heaviest demand on stove. Eliminating this feature, the market is dull and while there is no cessation of operations as yet, it seems likely to come in the near future. The usual advance of 10c. per ton will become effective on the first of June, making tidewater prices on that date as follows:

	Circular	Individual
Broken	$4.45	$4.45
Egg	4.70	4.60
Stove	4.70	4.70 @ 4.80
Chestnut	4.85	4.95
Pea	3.25	

Bituminous—The bituminous situation holds out even less hope than anthracite. It is going from bad to worse. Even with curtailed mining in many districts, the demand does not catch up with the supply, and prices have a tendency to sag. Contracts are being suspended, and large demurrage bills are accumulating at tidewater, with coal selling at ruinous prices, in some cases netting little more than the freight.

BALTIMORE

Foreign movement holds well and anthracite men believe that the next month will see a fair business. Bituminous as whole has experienced the worst week of the summer.

The past week has been the worst of the present flat spell, little or no new business developing. In the mining regions of western Maryland, West Virginia and western Pennsylvania the same tale is told of more coal on hand than can be disposed of, even with a curtailed production. Hope of a demand from the Lakes is bolstering up the West Virginia trade, for there is little business east on other than existing contracts. Slack is a sort of shuttle-cock of the trade, and sells variously, at from 50 to 65c. Three-quarter gas ranged between 80 and 90c. and steam coals at from 85 to 95c. Little change was noted in the Pennsylvania situation where producers are holding better coals for improved market conditions. Medium and low-grade fuels sell variously at from 95c. to $1.15.

That Baltimore is coming in for more of the foreign business is indicated in the large number of vessel charters being announced for June loading. Most of these will coal at the Curtis Bay pier of the Baltimore & Ohio R.R. The action of Congress in authorizing the deepening of the water approaches in Curtis Bay will mean another large pier there in the near future, the Baltimore & Ohio having announced their intention of erecting one in such an event.

While the May anthracite trade was less than in some former years, with a number of dealers, the hard-coal men are expecting a healthy June demand.

CENTRAL STATES

PITTSBURGH

Consumption small and demand light in all directions, particularly in the Lake trade. Substantial concessions made on new contracts. Coke eased off still further and now at the lowest point for some time.

Bituminous—There has been no increase in coal production in the past week, following the increase reported a week ago, when our estimate was that the Pittsburgh district was operating at 50 to 60% of capacity. A closer estimate would probably be 50 to 55%. The chief cause of the low rate is the small demand for the lake trade and the light demand in near-by territory, by railroads and manufacturing interests. The existence of stocks in consumers' hands is an influence, but now a relatively small one, as the stocks are fairly well liquidated. The actual consumption of coal is small.

The stocks accumulated by consumers months ago, in anticipation of a mining suspension, have been having this important effect, that they have very largely enabled consumers to postpone the making of annual contracts. Without stocks, there would have been wholesale renewal of contracts which expired Apr. 1; as it is, the bulk of the contracts are still unclosed, although two months of the new twelve-month have passed.

In such contracting as has occurred, regular prices have usually been cut, in the case of contracts at all desirable, and there are rumors that in extreme instances the cutting has been as much as about 20c. a ton for mine-run. For prompt shipment there has likewise been cutting. It is impossible to quote a definite market, but in general it can be stated that the bulk of the coal is realizing 10@20c. under the nominal price, except on slack, in which the concessions average nearer to 5@10c. The nominal prices remain: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

Connellsville Coke—The market has grown very soft. One or two aggressive sellers have gone forth to book contracts for furnace coke for delivery after June 1, and to close such business they have had to shade the $2 price by at least 15c., and possibly by 25c. in some instances. The operators who were openly committed to the $2 figure have not openly receded, but they are making no effort to sell and may revise their figure later when furnaces are forced to close. The leading foundry-coke producers have reduced their nominal asking price from $2.75 to $2.65, as some foundry coke of fairly good grade has been going for weeks at $2.50 and less. The market is quotable as follows: Prompt furnace, $1.80@1.90; contract furnace, $1.85@2; prompt and contract foundry, $2.35@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 16 at 294,715 tons, a decrease of 17,385 tons, and shipments at 275,830 tons, a decrease of 15,336 tons. Production appears to have exceeded shipments by 18,885 tons, making a total excess in the past eight weeks of no less than 84,860 tons, according to the "Courier" figures.

BUFFALO

Some cleaning up of bituminous on track, but not sufficient to improve the demand. Mines mostly running at a slow rate. Railroads not making contracts. Coke still inactive and anthracite quiet.

Bituminous—There is little stir in the trade, though it looks as if the operators and jobbers were more cautious about shipping unsold coal. Some of the terminal and junction points are less badly congested, but there is still excess coal everywhere. Some of the smaller mine owners and sales agents are hopeless; they say that it is impossible to do business at a profit and they are making little effort to go on. As a rule all the mines in the Allegheny Valley are running on part time, mostly because they have some contracts to take care of and they do not want to go out of business entirely. Buffalo is about as steady a consumer of bituminous as any point in this territory and it must be taken care of.

Some of the operators, not so well posted as they might be, are insisting on sales and shipping their output forward whether it is disposed of or not. With the market off so long, when there has been reason for expecting something better, it is hard to realize that the consumer is again in control of prices and is going to remain so for an indefinite time. The failure of bituminous coal to move by lake has intensified the dullness.

There is no real change in the condition of the bituminous market. Some mines are getting low prices, especially where the coal is not of the best or the sales organization is incomplete. Others claim that they are getting full prices, which are $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.15 for slack, with Allegheny Valley sizes about 25c. lower than Pittsburgh.

Coke—The market for all grades of coke is still as dull as ever, some dealers hardly being willing to discuss it. Prices rule on the basis of $4.50 for best 72-hr. Connellsville foundry, as formerly.

Anthracite—There is a fair demand, the lake trade keeping up better than was indicated early in the month, the week's shipment being 121,000 tons. A few cargoes that were loaded last winter are still here, because the vessel is unable to find a fair amount of business. All branches of the lake trade are very dull.

There is some life to the Western all-rail trade and some shipping agents are short of supply, on account of a better tide-water trade. Locally the demand is very slack. Independent anthracite is not coming this way at all liberally and all jobbers are short.

TOLEDO

Lake trade dull as a result of the large stocks in the Northwest and the lack of return cargoes. Unfavorable decision on the screen law creates additional uncertainties among the operating interests.

There is still an absence of demand from both steam and domestic consumers and lake shipments are light. A few boats are loading for up-lake ports but the great quantity of coal left at the docks last winter and the lack of return cargoes makes the probability of much more fuel going up at this time, questionable.

The decision of the District court, upholding the constitutionality of the Green anti-screen law, has caused a great set back and operators in this section are very doubtful of the consequences. A stay of execution for fifteen days was, however, granted so that the case can be appealed to the appellate court. The case will be carried up and until a decision is rendered business will probably remain at practically a standstill. There are operators in this section who claim that if the decision stands it will put their companies entirely out of business.

COLUMBUS

Miners' officials declare a strike, dating from May 2 and benefits will be paid.. Governor Cox issues a call for a conference of operators and miners. Ohio mine-run law declared constitutional.

All Ohio miners are still idle and will continue so for some time. Arrangements have been concluded for a conference of operators and miners to be held June 2 when an effort will be made to fix a new wage scale. This was brought about by the intervention of Governor Cox who invited the operators to his office for an informal discussion of the situation.

In the meantime the miners' officials, in order to releive the distress among idle miners, called a strike in Ohio, dating from May 2 and strike benefits at the rate of $3 weekly will be paid. For the time being only two weeks will be advanced as the treasury is much depleted. Enginemen and caretakers were not called out.

There is some increase in the demand for steam grades but the shipments from West Virginia and Kentucky are taking care of this. Because of the general business depression manufacturing plants have not been using so much fuel and the surplus stocks are lasting longer than was originally believed possible.

There is a slight increase in the demand for domestic grades but dealers have been able to take care of this from their surplus stocks. Some of the larger householders have shown a disposition to stock up earlier than usual and there is every indication of higher levels as the present situation will result in a depletion of stocks in every quarter.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.45@$1.35		$1.50@$1.40	$1.40@$1.35
¾-inch	1.30@ 1.25	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.25@ 1.20		1.30@ 1.25	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.15@ 1.10
Nut, pea and slack	0.85@ 0.80		0.85@ 0.80	0.75@ 0.70
Coarse slack	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.65@ 0.60

CLEVELAND

Although reserve stocks are rapidly disappearing the market fails to improve. Many plants are closed down temporarily. Lake trade is slowing up and freights have advanced on some smaller cargoes.

The wholesale market is again at a lower level, due largely to the lack of an outlet for Pennsylvania and West Virginia coals, which are being offered at low prices. A large number of manufacturies have used up their storage coal, but are buying little because they are working either part time or not at all. Brokers and operators who have contracts to supply No. 8 Ohio coal are filling orders with Fairmount gas and making more than they could were they selling No. 8. Fairmount slack can be bought to sell at $1.70 but brokers have been forced to meet Yourgiogheny slack offerings at $1.65 on track here. There is little demand for run-of-mine and three-quarter sizes. The general dullness of business in this vicinity is the real cause of the poor coal market.

Pocahontas operators are still hard pressed to sell slack. High-grade slack has been offered at $1 and what would ordinarily be a good grade of coal and readily acceptable is selling at even less. The buyers are extremely particular with the result rejections are more frequent than they have been in the last year.

Lake Trade—The lake shippers have taken so much coal at some of the upper docks they are forced to shut down on shipments. Splint, Youghiogheny and Pocahontas have gone up the lakes in large quantities and the docks did not have much space in the first place. The Pittsburgh Coal Co. has announced that it will contract for its vessel requirements in the next week or ten days.

Large ships are having difficulty finding cargoes. Vessels carrying 7000 to 10,000 tons are freely offered and coal shippers cannot possibly care for them until the dock space is cleared. On cargoes of less than 7000 tons, car service is being paid because boats cannot be readily obtained; 40c a ton, 10c. above the rate, was offered to get a boat to load coal paying car service. Offers of 37½c. were freely made on small cargoes. These smaller boats cannot break even hauling coal to Lake Michigan light as some of the larger boats are able to do.

From the way the season is opening there is every reason to believe there will be a rush of business this fall. Coal will be needed toward the latter part of the season and a slow start in the lake trade always results in a rush before the close. Coal shippers will have to pay some extra freight to get their coal before the end of 1914.

The market for spot and shipment coal is nearly the same quotations being as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.05		
Lump, 1¼-in.		$2.35	
Lump, ¾-in.		2.25	$2.00@$2.05
Mine run	2.60	2.10	1.95
Egg	3.05		
Nut		2.10@2.15	
Slack	2.20@2.35	1.65@1.70	1.65@ 1.70

CINCINNATI

No perceptible improvement, although the domestic movement is steady. Light demand for steam grades is still a feature, while inability to get boats at the lake ports is holding up the movement in that direction.

A few optimistic members of the trade believe they detect a change for the better but this seems to be without any real foundation. The slow lake movement, which usually absorbes a large tonnage at this season, is a depressing factor of large importance.

Operators report that while there is little or no difficulty in getting all the cars needed at the mines, it is impossible in most cases to move coal further than the lake docks, as there are no boats available. Many steamers which have taken on cargo of coal out have tied up on the return trip, refusing to load coal again on account of the inability to obtain return cargoes.

River coal is plentiful, the favorable stage of the Ohio having given Pittsburgh operators ample opportunity to move large tows down. In fact, this and other points on the Ohio are now so well stocked that shipments are likely to be substantially reduced, even with the usual prospect of low water in the near future. A dull market in nearly every department continues.

DETROIT

Steam market practically dead and the effects of the general suspension are becoming more evident. Anthracite normal.

Bituminous—The effects of the slump in general business and the depression in all parts of the country are becoming more and more evident in the coal business. The fact that

the Ohio mines have now been idle for two full months together with partial curtailment in the other mining districts without in the least creating any shortage in the market is significant of the trend of conditions. The steam market is practically dead, with slack down to 35c., while domestic trade is, if anything, even worse. Pocahontas, egg and lump appear to be only grades in any demand at all.

Anthracite—The customary activity has prevailed in hard coal and if anything a little larger tonnage than usual has been moved. The demand still centers on stove coal and the line trade has improved with indications for still more business, as the summer advances.

HAMPTON ROADS

Shipments during week fair. Demand light on all grades. Some coal being dumped for government use.

The movement from Hampton Roads has been fairly good. There have been some days during the week when little work was done at any of the piers but at other times they were all working to full capacity so that on an average the dumpings show up fair.

The demand for spot New River and Pocahontas run-of-mine has been somewhat light with few large parcels reported sold. A greater part of the shipments moving have been on contracts. It is impossible to say at what price spot sales have been made but it is understood that some of the smaller suppliers have made some slight cut in order to move accumulated tonnage. There is practically no inquiry at all for high volatile coals and although some small cargoes have moved this has also been on contract going to the New England market.

Foreign cargoes have been shipped to Naples, Genoa, Montevideo, Trieste, La Plata, Port Spain and Havana. In addition to foreign and coastwise shipments, the government has loaded some more coal into colliers for use in Mexican waters and it is expected that during the next few days two foreign steamers will take government cargoes for the naval stations on the Pacific Coast.

LOUISVILLE

Increased demand for domestic coal. Settlement of the differences between the operators and the miners in the western Kentucky field has little effect on the situation.

The demand for steam sizes is practically nonexistant, according to operators and dealers with connections in both divisions of the Kentucky field. The railroads, which have been laying in coal for the sole purpose of relieving the congestion at the mines, are overstocked at all their coaling stations. Occasionally the renewal of a contract at a slightly reduced rate is noted though for the most part the operators are holding out for their regular prices.

Mines in the eastern Kentucky field are working on an average of three days a week, while there are no definite figures available as regards western Kentucky operations. Prices continue without change, though the operators are said to be looking forward to an improvement in the demand which will enable them to put an advance into effect.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Better feeling in the coal market than for several months. Lump coal more active and demand for steam grades better. Pig iron seems to be improving, but coke is quiet.

The market on lump coal is gradually improving. It is the usual custom for the retail yards to place their orders for summer and fall delivery when the spring prices go into effect, but the majority of them failed to do so, believing that they would be able to buy at their own prices later on during the summer. However, recent developments indicate that business is going to be good and that there will be no reduction in the regular prices, so the retailers are beginning to come into the market. May deliveries will show a substantial increase over April.

While the steam business is not all that it could be, still, the general opinion is that within the next 30 days the situation will be normal, and the mines will be running to their usual capacity. Manufacturers of pig iron are more optimistic regarding the future.

NEW ORLEANS

Sales are below normal despite extra business resulting from the presence of the fleet in Gulf waters. Interior demand is very light. New yards along canal makes city delivery cheaper.

Coal sales are much below normal. Some sales are being made to cotton gins and other plants but retail dealers in the towns and cities are not stocking up as yet. Owing to the scant offerings of ocean freight the number of commercial vessels making this port is smaller than usual and as a result less coal is being taken on the water front. The presence of a number of refugee vessels and government transports has resulted in some business but practically no coal is being shipped to Mexico. Business with other Latin American countries, at no time large, is normal.

Negotiations are in progress for yard room along the New Basin Canal which will allow the landing of coal in the heart of the city from barges, and should effect some reduction in the cost of handling

Prices are being demoralized by the concessions that all companies are making to get business. Local dealers were disappointed in not getting the navy yard business. Government colliers now are replenishing the stock there with coal from Norfolk.

CHICAGO

Chicago coal market continues dull. The closing of a few railroad contracts and a slight gain in the demand for steam coal the only relieving factors. Anthracite trade suffering from money shortage. Unusually dull conditions prevail in smokeless coal and furnace and foundry coke.

The dull situation has been partially relieved by the completion of a few contracts by railroads and a slight increase in the call for steam coal. A small buying movement in screenings just keeps the price firm at what it has been for several weeks.

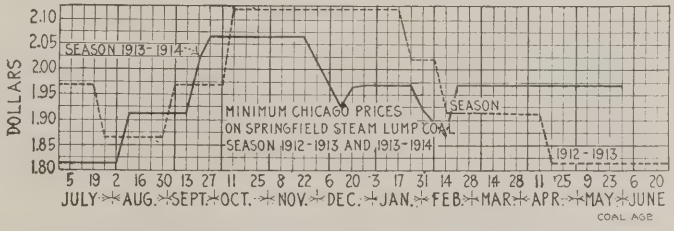
A shortage of money has caused a lack of interest in anthracite coal and resulted in weakening of the steam coal prices. It is usually customary for the anthracite consumers to purchase their coal in April or May to obtain the discount figures, but as a result of the present financial stringency, they are holding off.

A large number of dealers, who realize the position of smokeless coal among discriminating buyers, have been coming into the smokeless market with lower grades which analyze from 28 to 30 per cent. volatile matter. These coals are selling at from ninety cents to a dollar a ton on the track but this has had no material effect upon the real high grade smokeless, of which there have been few sales recently. Because of the continued dullness in the iron and steel trade, the same inactivity prevails in foundry and furnace coke. There is a little improvement in the demand for byproduct coke for domestic use.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	$2.07	$2.30@2.40	$2.12	
Steam lump.....	1.97		1.97	
Egg.....		2.30@2.40		$3.65
Mine-run.....	1.87	2.15@2.25	1.87	3.05@3.30
Screenings.....	1.77	1.95	1.67	

Coke—Connellsville and Wise County, $5@5.25; by-product egg, stove and nut, $4.45; gas house, $4.25.



ST. LOUIS

Coöperative and railroad-owned mines cutting prices and creating a weak market. Some further price reductions have been recorded.

During last season somebody was making money on different kinds of coal, but right now it seems to be a losing proposition on everything. In the Standard field the cooperative mines are the cause of all the trouble in one way, while the mines owned by the coal carrying railroads are the cause in another way. Both are a detriment to the independent operator, and keep the market continually below the cost of production.

The Government contract for the federal buildings, went to the Polar Wave this week, at $2.12 delivered wagon-load lots, guaranteed to develop an exceptionally high B.t.u. value, on Standard lump coal. Figuring 92c. for hauling and fright, this leaves $1.20. Franklin County coal is selling as low as $1 and $1.05 for the screened sizes, while Carterville is going at from $1.10 to $1.25. Both the Carterville and the Standard screenings market have fallen off some, the former selling at 75 and 85c. and the latter at 65 to 70c.

Independent and off-grade anthracite, is being offered as low as 38c. off the May circular. One of the relieving features to the anthracite trade has been the cancellation of the through rates in connection with the St. L. T. & E., which is owned by coal mining interests and also by St. Louis retailers. This company had about 28c. allowance from the Clover Leaf and connections, and had unlimited time at East St. Louis on their coal. They were thus able to cut the price whenever they felt so disposed, and nobody else could meet the competition. The St. Louis Coal Traffic Bureau accomplished something in this way.

Coke and smokeless are moving slow, and the retail trade is extremely dull.

KANSAS CITY

Wheat prospects helping the coal situation. Brisk bookings for June and July delivery reported. Mines showing tendency to extend operations.

Prospects for one of the largest wheatcrops in years have had a favorable effect on the coal situation. Wheat cutting will begin early in June and threshing will follow a fortnight later. Sales offices are devoting their efforts largely to selling farmers for June and July delivery, and the situation is much improved as a result. The tendency in some quarters to cut under the circular has about disappeared with the brisker demand, and the mines are extending operations. The worst of the summer lethargy is believed to be over, as demand from other sources will prevent extreme quietude in the late summer.

PRODUCTION AND TRANSPORTATION STATISTICS

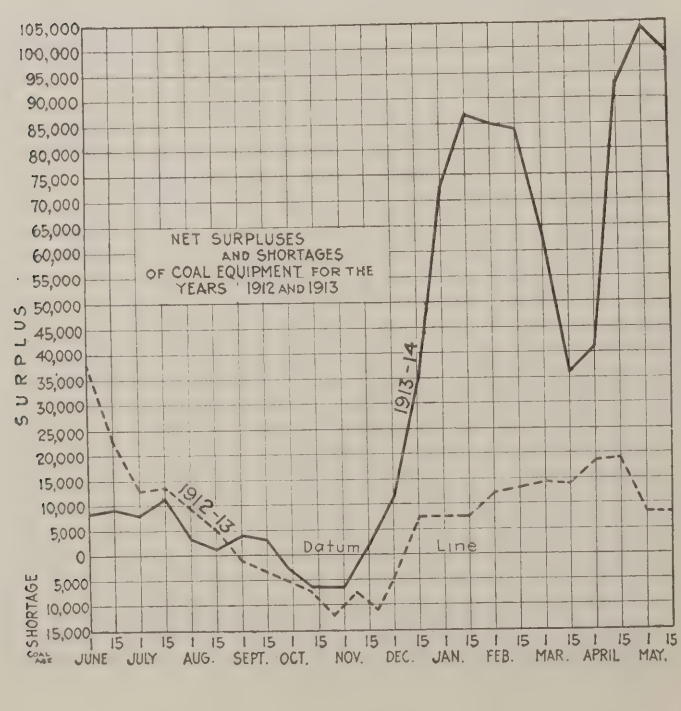
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended May 1, as follows:

	Surplus	Shortage	Net*
New England Lines	1,409	0	**1,409**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	17,669	0	**17,669**
Ohio; Indiana; Michigan; Western Pennsylvania	50,029	250	**49,779**
West Virginia, Virginia, North & South Carolina	4,893	26	**4,867**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	10,136	0	**10,136**
Iowa, Illinois, Wis., Minn.; North & South Dakota	8,580	20	**8,560**
Montana, Wyoming, Nebraska	999	0	**999**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	2,706	13	**2,693**
Texas, Louisiana, New Mexico	441	4	**437**
Oregon, Idaho, California, Arizona	2,802	0	**2,802**
Canadian Lines	0	0	**0**
Total	99,664	313	**99,351**

	Jan. 15	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1	Apr. 1	Apr. 15
Surplus	87,149	85,489	84,775	64,822	39,133	41,055	41,055	100,370
Shortage	789	102	239	1,394	3,282	615	615	29
Net*	**86,360**	**85,387**	**84,536**	**63,428**	**35,851**	**40,440**	**40,440**	**100,370**

*Bold face type indicates a surplus.



NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February, March and April of the current year in short tons:

	February	March	April
Pocahontas Field	942,477	1,161,793	1,156,670
Tug River District	204,074	246,490	221,344
Thacker District	198,228	274,786	232,181
Kenova District	71,401	88,616	96,116
Clinch Valley District	152,769	153,704	156,502
Other N. & W., Territory	3,694	2,741	2,827
Total N. & W. Fields	1,572,643	1,928,130	1,865,640
Williamson & Pond Creek R.R.	26,314	43,865	79,828
All other railroads	67,518	140,123	171,818
Grand total	1,666,475	2,112,118	2,117,286

Distribution of shipments for April was:

	Shipped	Tipple	Total
Pocahontas	1,066,583	16,336	1,082,919
Tug River	219,221	2,123	221,344
Thacker	222,770	9,411	232,181
Kenova	87,884	8,232	96,116
Total	1,596,458	36,102	1,632,560

Shipments of coke, entirely from the Pocahontas field amounted to 64,340 tons.

The following is the destination of shipments for April and the first four months in short tons:

	April		Four Months	
Coal	1913	1914	1913	1914
Tidewater, foreign	147,917	188,413	535,211	617,18
Tidewater, coastwise	326,920	323,280	1,300,671	1,315,14
Domestic	1,068,383	1,605,493	5,401,914	5,929,36
Coke				
Tidewater, foreign	6,950	.....	16,984	1
Domestic	122,845	2,204,204	7,816,249	8,265,29
Total	1,672,845	2,204,204	7,816,249	8,265,29

FOREIGN MARKETS

GREAT BRITAIN

May 15—The inquiry is limited, and, with supplies increasing, the tendency of values is easy. Quotations are approximately as follows:

Best Welsh steam	$4.62	Best Monmouthshires	$4.
Best seconds	4.38	Seconds	3.
Seconds	4.14	Best Cardiff smalls	2.
Best dry coals	4.20	Seconds	2.

The prices for Cardiff coals are f.o.b. Cardiff, Penarth o Barry, while those for Monmouthshire descriptions are n f.o.b. Newport; both exclusive of wharfage, and for cash 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry $4.80@5.52; furnace, $4.08@4.56.

COAL SECURITIES

The following table gives the range of various active coa securities during the week ending May 23:

Stocks	Week's Range High	Low	Last	Year's Ran High	
American Coal Products	84	84	84	86¼	8
American Coal Products Pref	....	....	105	106	10
Colorado Fuel & Iron	28	27⅝	28	34½	2
Colorado Fuel & Iron Pref	....	....	140	140	14
Consolidation Coal of Maryland	....	....	102½	....	
Island Creek Coal Com	49¼	48¼	48½	....	
Island Creek Coal Pref	85½	85½	85½	....	
Lehigh Valley Coal Sales	170	150	165	....	1
Pittsburgh Coal	....	....	20½	23½	
Pittsburgh Coal Pref	89	88	88⅞	93½	8
Pond Creek	18⅜	17	17½	....	
Reading	166⅞	165⅜	166⅛	172¼	15
Reading 1st Pref	89	89	89	89	
Reading 2nd Pref	..	..	90	93	
Virginia Iron, Coal & Coke	..	..	45	52	4

Bonds	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. g n. s f.g. 5s	90¼	..	92	92	91½	9
Colo. F. & I. gen. 6s	105	..	107½	June '12	..	
Col. Ind. 1st & coll. 5s. gu	73⅞	75	73⅞	74	73	7
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	78	
Cons. Coal 1st and ref. 5s	90½	92	90½	May '14	89	
Gr. Riv. Coal & C. 1st g 6s	89	..	99½	Feb. '14	99⅛	
K. & H. C. & C. 1st s f g 5s	..	..	102⅝	Apr. '06	..	
Pocah. Con. Coll. 1st s f 5s	89½	..	93	Mar. '14	93	
St. L. Rky. Mt. & Pac. 1st 5s	86½	87¾	87½	May '14	84	
Tenn. Coal gen. 5s	78	80	77	Apr. '14	77	
Birm. Div. 1st consol. 6s	103	..	103½	May '14	97⅛	10
Tenn. Div. 1st g 6s	102	103	101¼	101⅜	101½	10
Cah. C. M. Co. 1st g 6s	101⅝	102¼	102	Mar. '14	101	10
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	10
Victor Fuel 1st s f 5s	..	84	73	Apr. '14	73	7
Va. I. Coal & Coke 1st g 5s	91	93⅝	91⅜	91⅜	90	9

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 23
Issued Every Saturday
Hill Publishing Company

NEW YORK, JUNE 6, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

"Cost of breakdowns cannot be measured by cost of the broken parts"

The repair of breakdowns on a locomotive with plain bearinged armature shaft may run as high as $60 a month. But even this is an absolutely inadequate gauge of the loss caused by such breakdowns.

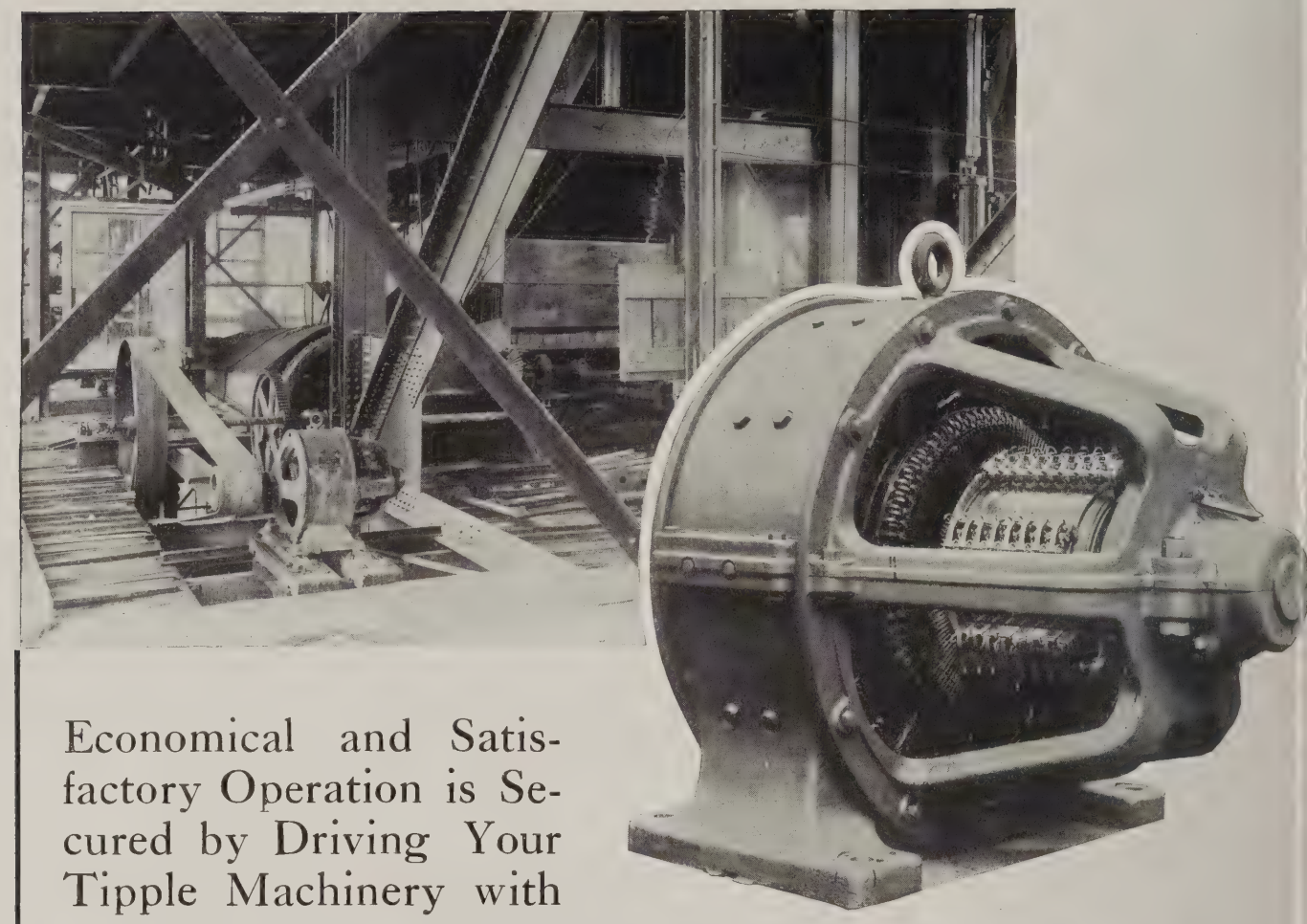
When a locomotive goes wrong on the job, the whole routine of the mine may be queered for the day, movement of coal stopped, trips of loaded cars stalled, men hopelessly waiting, disgusted,—for empties.

Equipment of the armature shafts of mine locomotives with HESS-BRIGHT Bearings is vitally important because such equipment eliminates the chief causes of locomotive failure.

Insist on HESS-BRIGHT for your Armature Shafts.

The Hess-Bright Manufacturing Co.
Philadelphia, Pa.

HESS-BRIGHT
HB DWF
BALL BEARINGS



Economical and Satisfactory Operation is Secured by Driving Your Tipple Machinery with

Westinghouse Electric Motors

These motors are especially suitable for driving tipple machinery. They are remarkably simple in construction with few parts, all of which are readily accessible.

The following are a few of their important features:

Electrical Characteristics:

High efficiency at all loads. This means low operating costs.

Sparkless commutation over wide range of load. This means continuous operation under severe conditions.

Low operating temperatures, and ample overload capacity.

Mechanical Characteristics:

Light weight with great strength.

Bearings are dust proof and cool running, insuring reliable service. They have liberal bearing area and are flooded with oil whenever the motor operates.

Write to the nearest office listed here for full information regarding these motors.

Westinghouse Electric & Mfg. Company

East Pittsburgh, Pa.

DISTRICT OFFICES:

Atlanta, Ga.	Chicago, Ill.	*Houston, Tex.	Minneapolis, Minn.	Salt Lake City, Utah.
Baltimore, Md.	Cincinnati, Ohio.	Indianapolis, Ind.	New Orleans, La.	San Francisco, Calif.
Birmingham, Ala.	Cleveland, Ohio.	Joplin, Mo.	New York, N.Y.	Seattle, Wash.
Bluefield, W.Va.	Columbus, Ohio.	Kansas City, Mo.	Omaha, Neb.	Spokane, Wash.
Boston, Mass.	*Dallas, Tex.	Louisville, Ky.	Philadelphia, Pa.	Syracuse, N.Y.
Buffalo, N.Y.	Dayton, Ohio	Los Angeles, Calif.	Pittsburgh, Pa.	Tacoma, Wash.
Butte, Mont.	Denver, Colo.	Memphis, Tenn.	Portland, Ore.	Toledo, Ohio.
Charleston, W.Va.	Detroit, Mich.	Milwaukee, Wis.	Rochester, N.Y	Washington, D.C.
Charlotte, N. C.	*El Paso, Tex.		St. Louis, Mo.	

*Westinghouse Electric & Mfg. Co. of Texas.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JUNE 6, 1914 NUMBER 23

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 911

The Wonderful Dream. A poem by Berton Braley.

WHAT IS TO BECOME OF THE ANTHRACITE INDUSTRY WHEN THE SO CALLED TRUST IS DISSOLVED: *Pages* 912-917

Some interesting history concerning coal mining in the anthracite fields of Pennsylvania. Conditions prior to present agreements and causes that led up to understandings between the big railroad interests. Labor troubles in 1900 and 1902 and adoption of sliding-wage scales. If the railroads must part with their coal holdings, it is suggested that the industry be governed by a board of commissioners. Eli T. Conner. COAL AGE, Vol. 5.

COAL PRODUCTION DURING 1913 IN THE GERMAN EMPIRE: *Page* 917

*NEW POWER DEVELOPMENTS OF THE D., L. & W. COAL CO.: *Pages* 918-925

This company has recently installed a large power plant at Nanticoke, Penn., using 4000-kw. turbo-generators with superheated steam. An exhaust-steam turbine unit, supplied with a Rateau regenerator and a cooling tower, located at Kingston, operates in multiple with the above plant. H. M. Warren. COAL AGE, Vol. 5.

THE OLDEST MINE IN THE ANTHRACITE REGION: *Page* 925

*THE NEW MINE FIRE IN THE PANTHER CREEK VALLEY: *Pages* 926-928

A brief description of the new fire at the Lehigh Coal & Navigation Co.'s operations. The fire was practically beyond control before discovered and will be sealed off and the workings flushed. Extensive preparations for carrying this out are under way, including the construction of two miles of standard-gage railroad. A. T. Shurick. COAL AGE, Vol. 5.

INQUIRIES OF GENERAL INTEREST: *Page* 944

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 945

THE COLORADO STRIKE: *Pages* 929-930

Further light is being obtained by the public regarding the strike in Colorado. The Industrial Relations Committee has heard a lurid account from Mrs. M. H. Thomas and Mrs. Jolly, a detailed rebuttal of the major part of their charge from Major Boughton and a painfully neurotic plea from Judge Lindsey. COAL AGE, Vol. 5.

GAS IN ANTHRACITE MINES: *Pages* 930-931

*AN INTERESTING ANTHRACITE DEVELOPMENT: *Page* 931

WHO'S WHO IN COAL MINING: *Pages* 932-933

Brief sketches of the lives of Frederick E. Zerby, general manager of the Kingston Coal Co., Kingston, Penn., and John C. Haddock, president of the Plymouth Coal Co., Wilkes-Barre, Penn.

INDUSTRIAL PEACE INCREASES EFFICIENCY OF MINERS: *Page* 933

EDITORIALS: *Pages* 934-935

The Strike of 1902 and 1914—Explosibility of Anthracite Coal Dust—A Matter of Names.

SOCIOLOGICAL DEPARTMENT: *Pages* 936-939

*The Edwardsville Improvements. COAL AGE, Vol. 5.

LEGAL DEPARTMENT: *Page* 940

Recent Decisions.

DISCUSSION BY READERS: *Pages* 941-943

The Safety Boss in Coal Mining—Safety or Refuse Chambers in Mines. Letter No. 5—The Eccles Explosion.

STUDY COURSE IN COAL MINING: *Page* 943

*A Problem in Mechanics—A Longwall Proposition.

COAL AND COKE NEWS: *Pages* 950-954

ADVERTISING INDEX: *Page* 64

NUMBER OF COPIES PRINTED THIS ISSUE 12,000

None sent free regularly, no returns from news companies, no back numbers.

The Great National Antidote For Stagnation

The Weekly Ad-Talk Page

It is interesting to consider the wide application of advertising in these days.

Only a few years ago it was considered an extraordinary and rather a dangerous thing for a church to advertise. And yet today church advertising is regarded as commonplace.

Advertising is used in almost every field of work.

Probably you, yourself, can remember political candidates elected to office because of judicious appeals in the newspapers or on the billboards.

Money is raised for charity by advertising.

Cities advertise in order to increase their population, to draw factories, shops, manufacturing plants of various kinds.

Whole primitive districts of the great Northwest have been turned into thriving communities by means of the advertising of the Canadian railroads.

Advertising is one of the most powerful of modern institutions. It is our great national antidote for stagnation.

Advertising is a goad—in its lexicon there's no such word as "quit."

It forces the whole manufacturing world to keep on the jump—to do new things—to evolve new ideas—to better quality—to make honest prices.

To those who conscientiously use advertising as a salesman, it brings great business returns.

To those who "read, mark and inwardly digest" advertising, it gives the power and ability to buy widely, reasonably and profitably.

The rule must work both ways, or it won't work either.

"A good article, good advertising, good results for the buyer"—that's the formula and you can't supply a "bad" for any one of those three "goods" and get away with it!

Cultivate your acquaintance with the ads in Coal Age—they are put there for your benefit.

COAL AGE

Vol. 5. NEW YORK, JUNE 6, 1914 No. 23

The Wonderful Dream

By Berton Braley

Written expressly for Coal Age



WEARY with project and plan and scheme
The Manager slept and dreamed a dream
Of a noble Stranger who bade him, "Come,
And I'll show you a mine that is GOING SOME!"
So away they flew through the ambient air
Till they came to a spot exceeding fair,
And there they gazed on a handsome mine
Where everything seemed to gleam and shine,
Where hoist, compressor and breaker too
Were big and busy and neat and new,
And all the workers, with smiling faces,
Were doing their best in their proper places.

Into the deep shaft's yawning crater
They dropped in a cage like an elevator,
And through the whole mine's great extent
The Manager and the Stranger went.



THE air was bracing and pure and cool,
There wasn't a sign of a horse or mule,
(Electric motors performed the work
Which they had done in the dark and murk)
Each miner toiled with a right good will,
His cars stood ready for him to fill,
There was no hurry, no heat and haste,
No useless waiting, no fret, no waste,
The miners toiled with a skill most deft
And when they were through there was no coal left.
The guide explained as they went their way
That the miners lived to be old and gray
And died at ninety or more, he said,
With the sorrowing family round the bed!

He added, "this is a fact, I vow,
"There's never a strike or a labor row!"
The Manager wiped his throbbing brow,
"Say, where is this mine?" he loudly cried,
"In Heaven, of course" returned the Guide!



THE Manager woke and from bed he sprung
For the telephone bell had loudly rung,
He put the instrument to his ear,
And this is the message he had to hear,
"Hello, hello! The pumps are clogged,
The lower workings are water-logged,
And the hoist is broke and the fan won't go,
And the breaker's stopped—'cause the steam's too low,
And the shaft is filling with mud and muck,
And—hey, hello there! The men have struck!"

What Is to Become of the Anthracite Coal Industry?

By Eli T. Conner*

SYNOPSIS—Some interesting history concerning coal mining in the anthracite fields of Pennsylvania Conditions prior to present agreements and causes that led up to understandings between the big railroad interests. Labor troubles in 1900 and 1902 and adoption of sliding wage scales. If the railroads must part with their coal holdings, it is suggested that the industry be governed by a board of commissioners.

The dissolution of trusts or supposed trusts controlling many important lines of business, which state and national laws or legislators demand, naturally prompts the question: What is to be done with the pieces when a long established enterprise is broken up? Should the persistent efforts to disrupt the so called "Anthracite Coal Trust" prove successful, and the present owners of over 90 per cent. of the mines and lands in that region, the railroad companies, be compelled to relinquish their coal holdings, how shall the anthracite business be conducted?

The present owners, who are struggling to maintain a position that has taken years to attain, together with untold millions of dollars capital, could hardly be expected at the present time to consider any plans under such an eventuality, but it seems to me that the effects of such dissolution, should it take place, ought to be pointed out, in the public interest, as well as for the protection of the invested capital, and the interests of the employees; and that the coal remaining shall be conserved to the utmost possible extent.

Causes That Led Up to the Present System

Intelligent consideration of this important subject can only be given in the light of the past experiences in the anthracite region. It is, therefore, necessary to review as briefly as possible, the history of the development of the industry and the causes that led up to the system that now prevails.

Aside from the question of freight rates on coal, which has no part in this discussion, a correct understanding of the conditions will reveal that great benefits to all interested, including the general public, have followed the inauguration of the present regime.

The advocates of a return to "the good old times of unrestrained competition," should recall its baleful effects upon all kinds of industry, individual employees and property, during the three decades from 1865 to 1895.

It only requires consideration of one prime instance to illustrate the point desired—the transportation system. During the period mentioned, the fiercest and most unscrupulous competition in rates, rebates, and every other form of warfare known to experts of that destructive period, was the rule, resulting in wrecks of system after system, with receiverships and re-organizations with their attendant waste of resources; the physical deterioration of property, and the destruction of the equities of security holders.

*Consulting engineer, Stephen Girard Bldg., Philadelphia, Penn.

This competition, aided sometimes by the assent of state authorities, was the main reason for the abandonment and destruction of the systems of inland waterways and canals. Canals were said to be out of date, and truly, were unprofitable, but it is now fully recognized that it was a serious mistake to destroy the improvements that had been so popular and useful during the first half of the 19th century.

What happened in transportation affairs was duplicated in nearly all other lines of industry, and particularly was this the case in the production and marketing of anthracite coal, which is the subject of this paper.

Inefficiency in Mining Irreparable Waste

The effects of the chaotic conditions in transportation affairs were serious, though not irreparable; but in mines, it is quite a different thing, for here, unless the highest grades of efficiency and care are constantly exercised, great and irreparable waste of an incomparable natural resource results.

It will be interesting to trace the history of the anthracite industry from 1865; after the artificial stimulation of the war period, until 1895, when the lowest depths of despair were plumbed by those whose capital and interests were involved. During this period, when the annual output of anthracite coal increased from about ten million tons to forty-six and one-half million tons, almost unrestricted competition in every department of the industry, but particularly in the market, prevailed.

Efforts were made at various times by many interests to arrive at uniformity in operating methods and market prices, but these attempts nearly always failed.

Most of the mines developed prior to 1871 were owned by individual operators, the conspicuous exceptions to this rule being the Delaware & Hudson Canal Co., the D., L. & W. R.R. Co., the Pennsylvania Coal Co., and the Lehigh Coal & Navigation Co.

The demoralization was so great during much of this period and the failures of operations so frequent, that it was almost impossible to interest capital in such a hazardous business; but meantime the great value of anthracite coal as the ideal domestic fuel, as well as its value as natural coke for the manufacture of pig iron, was more and more appreciated by the consuming public, as indicated by the steady annual increase in production. The growing inability of individual operators to continue the fight for exstence, partly due to the fact that the cheaply mined coal above water level was exhausted, but more to the fierce competition in the markets which reduced the prices realized below the profit line, coupled with the imperative necessity to assure all the coal for transportation that was possible, practically forced upon the railroad companies the necessity to buy and operate coal mines themselves.

All of the railroads serving the anthracite region from the early days of its exploitation had been more or less intimately connected with the mining industry, but about 1871 the Phila. and Reading R.R. Co. adopted the policy

of buying nearly everything in the way of operating collieries and undeveloped coal lands naturally tributary to its lines.

This action by the Reading R.R. was stimulated by the invasion of its territory by the Pennsylvania and the Lehigh Valley roads, all striving to assure their position in the transportation of this profitable freight. This enabled many individual operators who had been on the verge of bankruptcy to get back part of their capital, and others to reap considerable profit, but it transferred the burden to other capitalists, who were unable to carry it, as instanced the years when the Reading R.R. was in receivers' hands, the Central R.R., of N. J., receiverships, the many years when the Lehigh Valley R.R. failed to earn dividends, and others that need not be mentioned.

The individual operator in most cases held his property under lease for a term of years, the minimum term, usually being 15 years and the maximum 30 years. These leases always provide that a certain rate of royalty per ton of coal sold shall be paid to the landlord, and that a minimum amount shall be paid, whether any coal is sold or not. Generally, the minimum clause is not particularly burdensome, but in times of dull business or shortage of railroad cars, or when production is curtailed for other reasons, the advance payments on this account mount up to considerable sums, and are a serious drain on working capital, when the margin of profit is as small as it was during a large part of the period under consideration.



Taylor Breaker of D. L. & W. R.R. Co., Taylor, Penn.

The necessity to mine enough coal to meet the minimum requirements of leases was a contributing cause of the unbusinesslike policy so long prevailing in the marketing of anthracite coal.

Competition Was Disastrous

The effects of the fierce competition in the anthracite industry were most severe in the Southern or Schuylkill field, on account of the greater cost of production due to the excessive contortion of the coal measures, and the generally steep pitches prevailing, and also to the softness and friability of the coal, resulting in a smaller yield of domestic sizes; as compared with the northern field, where the measures are generally flat or on gentle pitches, and the coal is of a strong tough nature. By reason of these natural advantages, the growth of the industry in the northern field was very rapid and operations there have generally been more successful than in the southern region, consequently individual operators were able to hang on longer here than elsewhere.

Purchase of Mines by Railroads Did Not Correct Greatest Evil

The acquisition by the railroad companies of most of the mines did not correct the greatest evil of the industry—unreasonable competition, resulting in unremunerative prices for the product, because for years each transportation interest was struggling to increase the amount annually hauled to market, in order to be able to claim a larger percentage of the output of the whole region, and thus the market was generally glutted, with the inevitable result that the buyer dictated the price. During this period of chaotic mismanagement, it was no un-

usual thing to see large blocks of prime anthracite coal sold at tidewater points at auction, the prices realized sometimes being but little above the freight.

It was the custom for the general sales agents to meet occasionally, ostensibly to exchange views for the mutual benefit of their respective companies, and the advancement of the industry, but the general result of these meetings was that many of those making the usual "gentleman's agreement," immediately tried to take advantage of his fellows to book all the business possible, not by the superiority of his salesmanship, but by cutting prices.

If such foolish and improvident practices as have been described had resulted only in the financial loss to those engaged in the warfare, it would not have been so serious; it would have been only a question of the length of the pocketbooks of the combatants; but this is the least of the damage.

In order to keep the cost of production down to the lowest possible figure, the operators were compelled to resort to measures that were a disgrace to intelligent mining men. Thus, they developed only the thickest beds of coal, and frequently extracted only the bright clear glassy coal, leaving benches of equally as good fuel, and thinner beds, oftentimes in such condition that the coal was hopelessly lost for all time.

These reprehensible practices were not through ignorance upon the part of the owners and managers, because a majority of the original stock of coal-mining men came from England, Scotland and Wales where, speaking generally, methods of mining prevail that result in the maximum yield of coal from each acre of land. The late Jos. S. Harris estimated the average marketable yield in the anthracite region as 33⅓ per cent. of the original content. This has since been increased in various ways, but the loss of good coal is still very large.

Destructive Mining Methods

These destructive methods were only tolerated as a matter of grim necessity, because everybody else was doing it, and each mining company in order to live at all must of necessity follow suit. This intolerable waste of such an invaluable resource was fully recognized by all far-sighted mining men, and great and commendable efforts were made to correct it, but with very indifferent success.

It was appreciated that the situation and conditions surrounding the anthracite coal industry of Pennsylvania made it almost imperative, in order to correct the known errors in mining and marketing methods, and to properly conserve the remaining coal, to bring about in some way a combination of the many divergent interests; in other words, to effect what nature evidently intended, a harmonious unity of the whole region.

The first genuine effort in this direction was made by A. A. McLeod, president of the P. & R. R.R., in 1892-3, when he succeeded in leasing the C. R.R. of N.J., and the Lehigh Valley R.R. He also brought out what was known as the 60 per cent. contract, which was offered to, and accepted by most of the individual operators. This contract provided that the railroad company or its subsidiary coal company would buy the output of the individual operator's mine, paying therefore 60 per cent. of the price realized for the sale of the coal at tidewater points. The immediate result of the measures instituted by McLeod was a steadying effect in the market. Anthracite coal for a time ceased to be a football, at the mercy of anybody who felt like kicking it, and became a stable article of commerce at a fair price to the consumer and a reasonable profit to the producer. Unfortunately, for the proper conservation of the coal in the ground and for the operator who had his money invested, the McLeod system did not last long, as he was ousted in 1894 and the old methods of cutthroat competion again prevailed, so that the year 1895 was the most disastrous in the history of the industry.

Employees Were Made to Suffer

The operator was not by any means the only sufferer by reason of the conditions described. The employees were made to bear their share of the general distress, and in some instances, more than their share. The old Workingman's Benevolent Association, known as the W. B. A. which had helped the miners for a time to extort reasonable wages from the employers, broke up on account of internal dissensions in 1875, and for a long period the employees were unable to organize for their mutual protection. During the life of the W. B. A., most of the employees of the whole anthracite region were organized, which forced the operators to come together for mutual defense.

The operators' organization was inharmonious and less effective than it should have been; the northern members, particularly those in the Lackawanna region, breaking away from the other members and making agreements with the organized miners that could not be accepted by the southern operators, on account of the widely different natural conditions.

Many of the working methods adopted during the life of the W. B. A. became standard, and governed the compensation of employees after the disruption of the union. The most important of these was what was known as the "sliding scale" which provided that the rates of wages paid should be a certain percentage of the prices realized at tidewater. This system was in vogue in the southern field and to some extent in the Lehigh region, but not in the northern field.

Employers Took Unfair Advantage

The disbandonment of the W. B. A. left the employees at the mercy of the employers with the usual result of unrestrained power in the hands of any body of owners. In order to cut down the operating costs, many unfair advantages were taken of the mine workers. This was made easier by the large influx of laborers from Hungary and other countries of southern Europe, which began about 1881 and continued until the whole complexion of the operating force at most of the mines was changed, so that by 1895-98, 50 to 60 per cent. of the mine employees were of this class.

It is not fair to call these immigrants ignorant and undesirable acquisitions, as most of them were young and vigorous workmen and many of them could read and write in their own language. The fact that they knew no English, and that they came from countries where laborers' compensation is pitifully small, was taken advantage of by the anthracite operators, and in many cases they were paid less than standard wages, and used to break down the average that had been established by years of effort, and by numerous strikes and lockouts.

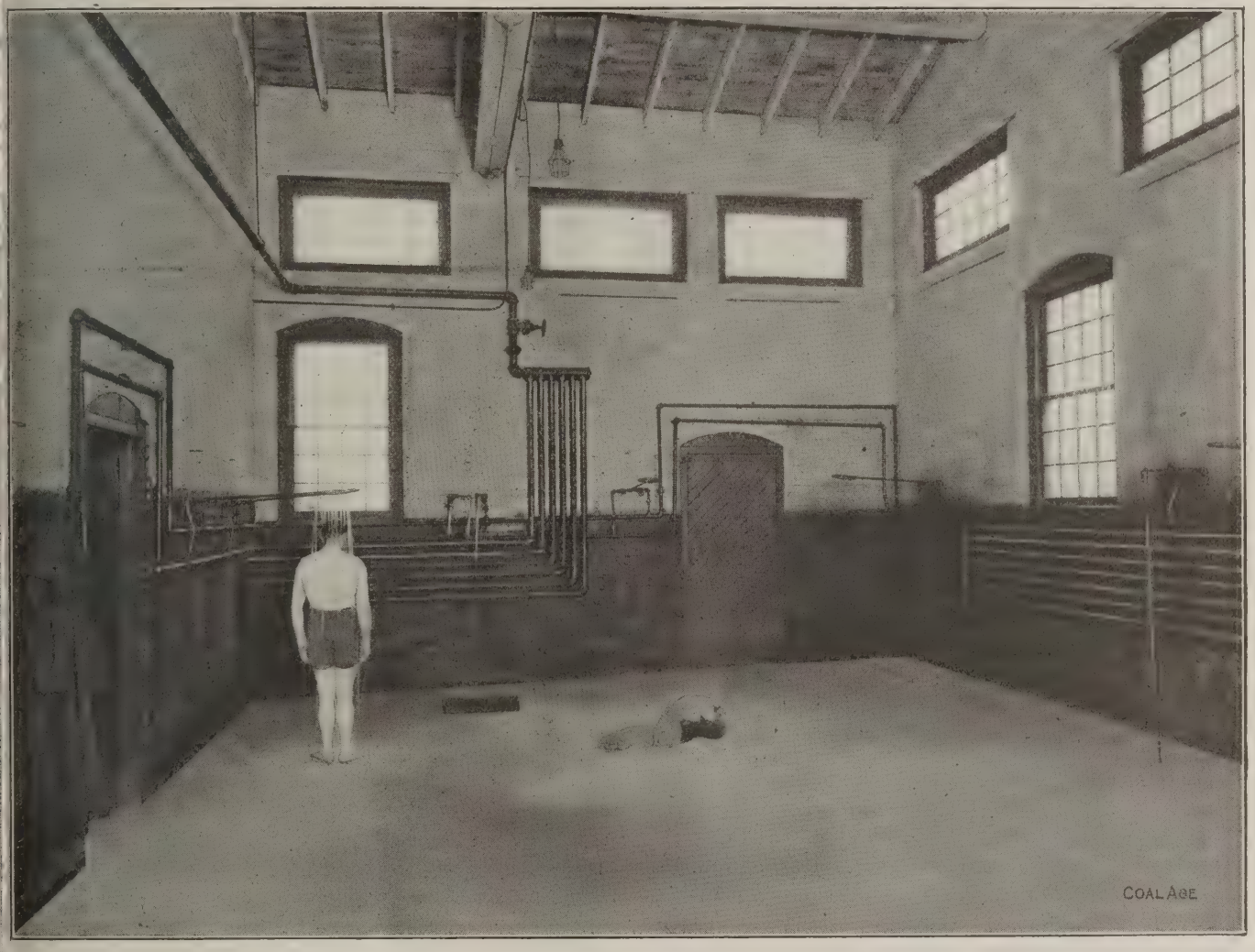
Another iniquity that was enforced by the operators, because they had the power, was in compelling the miners to purchase from the company powder and other mine supplies at exorbitant profits—powder that cost the operator $1.00 per 25-lb. keg was sold to the miner at $2.25 to $2.75 per keg. The individual operators also reaped large profits from their company stores; in many instances, compelling the employees to patronize these "pluck me" institutions, under penalty of losing their jobs, and as there was usually a plentiful supply of labor it was a serious matter for a man to be discharged. The company store abuse and the extortionate prices for powder and supplies have long since been corrected.

The powder extortion was enforced in the northern and Lehigh regions, but in the southern field, where the P. & R. Coal & Iron Co. is the dominant factor, it was sold at a moderate profit. This company also deserves credit for a generally more strict observance of agreements than many others.

The disastrous year of 1895 and the remembrance of the satisfactory conditions prevailing during the McLeod regime brought home forcibly to all mining companies the absolute necessity of some kind of combination or community of interest. Efforts were made in this direction, but were frustrated by the usual jealousies between the railroad-owned mining companies, generally called the "Big Companies." The individual operators were always at a disadvantage in competition with the big companies, who could afford to produce coal at a loss and depend upon the freight profit to even up, while the individual must earn enough during the life of his lease to repay his capital outlay, and as much more as possible to make his profit.

Independent Operators Combine

In the hopes of improving their condition, a majority of the individual operators, controlling a substantial tonnage, formed a corporation for the purpose of building their own railroad from the northern coal field to tide water. A route was selected, surveys made, and they even bought a large consignment of steel rails. This movement was headed by an aggressive and successful firm in the northern field who operated six or seven collieries of large capacity. The aggressive tactics of the individual operators' association and the threatened further competition in transportation of anthracite coal alarmed the financial backers of the several railroad companies, and overtures were made which, it is said, contemplated the purchase by the combined railroad companies of nearly all of the individual holdings. The result of this offer was the sale of the Simpson & Watkins Collieries to a corporation known as the Temple Iron Co. This concern was backed by five of the anthracite railroad companies. This sale stopped the construction of the inde-



Showers in Miners' Wash House, Storrs Mine of D., L. & W. R.R. Co.

pendent railroad, and the Temple Iron Co. has ever since been regarded as the instrument through which the "coal trust" has controlled the business.

The directors of the Temple Iron Co. were the presidents of several of the principal anthracite railroads. This sale broke up the individual operators' association, but as there were still some resourceful and successful operators whose properties had not been absorbed by the so-called trust, the business was by no means a monopoly. The Pennsylvania Coal Co. owned valuable mines and 70 miles of railroad, known as the Erie & Wyoming Valley R.R., from the mines to a connection with the Erie R.R. at Hawley. This company, together with the late Edw. L. Fuller, of Scranton, at that time controlling the Seneca Coal Co., and others, obtained an option on the abandoned Delaware & Hudson Canal from Honesdale to Rondout, on the Hudson River. It was proposed extending the E. & W. V. R.R. to the Hudson by building on the old canal site.

This threatened invasion of the transportation field by another competitor forced the financial interests to buy the Pennsylvania Coal Co., and its railroad, for the enormous sum of $27,000,000, and turn it over to the Erie R.R. for about $30,000,000.

Gradually other individual holdings were bought in by the railroad companies, between 1895 and 1900. Many complaints were made by the mine employees relative to their wages, and occasional local strikes were inaugurated, but as the men had no organization, no substantial concessions were made.

Labor Troubles Commence

In 1897 the dissatisfaction became so great in the Lehigh region that striking employees at Audenried and McAdoo marched in a large body to other mines and compelled the men to join them. This marching continued for several days until finally on Sept. 10, 1897, a large body of marchers approached Lattimer. They were met by the sheriff of the county with a posse. They were ordered to disperse, but did not do so, when they were fired upon by the posse and 16 men were killed and others wounded.

This lamentable affair ended the strike, but it did not allay the discontent of the men, who continued to agitate their grievances, and gradually locals of the United Mine Workers of America were secretly organized. In 1900 the U. M. W., at a convention in Indianapolis, ordered all anthracite mine workers to quit work.

The managers of the coal companies had laughed at the pretensions of this soft-coal union, believing that such a small percentage of the anthracite employees were members that no attention would be paid to a strike order, so that they were much surprised on Sept. 17, when practically all the men failed to report for duty. The whole region was tied up. The operators believed that it was only a question of a short time when they would win, but did not reckon with the political situation. Mark Hanna, who was conducting the campaign for President McKinley's second election, feared that unless the strike were settled it might cause the defeat of the Republican candidate. He therefore went to J. P. Morgan and laid the matter before him. Financial interests could not brook the possibility of a change in administration at that time, so the anthracite railroad presidents were ordered to settle. The coal companies were thus compelled to open negotiations with John Mitchell and his advisers for a settlement of the strike.



Two Views of New Office Building of Lehigh Valley Coal Co., in Wilkes-Barre, Penn.

The settlement was based on a 10 per cent. advance in wages, part of which, so far as the mines were concerned, was made up by a reduction in the price of powder.

The Strike in 1902.

The men demanded other things that were not conceded, but they had gained a substantial victory, much more than the pecuniary advantage, and had succeeded in organizing the whole region, so that when their demands were refused in the spring of 1902, the call to strike was obeyed. This strike lasted until fall, and was settled by the intervention of President Roosevelt, who with the consent of the contending parties, appointed the Anthracite Strike Commission. The award of that commission has been the basis governing the relations between employers and men ever since.

The 1900 and 1902 strikes compelled the operators to get together and to work in harmony, and as a result they established the market value of anthracite coal on a more stable basis than ever in the history of the industry. Besides this advantage, the conditions prevailing for the past dozen years have made it possible to pu

nto effect at the mines measures of conservation that ıave resulted in a much better yield of coal from a given area of ground worked over; to institute safety neasures for the protection of the employees, and to gen-rally elevate the standards of business methods far above ıny thing before attempted. Most of the credit for this atisfactory state of affairs is due to the late George F. Baer, president of the Philadelphia & Reading Co.

This rather lengthy rehearsal of the salient features of an industry that bears a most important part in the welfare of over one-third of the inhabitants of the United States, is for the purpose of emphasizing in the strongest possible manner the statement, that under no circumstances should it be permitted to fall back into the conditions prevailing prior to 1900.

It appears inevitable that the railroads must absolutely get out of the business of mining coal. When their mining enterprises are separated from them, a plan to manage the production and distribution of anthracite coal that will embrace practically the whole region should be adopted; in short, it should be a benevolent monopoly, directed by a supreme trustee, or board of trustees, acting in the public interest. Government ownership, which has been talked of by some legislators, would be extreme folly, for a business requiring the special training necessary to properly handle it, such as this, should under no circumstances be allowed to fall into the hands of politicians.

Price of Coal to Consumer Will Not Be Reduced

The hope of many that a severance of the relations between the railroad companies and their mining interests will result in a material reduction of the price of anthracite coal to the consumer is not likely to be realized. It is well known that many mines controlled by the railroad companies do not earn profits at all commensurate with the investment therein, and others are operated at an actual loss. Such operations when placed upon their own resources must either obtain more money for the output, or be abandoned. Therefore, should the freight rate for hauling anthracite coal to market be reduced, the amount of such reduction, or a considerable part of it, will probably be added to the price of the coal at the mine.

The permanent closing of any number of the mines now unprofitable or near that point, would be a calamity, for the present demand for anthracite coal is very nearly equal to the capacity of the whole region. The capacity cannot be greatly increased.

The suggestions made in this article, that the industry as a whole should be directed by a board of trustees or commissioners, is made at this time with a view to stimulating discussion of the subject. Of course, such a plan could only be made effective with the consent and coöperation of all parties interested. The plan might be modeled somewhat on the lines laid down for the conduct of the affairs of subsidiary corporations of the New York, New Haven & Hartford R.R., although the magnitude and importance of the anthracite industry far exceeds those New England enterprises.

Duties of Proposed Commission.

It is tentatively suggested that a governing body such as indicated might be charged with the following duties:

A.—The full and complete carrying out of the agreements between employers and men.

B.—The observance of all the legitimate obligations of the several mining companies to their security and stockholders. Each company, of course, must stand on its own foundation.

C.—The output of the mines would naturally flow to market over existing transportation lines, but the commission should be empowered to direct the same to the best interest of the several mining companies, and the proper supply of fuel to the public.

D.—The commission should be empowered to fix the price at which coal should be sold to consumers after due consideration of all the factors that should justly govern.

In this connection the testimony of the late George F. Baer, president of the P. & R. R.R., in the case of the United States vs. Reading Co., the Phila. & Reading Co. et al., in 1909, is illuminating. The testimony of Mr. Baer is as follows:

> The result is that coal can be produced in the Wyoming region, where they have no serious water problems and where the veins are nearly flat, and where they are not so thick, and, therefore, less mine timber is required, at from 40 to 50c. a ton cheaper than we can. . . We, therefore, must fix a price on coal that will enable us to operate our mines, and the other regions naturally get the benefit of it. There is a natural law on that subject which has been stated by all writers on political economy. For the purpose of accuracy, I have formulated it: "The price of the entire supply of anything necessary for a community will be regulated by the cost of production of that portion of the necessary supply which is produced at the greatest expense." Anderson, Malthus, Ricardo, Smith and everybody since have practically laid down that rule, and it is a law of common sense illustrated in various ways. Here are two farms. They may be side by side; one can grow wheat to the extent of 20 bu. to the acre, the other 30, but there will be no difference in the price of the wheat. If the price of anthracite coal were fixed so as not to yield a profit to our coal and iron company, the result would be that the mines would stop for a short time, and the price of coal would necessarily go up, because the withdrawal of 30 per cent. of any commodity would naturally affect the price, and the final result would be that, the price advancing, our mines would resume operations again. Therefore, it is the general custom of the other companies, I believe, to follow our circular. We fix the best price we can get, and the Wyoming region and the people that can produce coal cheaper than we do necessarily follow our price, because it would be foolish for them to undertake to cut it when there is a market for the reasonable output of existing mines, taking it year in and year out. (Transcript of Record, Supreme Court of the United States, October term, 1911, No. 477, Vol. V, p. 1176.)

E.—Power should also be vested in the commission to prevent undue waste of coal by improper mining methods.

F.—The commission should be empowered to require uniform methods of accounting by all of the mining companies.

Coal Production During 1913 in the German Empire

The total German coal production in metric tons was 191,511,000; lignite was 87,116,000, and briquettes, 7,964,000. This output shows an increased production over that of the year previous of 10.39 per cent. in coal and 5.80 per cent. in lignite.

Germany exported in 1913, 34,573,000 tons of coal and 6,411,000 tons of lignite.

In this connection it may be remarked that the German Empire has become a formidable competitor of Great Britain in the exportation of coal and coke.

New Power Developments of the D., L. & W. Coal Co.

By H. M. Warren*

SYNOPSIS—This company has recently installed a large power plant at Nanticoke, Penn., containing 4000-kw. turbo-generators using superheated steam. An exhaust-steam turbine unit, supplied with a Rateau regenerator and a cooling tower, located at Kingston, operates in multiple with the above plant.

In 1905, the Delaware, Lackawanna & Western R.R. Co. constructed near the town of Nanticoke, Penn., an electrical generating station containing three 303-hp. Babcock & Wilcox boilers, and three 500-kw. vertical Curtis turbines, generating current at 4150 volts, 3 phase, 60 cycles.

The station was built large enough, however, so that later two additional boilers and two additional turbines were added, making a total capacity of 2500 kw. The load on this plant gradually increased until the station became much overloaded.

About two years ago it was decided to increase the capacity of this plant, and as the new mining developments in this section will require a constantly increasing amount of electrical power, it was considered advisable to design the addition to accommodate turbines of large capacity. The addition is now constructed and contains two 4000-kw. Allis-Chalmers turbines, each having a maximum capacity of 6000 kw. The boiler plant is arranged to accommodate 20 Babcock & Wilcox 303-hp. boilers, set in batteries of two boilers each. At the present time, however, only eight boilers are installed, although the foundations are completed for the entire number.

Fig. 1 is an exterior view, showing the addition to this plant, the old installation being seen in the rear. It will be noted that the turbine room proper is inclosed by a temporary wall at the end, the general design being such that additional generator capacity can be installed by extending the generator room as designed, providing the necessary increase in boiler capacity in a building or buildings constructed at right angles to the original boiler room.

Fuel Is Delivered in Railroad Cars

Fuel is delivered in railroad cars directly over the coal bunkers, from which it runs by gravity through vertical pipes to the boiler room, where it is hand-fired to the boilers. As the fuel used is locally known as No. 2 Barley, a size smaller than Barley, or No. 3 Buckwheat, it contains a considerable amount of very fine material, causing large quantities of dust, and in designing the boiler plant, particular attention was given to so arrange the settings, ashpits and main flues, that this large volume of material could be flushed from these various points by means of water into the ash cars. This is an important point, for if provisions were not properly made to handle this dust, the expense of removing it or the consequent inefficiency of operation if it were allowed to accumulate, would be objectionable from an operating point of view.

Referring to Fig. 2, showing a section through the boiler plant, the general arrangement will be noted. The dust referred to is flushed from the ash pit, and the space back of the bridge-wall, through the two pipes shown in the section, into the ash car.

The grates are of the stationary pinhole type, having about 4½ per cent. air space. In cleaning these, the ash is pulled forward and allowed to drop through removable

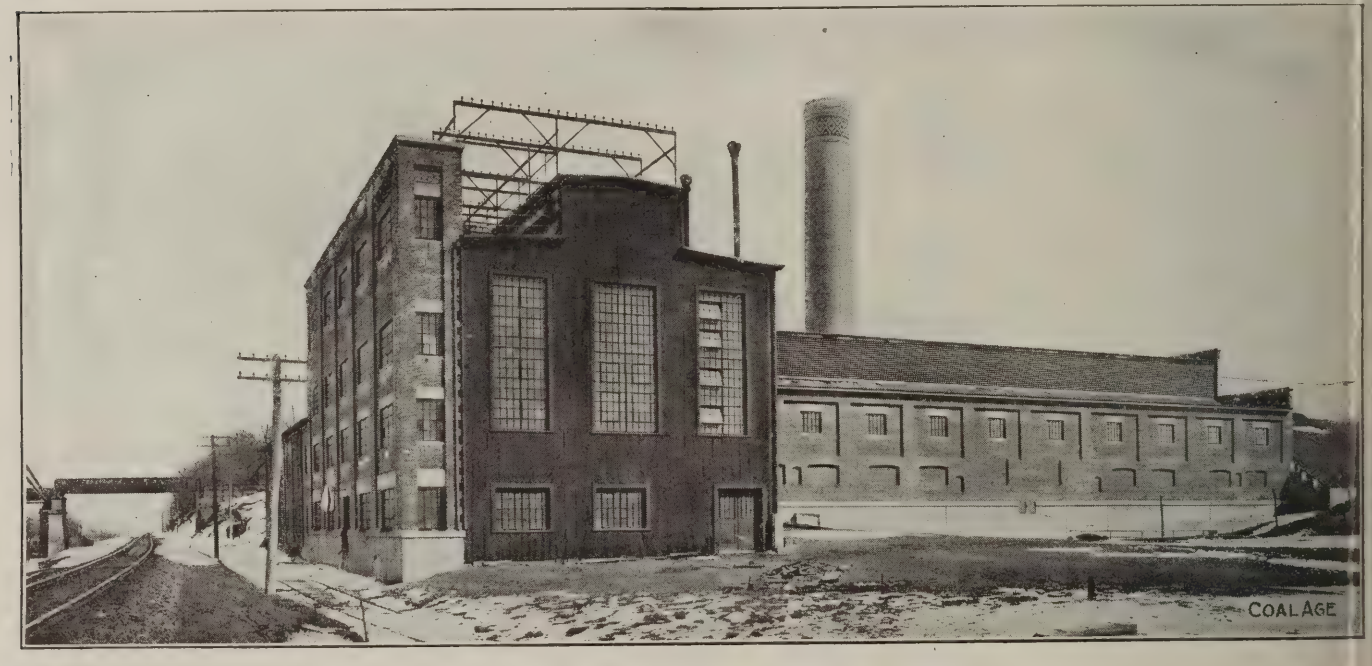


Fig. 1. Exterior View of Power-Plant Addition

*Electrical engineer, Delaware, Lackawanna & Western R.R. Co., Scranton, Penn.

ad plates into the ash car as shown. Thus there is no cumulation in the ash pit proper, except such fine dust may work through the grates. This is actually a comratively small amount.

As forced draft is used, it is important that the ash t be kept tight, to prevent air leakage; and to take care this situation a 4-in. wall consisting of a single course brick is built from the foundation vertically to the ont end of the grates and back of the dead plate. As a sult, the ash pit is always practically air tight, and l trouble is avoided due to any air leaking out through iat would normally be the ash-pit doors.

As only eight boilers are installed at present, only the ain flue required to serve them and the two additional ilers that will be installed later on this side of the ant, was built. The flue on the opposite side of the ant will be constructed when required.

Referring to Fig. 4, the general arrangement of the ain flue and stack is shown. The bottom of the flue pitched toward the stack from either end and the enre conduit is lined with glazed hollow tile. This marial was used because of the heat to be withstood, and e fact that water will be used for flushing out the ist.

When cleaning the flue, water is introduced through ie or more cleaning doors located in the building wall xt to the flue, the material running out to the point the center of the plant to an opening in the ain floor. From this point, it runs through a pipe ider the boiler foundation into the ash pit, where it is livered into the ash car.

The ash-pit floor is pitched so as to drain to five ctangular sumps. These are covered with cast-iron atings and are connected together near the top by tile pe. The material in suspension can settle in these nks, but the water is allowed to run free, discharging ially through an overflow pipe to the outside. The mps can be cleaned as occasion requires.

The steel ash cars are provided with roller bearings d arranged for side dumping. After being loaded they e pushed by hand to the turntable shown and from ere to a point just outside of the building, at the curved rtion of the track. From this point they are hauled an incline by means of a small steam-driven hoist, lo-ted at the elevation of the fuel track. The ash is at e present time dumped, from this elevation, to form a l that can at some later date be used for additional el tracks which may be required if a new boiler plant tion is built. Later on, it is proposed to load the ash to railroad cars for final disposition.

The boilers, rated at 303 hp. each, are set in batteries two. The grates are 11 ft. 6 in. wide, 8 ft. deep, and ve a total area of 92 sq.ft. The ratio of heating surce to grate area is 33 to 1.

Superheated Steam Is Used

Each boiler is equipped with a B. & W. superheater, signed to give 150 deg. superheat. As the temperature the superheated steam increases as the boiler is forced, e number of boilers actually using forced draft, at any ne during the day, is varied, depending upon the load, d in this manner the temperature of the superheated am is kept practically constant regardless of power quirements.

The usual boiler-plant auxiliaries, such as blast fans for producing the forced draft, boiler feed-water heater, and feed-water pumps, are located in the turbine room instead of in the boiler room, this having been considered desirable as the turbine room is naturally cleaner, and in addition all the machinery is in this way placed under the supervision of the operating engineers.

Two Jeffrey single-inlet blast fans, each 9 ft. in diameter and 3 ft. 6 in. wide, are located at one end of the ash tunnel, see Fig. 4. These deliver air to the two air tunnels from which it reaches the ash pits, being controlled by dampers in the bridge wall.

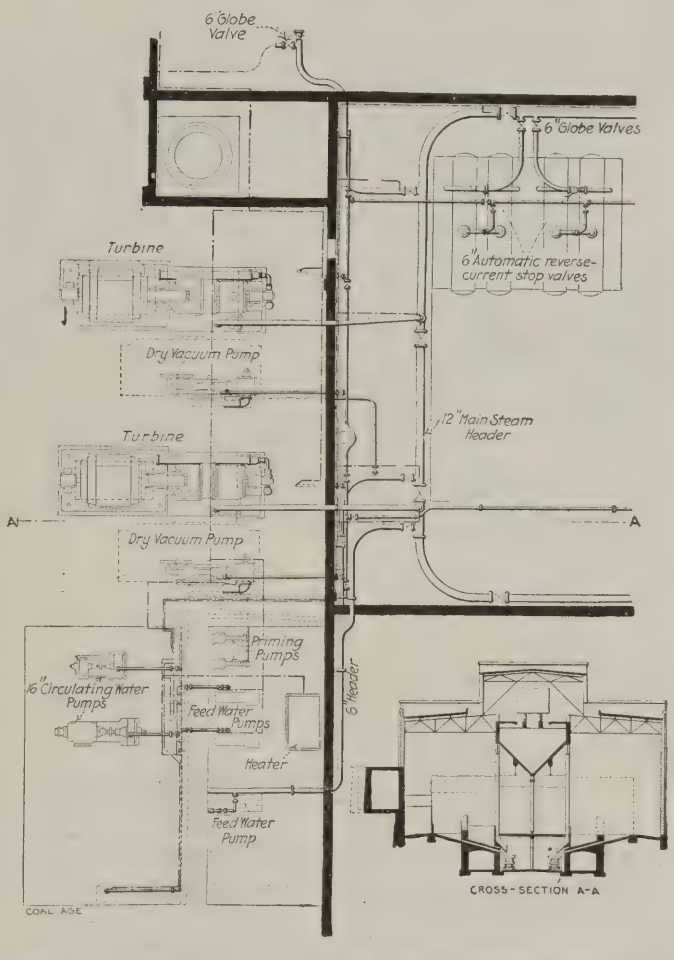


Fig. 2. Part Plan of Plant and Section through Boiler House

With the blast fans located in the ash tunnel, as shown, all the air used for the forced draft must be drawn through this tunnel. This insures a supply of good air at all times in the tunnel, eliminating any danger of the ashmen being overcome by gas.

In the summer time the air entering the tunnel will come through the opening in the side of the foundation wall through which the ash cars are taken; also through the doors at the foot of two stairways that lead from the firing-floor level into the ash pit. In the winter time, however, in order to avoid freezing in the ash tunnel, most of the air will be taken through the doors leading from the stairways with the opening of the ash track to the outside air partially or entirely closed.

The stack, which was built by the M. W. Kellogg Co., is 12 ft. in diameter, 125 ft. in height, from the top of grates, built up of hollow radial brick with an expansion

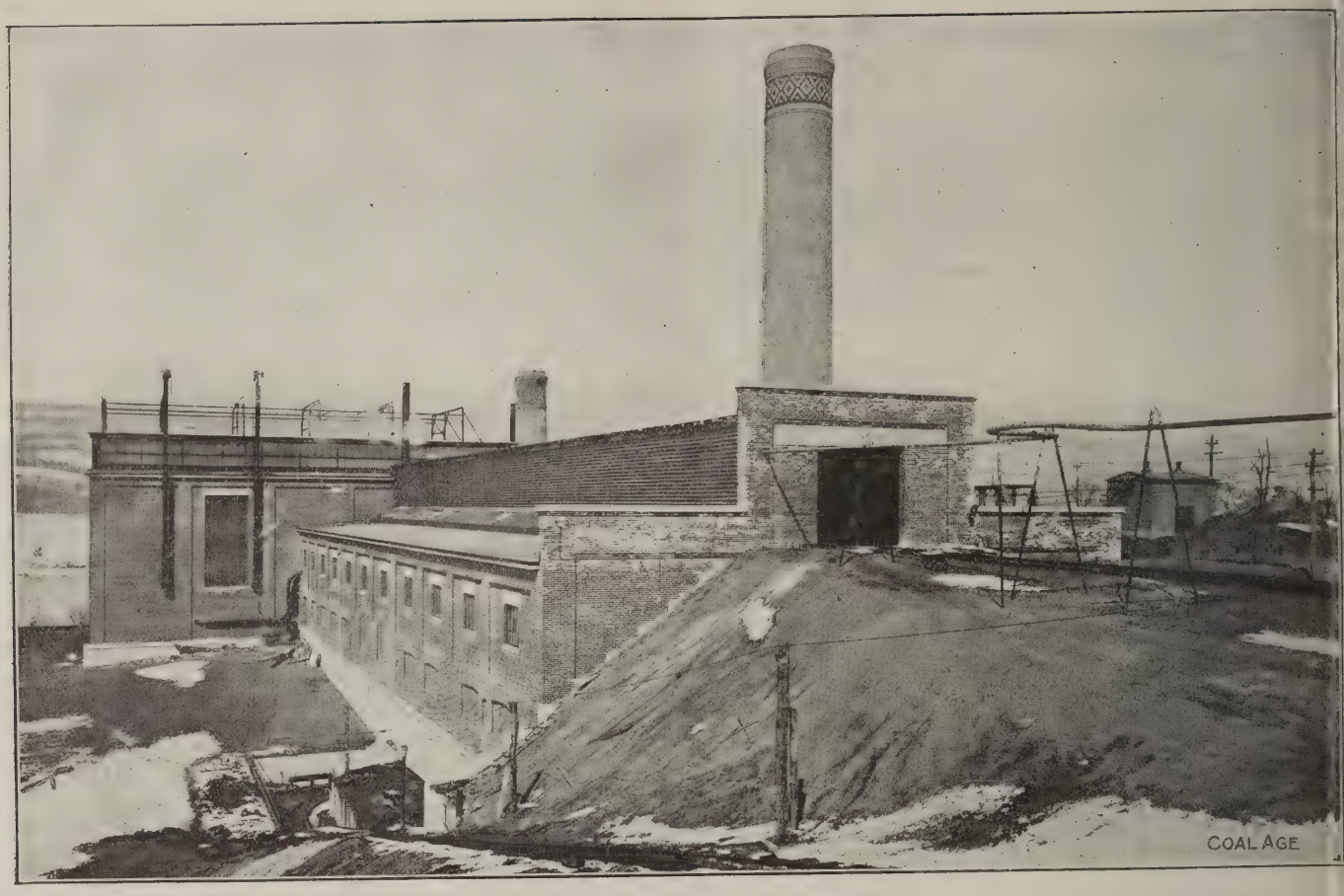


FIG. 3. VIEW OF BOILER AND POWER PLANT, SHOWING LOUVERS, SKYLIGHTS AND ASH-CAR INCLINE

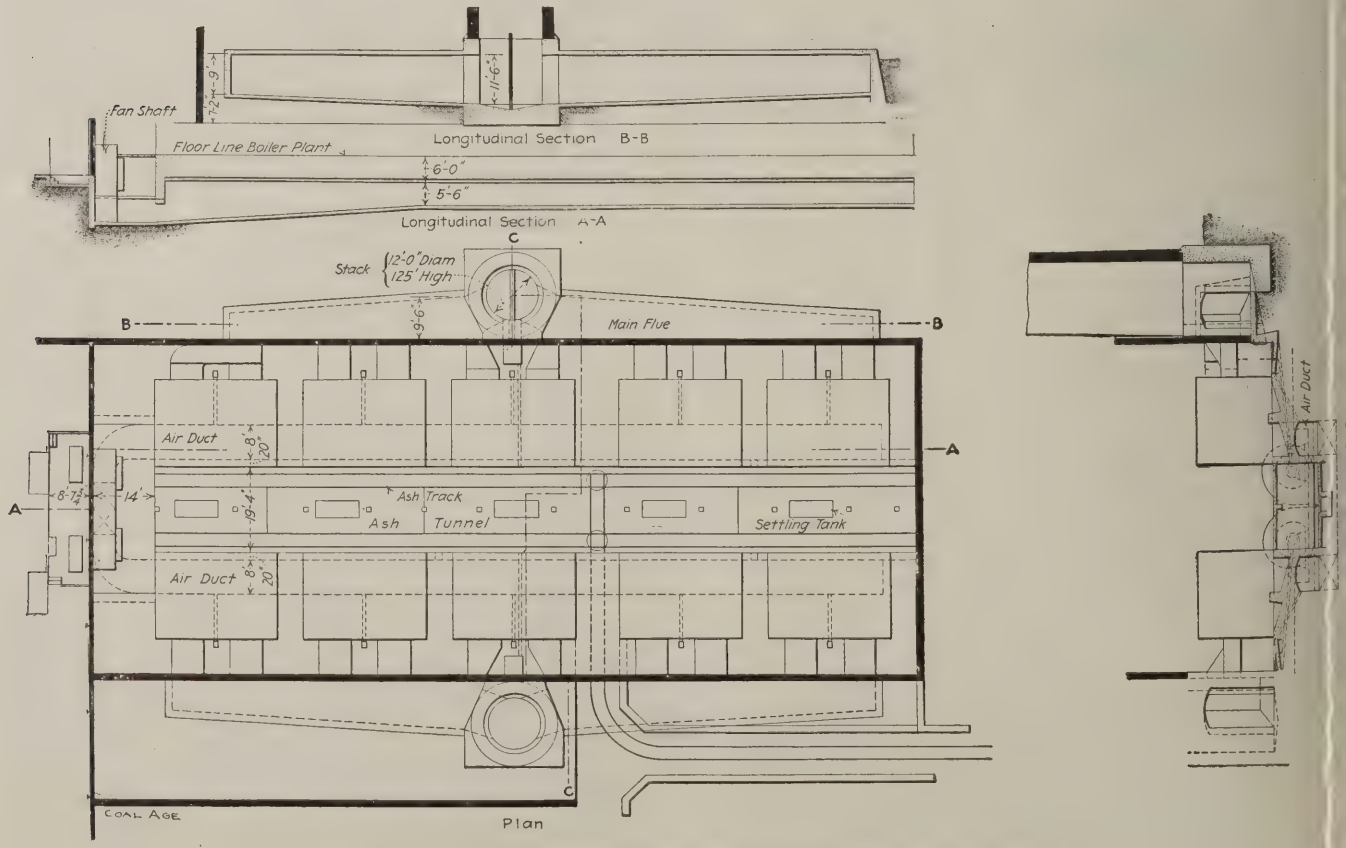


FIG. 4. ARRANGEMENT OF FLUES, AIR DUCTS AND STACKS

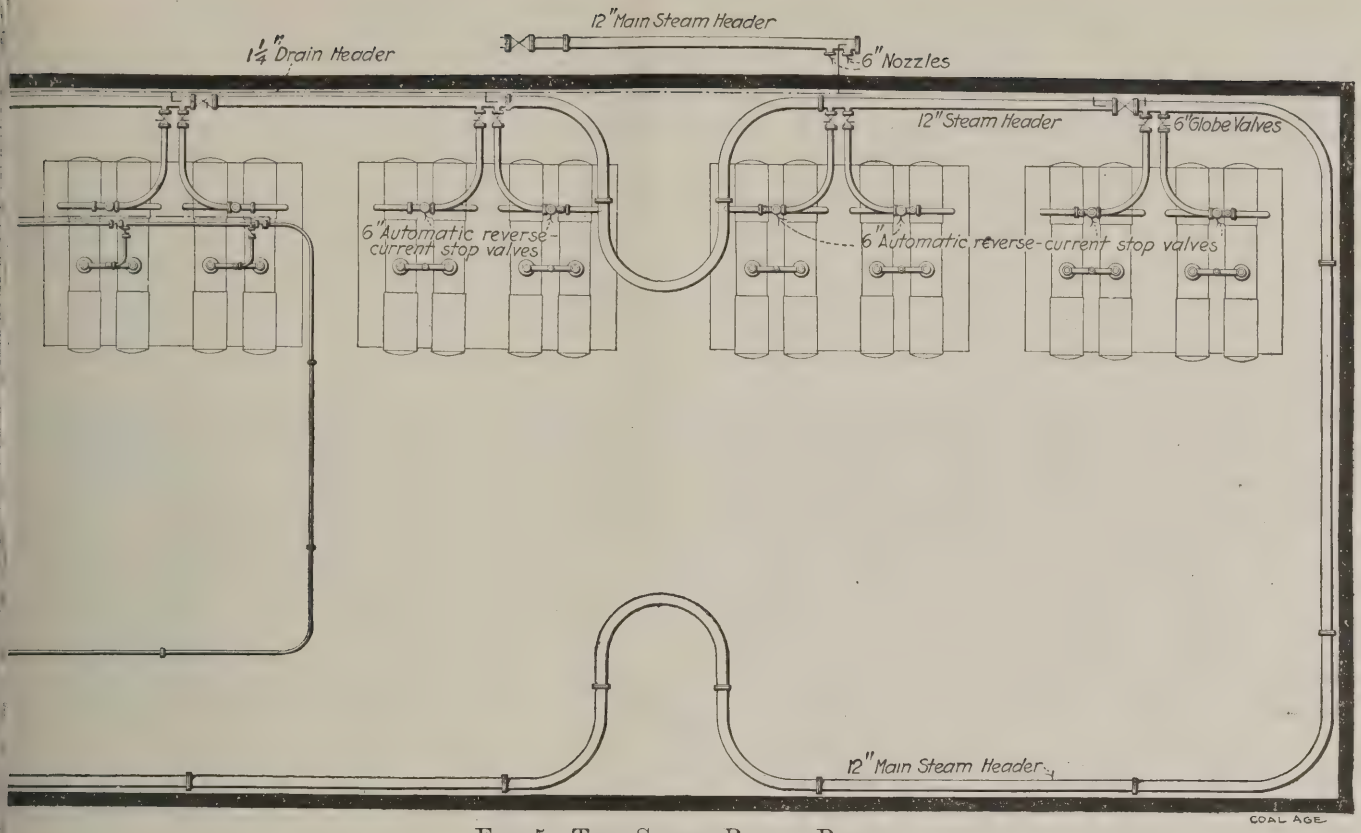


FIG. 5. THE STEAM-PIPING PLAN

ining wall extending on the inside for 30 ft.; a vertical partition rising from the base of the stack to a point 5 ft. above the flue opening insures proper draft conditions, in the event of only a portion of the boilers being used. This stack is protected by lightning rods of the usual construction.

In Fig. 3, note the incline up which the ash cars are drawn to the fuel-track level. In order to insure a free ventilation of the boiler room, louvers are extended the entire distance of the monitor. These are made of monel metal, in order to avoid any trouble due to action of the gases that might escape from the firing room.

In addition to the windows in the side of the boiler room, light is provided by a wire-glass skylight running the entire length of the boiler plant on each side of the monitor, extending on an incline from the bottom of the louvers to the main roof, as shown in the photograph.

As ashes were used for a considerable portion of the main fill on which the fuel cars are handled, and as there was a possibility of these taking fire, rock and clay were first dumped against the retaining-wall at the end of the building, for a considerable distance in order to eliminate any chance of fire injuring this wall, and as the main flue was built of concrete, although lined with hollow glazed tile, it was protected in the same manner before leveling off the ground with ashes.

A Loop Piping System Is Employed

The final arrangement of the high-pressure steam main is such that it forms a loop around the interior of the

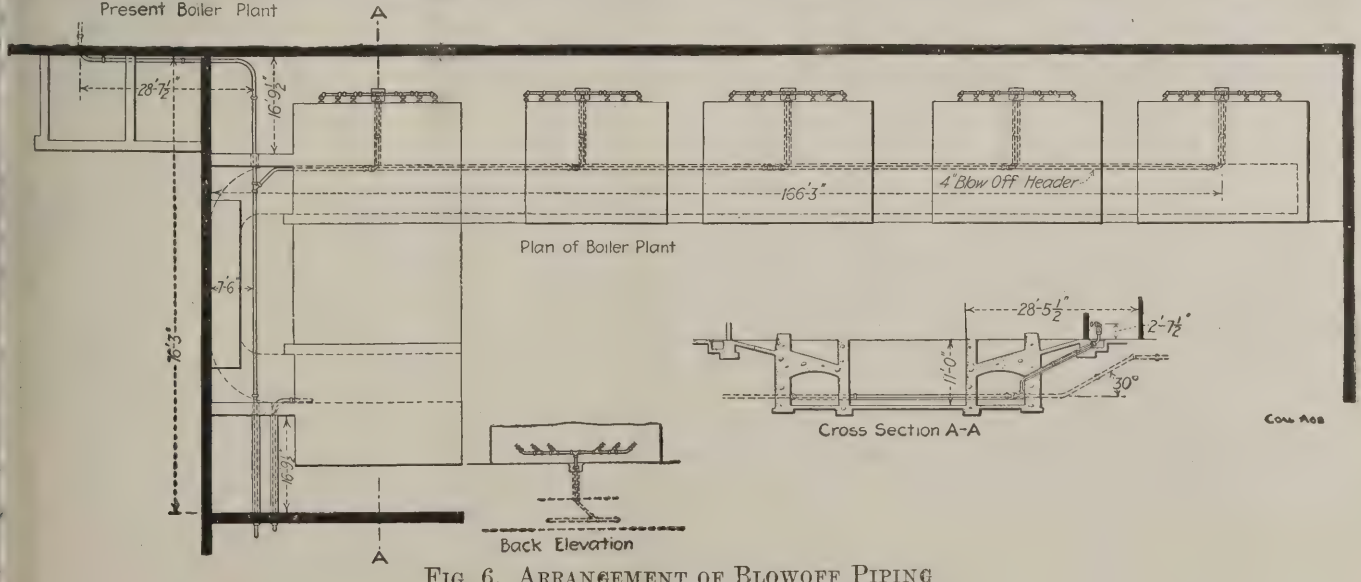


FIG. 6. ARRANGEMENT OF BLOWOFF PIPING

boiler plant, running back of the boilers and being supported from the building wall on brackets. As only eight boilers are installed at present, the loop is not completed and ends with the eighth boiler. It is also blanked off where the branch leads into the turbine room for supplying steam to the circulating pumps.

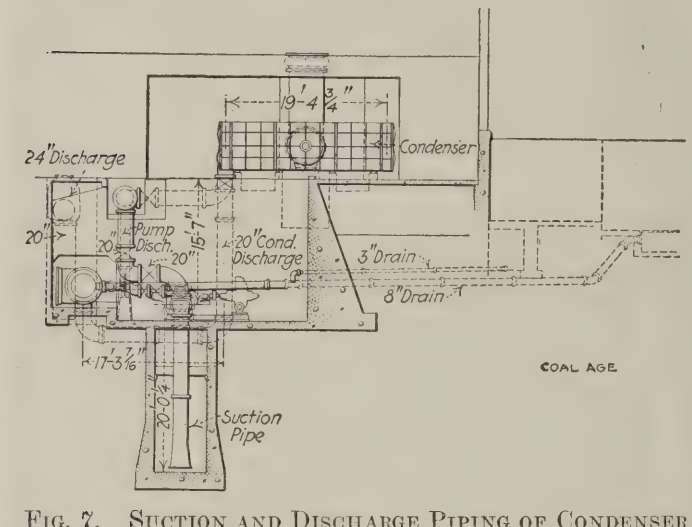


FIG. 7. SUCTION AND DISCHARGE PIPING OF CONDENSER

Each boiler is connected to the main through a non return valve placed on the boiler outlet and a stop valv where the boiler lead enters the main. These two valve insure absolute safety when a boiler is cut out for in spection.

All high-pressure piping is made up of standard full weight pipe, provided with reinforced Vanstone joints Where the size of pipe is too small to permit this joint the flanges are welded. Fittings are avoided as much a possible by the use of welded nozzles, therefore eliminat ing a large number of joints. On the superheated steam lines where it is necessary to use any fittings, they ar made of cast steel. The valves were manufactured b the New Bedford Valve Co. and those used on the super heated-steam lines have cast-steel bodies, nickel-bronz seats and disks and nickel-steel stems.

As it was not considered advisable to use the high-tem perature superheated steam on the blast-fan engines, ro tative dry-vacuum pumps, priming pumps, and servic pumps, the 4-in. high-pressure main is connected to fou boilers to provide dry saturated steam for these units.

The boiler feed line extends from the feed pump in the turbine room through the boiler room, return ing in the form of a loop. This is a cast-iron line except where bends occur to provide for expansion These are made of wrought-iron pipe, with welde flanges. Each boiler is equipped with a high- an low-water alarm and a "Watch-dog" automatic feed regu lator.

Blowoff piping is arranged, as shown in Fig. 6, t consist of steel pipe with welded flanges, and cast-stee fittings where required. All joints are male and femal to prevent any possible chance for gaskets blowing ou while the pipe is in operation. The blow-off connection for each battery of boilers are led to a common pipe a shown, this passes through a pipe laid in the concret foundation of the boiler to the air duct, where it con nects to the main blow-off pipe. This leads out throug the building to a blow-off tank.

TWO 4000-KW. TURBINES ARE INSTALLED

The turbine room contains two Allis-Chalmers Mfg Co.'s high-pressure steam turbines, operating at 180 r.p.m., having a normal rated capacity of 4000 kw. an a maximum of 6000 kw. These are each connected to 13,500-sq.ft. rectangular horizontal-flow surface conden ser having 1-in. tubes. The condensate of each machin is pumped out by a two-stage turbine-driven centrifuga

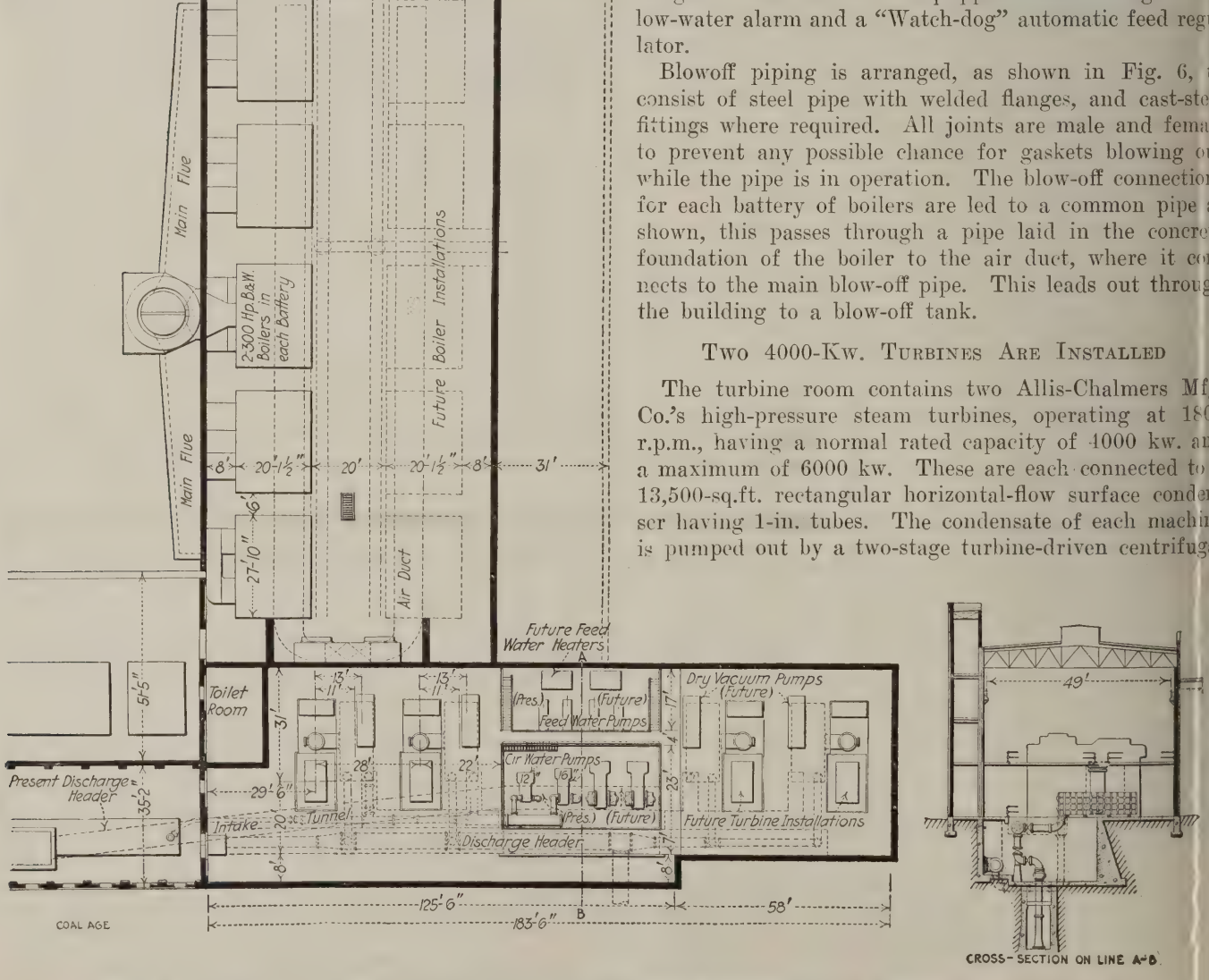


FIG. 8. GENERAL LAYOUT OF ENTIRE PLANT, SHOWING PROVISION FOR FUTURE INSTALLATIONS

pump, designed to deliver against a head of 30 ft. to the feed-water heater. Each condenser equipment is also served by a 12x30x18-in. horizontal single-phase rotative dry-vacuum pump.

The circulating pumps consist of an 8000-gal. per min. bi-impeller centrifugal pump driven by a noncondensing steam turbine and a 4000-gal. per min. single-impeller centrifugal pump similarly driven. The condensers, with their auxiliary equipment, were furnished by the Alberger Pump & Condenser Company.

The condensing water is taken from the Susquehanna River, which flows parallel to the power plant and about 200 ft. distant. At the old plant at Nanticoke, there was provided a vertical shaft in the turbine room connected to the river by a tunnel. This tunnel was partitioned in the center, one side acting as an intake for the water, and the other, as the discharge.

On account of the additional amount of water required for future service, it was decided to use this tunnel entirely as an intake, discharging the circulating water to the river through a 48-in. cast-iron pipe.

As the Susquehanna River rises about 22 ft. in the wet season, it is necessary to either use vertical pumps, placing the driving turbine or motor above the high-water mark, or to provide a practically water-tight pit. The latter scheme was employed in the addition, a large shaft being sunk in the rock and connected to the bottom of the old shaft by means of a rock tunnel. In this excavation and at the proper elevation, a heavy concrete floor was provided, on which rest the turbine-driven circulating pumps, at such an elevation that they will lift the water without difficulty when the river is at its lowest point, the floor being sufficiently impervious to exclude practically all the water when the river is high.

A Water Seal Is Formed

In order to reduce power required to handle the circulating water to the lowest possible amount, the connections are such that after the water passes through the condensers, it is piped downward to a point below the level of the 48-in. discharge line so as to form a seal and in this way obtain the advantage of the vacuum due to water dropping this distance. This works out satisfactorily in practice, and at times the advantage obtained has been such as to produce 13 in. of vacuum at the top of the condenser—thus reducing the average effective head of the circulating pump about 14½ ft. See Fig. 7.

There are three boiler-feed pumps, two being Alberger centrifugal pumps, each having a capacity of 250 gal. per min. against a pressure of 165 lb., each driven by a Kerr steam turbine; the third is a 5-in. 3-stage Alberger centrifugal pump having a capacity of 500 gal. per min., and driven by an Alberger Curtis turbine.

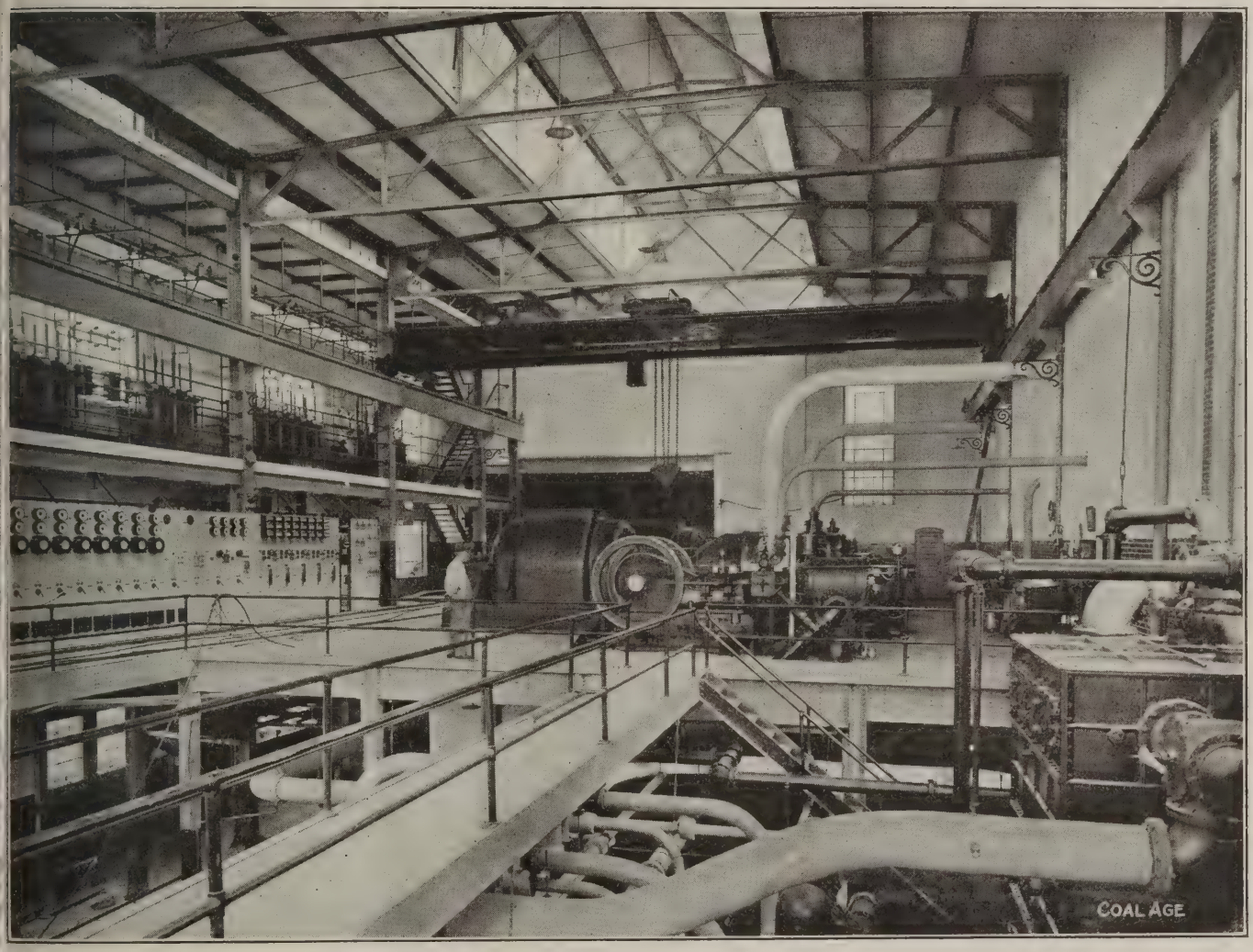


Fig. 9. Interior of Turbine Plant

To provide a constant head of water available for the sealing glands of the turbines, a steel tank is located at one end and at the top of the switchboard gallery. To this, water is piped from a high-pressure water-supply line, the pumping plant of which is also located at this power plant, and also from the service pump located in the shaft. Float valves placed in this tank control the flow of water from these lines, thus insuring a constant supply at all times and at a uniform head, eliminating the possibility of losing the vacuum on the turbines due to a failure of water for the sealing glands.

It will be noted that all of the auxiliaries are steam rather than motor driven, and all of the turbine-driven auxiliaries are supplied with superheated steam. The exhaust from all is led through the exhaust piping to a 6000-hp. Cochrane feed-water heater. Arrangements

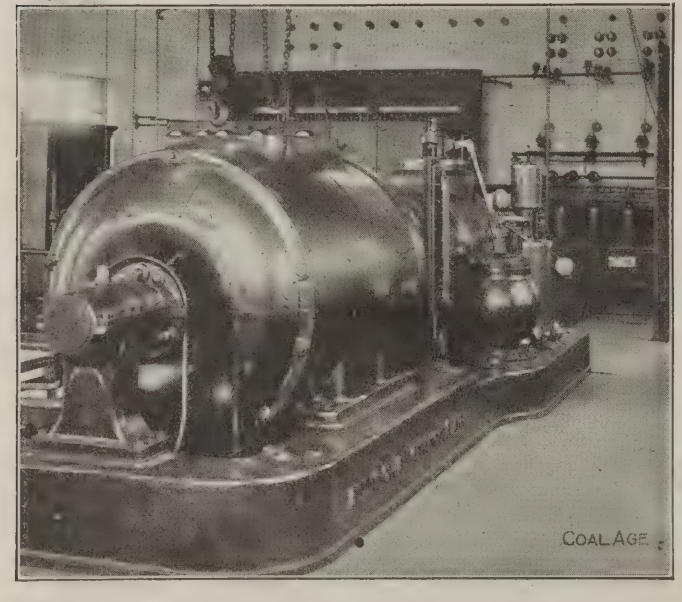


FIG. 10. ONE THOUSAND-KILOWATT, LOW-PRESSURE TURBINE UNIT

have been made so that an additional 6000-hp. heater can be placed alongside the present one, at some future date.

A 20-ton hand-operated traveling crane is available for handling all the equipment, except the two Ridgway (11x16-in.) blast-fan engines and the condensers. To facilitate the removal of tubes and cleaning of condensers, I-beams are supported from the steel work of the turbine floor, and located in front of the condenser heads, so that by means of an ordinary chain hoist and trolley on the I-beam, these heads can be easily handled.

THE OPERATING SWITCHBOARD IS ON THE TURBINE FLOOR

From the photograph, Fig. 9, showing the interior of the power plant, the general arrangement of the switchboard and high-tension switches can be seen. The operating board is placed on the turbine-room floor, for easy access of the watch engineer. The new portion of the board, with its oil switches and current and potential transformers, choke coils, and instruments, was furnished by the Westinghouse Electric & Manufacturing Co. The old portion of the board, shown near the right-hand end of photograph, furnished by the General Electric Co., was formerly in the old station and has recently been moved, so that all the switchboard panels will be together.

High-tension oil switches are of the remote-control solenoid-operated type and, as will be noted, are placed on the gallery above the operating board. In this manner, all high-tension current is kept away from the operator and confined to the high-tension switch gallery and the gallery above, in which are placed the choke coils, and lightning arresters, with their disconnecting switches.

The direct-current power required for operating the high-tension switches and overload relays, is furnished by a set of lead storage batteries, consisting of 60 cells, having a capacity of 80 ampere-hours. These cells are charged by a small motor-generator set. They also furnish power to an emergency lighting circuit, in case the turbines should, for any reason, fail. In this event, a switch automatically connects the battery referred to, to a lighting circuit in the boiler room and one in the turbine room.

This plant supplies electric power to the Truesdale, Bliss, Auchincloss, Avondale, Loomis and Woodward Col-

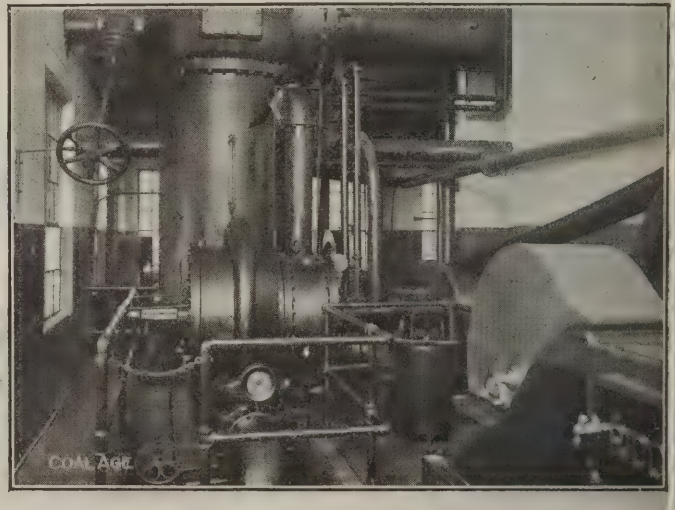


FIG. 11. LE BLANC CONDENSER, BELT DRIVEN FROM A RIDGWAY ENGINE

lieries. Because of the distance to the Woodward colliery and the fact that this line will eventually be extended still farther, the voltage of this circuit is stepped up from 4150 to 16,000 volts. At the Woodward colliery, and operating in multiple with the Nanticoke plant, is a 1000-kw. Allis-Chalmers exhaust-steam turbine.

EXHAUST-STEAM TURBINE PLANT, WOODWARD COLLIERY, KINGSTON, PENN.

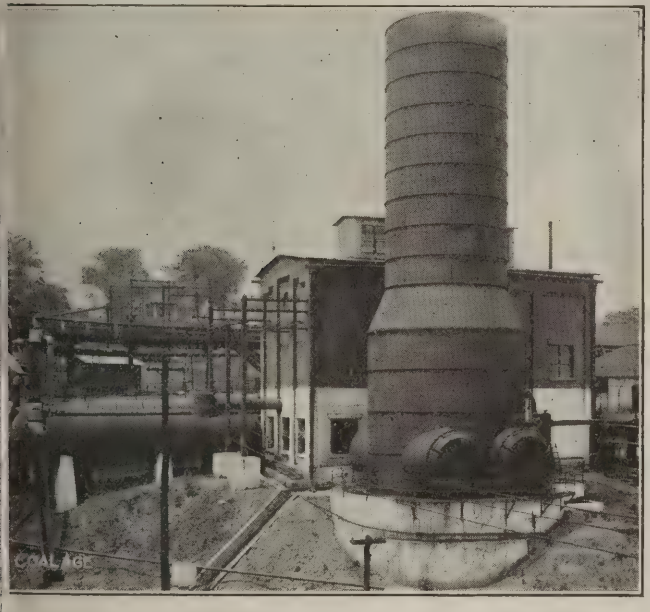
This exhaust-steam turbine, Fig. 10, draws steam from the various engines about the colliery, such as those driving mine-ventilating fans, breakers, generators and hoists. There is available about 20,000 lb. of steam per hour from engines that operate at practically a constant load, and in addition to this, there is an extremely variable quantity of steam from the hoisting engines, which averages about 20,000 lb. per hour, making a total of 40,000 lb.; but because of the variations due to the hoisting engines, the exhaust steam is first taken through a Rateau regenerator. This is about 40 ft. long, 6 ft. 6 in. in diameter, and contains about 40 tons of water.

From the regenerator the steam passes through a large Sweet separator next to the turbine. A Le Blanc condenser, Fig. 11, together with its air pump, is driven by a belt from a four-valve Ridgway engine, which also drives

he exciter. As no adequate supply of condensing water as available, it was necessary to use artificial cooling. The water after it leaves the condenser is accordingly umped direct to the top of a Henry R. Worthington ombined forced- and natural-draft cooling tower, see ig. 12.

Because of the necessity of using a cooling tower, it is nportant that the condenser be as efficient as possible in rder to keep down the amount of circulating water re- uired, or, in other words, it was advantageous to employ condenser equipment which would operate at a temper- ure very close to the theoretical. This would not only ep down the amount of water circulated, but would so deliver the same through the cooling tower at the ighest possible temperature under the given conditions. his, in turn, would tend to make the cooling tower ore efficient.

Ordinarily, the Le Blanc condenser would have been riven by a steam turbine, but because of the large nount of power required to operate the condenser equip- ent when delivering water to the cooling tower, the uantity of steam taken by an outfit using a turbine ive, was considered excessive. For this reason, a belted



G. 12. Exterior View of Woodward Plant, Show- ing Cooling Tower and Regenerator

uipment was used, with the result that the steam con- mption required to do this work was about half what would have been with the turbine. With the engine ive, considering the fact that the exhaust from this ma- ine passes through the low-pressure turbine, the ef- iency of this unit, as will be readily seen, is extremely gh.

The cooling tower, being of the natural- and forced- aft type, is equipped with four fans which are driven a vertical Troy engine. Under actual operating con- ions, with the barometer normally at 29.2 in., the cuum on the turbine is from 26 to 28 in., depending on e outside temperature—the vacuum in all cases cor- ponding closely to that theoretically possible, consider- g the temperature of the injection water and the ight of the barometer.

This turbine unit delivers power at 4150 volts, 3-phase, cycles, and as before stated, operates in multiple with the Nanticoke plant, but because of the transmission line having a higher voltage, transformers are installed at this plant to step up the potential. One feeder, how- ever, runs direct to the colliery substation inside the mines, at 4150 volts.

As this turbine can only run at such times as exhaust steam is available, the normal operation is for about 10 hours each working day. The output averages about 8300 kw.-hr. per day, about two-thirds of which is used at this colliery, the remainder being transmitted back to the Nanticoke plant.

As there is a steam plant at this colliery, operating during the day at about 3500 boiler-hp., the necessary boiler feed water is taken from the discharge of the con- densers at the low-pressure plant, and an equivalent amount made up into the cooling tower basin from water mains. This materially assists in keeping down the tem- perature of the injection water.

The Oldest Mine in Anthracite Regions

The Lehigh Coal & Navigation Co.'s No. 1 Tunnel at Nesquehoning, Penn., which was originally known as the Room (Rhume) Run Tunnel, is undoubtedly the oldest anthracite mine tunnel in operation. The exact date of opening is not positively known, but is presumed to be 1830. The Room Run Railroad, built to carry the coal from this tunnel to Coalport, was constructed in 1831, and the tunnel had unquestionably cut some of the veins prior to this date.

"Statistics of Coal," by R. C. Taylor, published in 1855, states that 334,929 tons of coal were secured from this tunnel in the year 1837, and that eight seams were being worked in 1847.

This tunnel has been in continuous operation since its opening, the present daily output being about 1300 tons. Coal will likely be brought out through the tunnel for a period 30 years longer.

Engineers' Society of Western Pennsylvania

On Friday, May 29, the society organized a metallur- gical and mining section. A paper on the "Progressive Alteration of Coals of the Northern Appalachian Fields" was read by David White, chief geologist, U. S. Geologi- cal Survey, Washington, D. C.

The society visits today, Saturday, June 6, the works of the Keystone Coal & Coke Co., near Greensburg, in- specting a modern coal washer and Belgian coke ovens at the Huron mine and a large electric rope haulage at the Crow's Nest workings.

Interesting Articles Next Week

The June 13 issue of Coal Age will contain a number of articles of much value to all coal-mining men. One article will suggest that reinforced-concrete mine timber- ing has advantages over steel and wood. Another will deal with the engineering methods of the Lehigh Valley Coal Co. A third article will describe a new steam hoist- ing engine. Other subjects covered will be "A Novel Lining for Shafts," "Reliability of Electric Signals in Mines," etc.

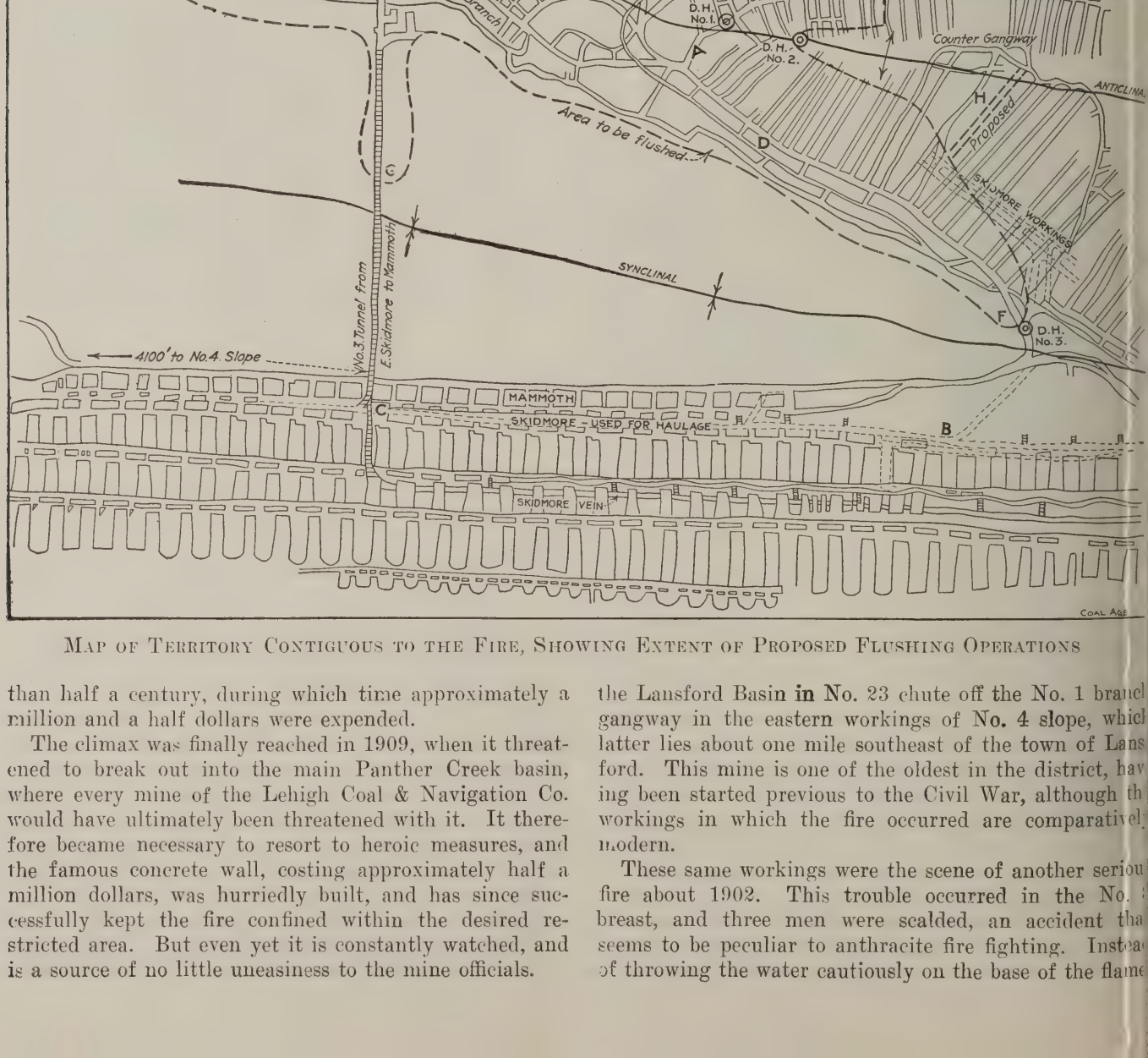
The New Mine Fire in the Panther Creek Valley

By A. T. Shurick

SYNOPSIS—A brief description of the new fire at the Lehigh Coal & Navigation Co.'s operations. The fire was practically beyond control before discovered, and will be sealed off, and the workings flushed. Extensive preparations for carrying this out are under way, including the construction of two miles of standard-gage railroad.

Any mention of a mine fire in the Panther Creek Valley must inevitably convey thoughts of the disastrous Summit Hill fire, the largest in the history of the mining industry of this country, if not the world. This historical conflagration stubbornly resisted every effort to extinguish it, made at intermittent intervals, for more than half a century, during which time approximately a million and a half dollars were expended.

The climax was finally reached in 1909, when it threatened to break out into the main Panther Creek basin, where every mine of the Lehigh Coal & Navigation Co. would have ultimately been threatened with it. It therefore became necessary to resort to heroic measures, and the famous concrete wall, costing approximately half a million dollars, was hurriedly built, and has since successfully kept the fire confined within the desired restricted area. But even yet it is constantly watched, and is a source of no little uneasiness to the mine officials.



Map of Territory Contiguous to the Fire, Showing Extent of Proposed Flushing Operations

Some Other Mine Fires in This District

While the new fire is not in any way connected with the old original Summit Hill conflagration, it is none the less interesting to note that the present trouble is in the hands of engineers who have had a great deal of experience along this line. It might be added further that the bituminous engineer has little conception of what an anthracite mine fire in the Mammoth Vein means. The physical conditions of operations in this vein are such that large areas are mined, which are practically inaccessible for either inspection or survey, and it was in such a place as this that the new fire originated.

The fire occurred at the point *A* on the south side of the Lansford Basin in No. 23 chute off the No. 1 branch gangway in the eastern workings of No. 4 slope, which latter lies about one mile southeast of the town of Lansford. This mine is one of the oldest in the district, having been started previous to the Civil War, although the workings in which the fire occurred are comparatively modern.

These same workings were the scene of another serious fire about 1902. This trouble occurred in the No. breast, and three men were scalded, an accident that seems to be peculiar to anthracite fire fighting. Instead of throwing the water cautiously on the base of the flame

it was played recklessly on the main portion of the fire, with the result mentioned.

Origin of the Present Fire

The workings in which the present fire occurred had been standing idle for about three months, pending improvements and changes in the ventilating system, and were only again being reopened. It is therefore impossible to say just how long the fire had been burning; it may have been smouldering for some time and made rapid headway when the ventilation was restored.

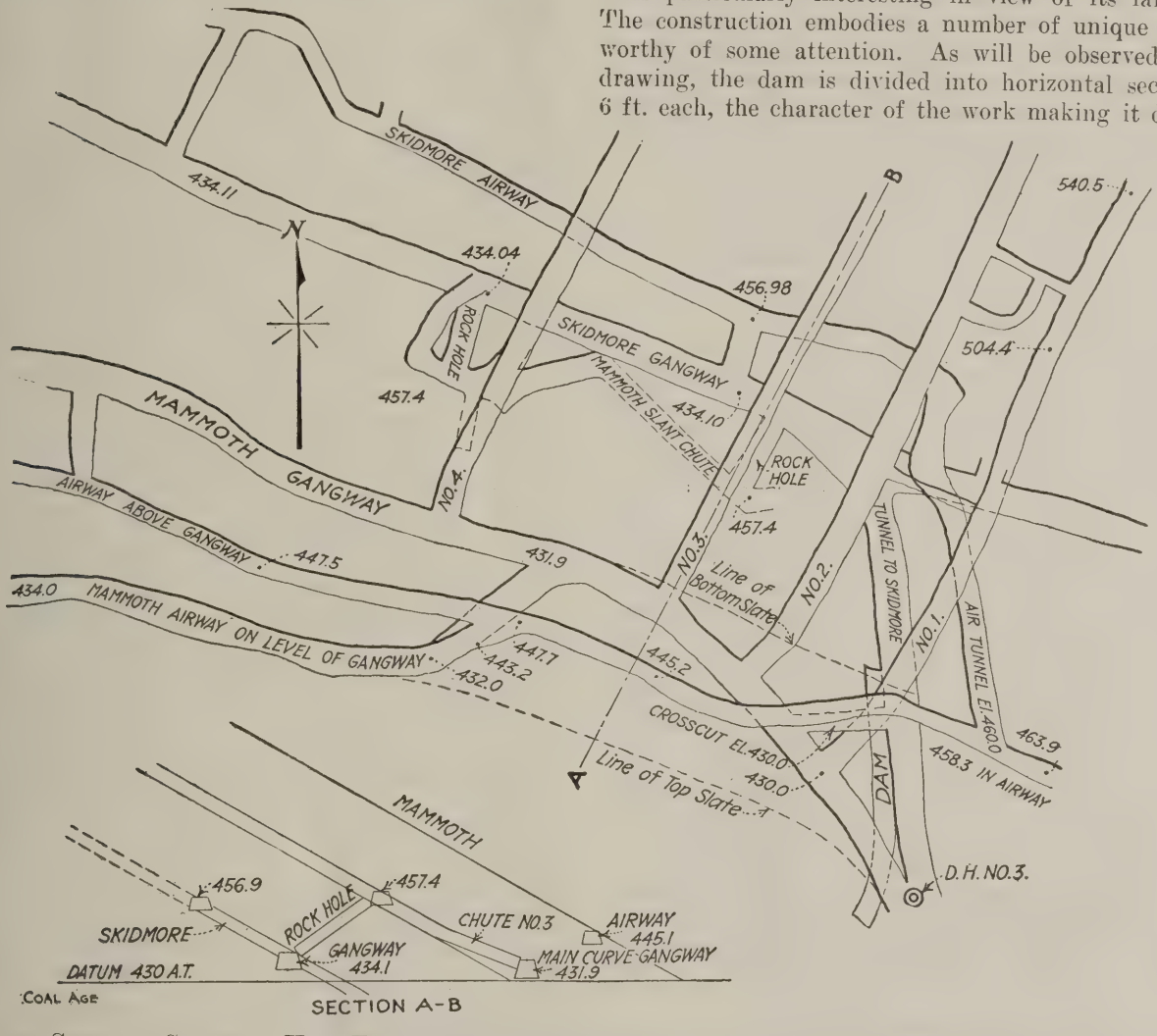
The fire was discovered on Saturday, May 2, and an attempt was made to put it out with an ordinary fire hose. A 2½-in. line was laid in toward the fire, but before it was reached a number of men were overcome and it was necessary to lay the last four lengths with the aid of Draeger helmets, which proved very effective. A second fire line was then established from a pump located at the No. 3 Tunnel from the Mammoth Vein to the Skidmore at the point *C*, noted on the map; 800 ft. of hose was laid through the tunnel, and 750 ft. through the airway and gangway of the Mammoth Vein up to the fire. On Monday, May 4, at 8 p.m., both the fire lines were pouring water on the blaze.

It had become evident by this time that the fire would be exceedingly difficult to handle, and after a conference with the state mine inspectors it was decided to seal it off. Temporary stoppings were accordingly put in on the No. 1 gangway on the Mammoth Vein at the point *D* and also at the point *E* at the connection of the No. 3 North Tunnel with the Mammoth Vein workings. It was at the same time decided to put in concrete dams at the point *F* in the Mammoth Vein workings, and *G* about half way through the No. 3 North Tunnel.

Elaborate Dam Construction

Detail drawings of these dams are shown herewith, and it will be noted that the one designed for use at the point *F* is particularly interesting in view of its large size. The construction embodies a number of unique features worthy of some attention. As will be observed by the drawing, the dam is divided into horizontal sections of 6 ft. each, the character of the work making it desirable to lay each of these sections separately. To secure a firm joint between the different sections, a concrete key about 18x24 in. is provided, together with reinforcements projecting from the top of one section into the base of the next one above.

Since the structure acts as an actual dam only for about 10 ft. of its height, reinforcements against heavy pressure are provided only at this point, as will be noted in the drawing. It will also be observed that it is the intention to concrete the adjoining gangway in which it is proposed to intersperse steel supports between the existing timber sets, which will either be removed or left in, as may seem the most desirable when the concreting begins.

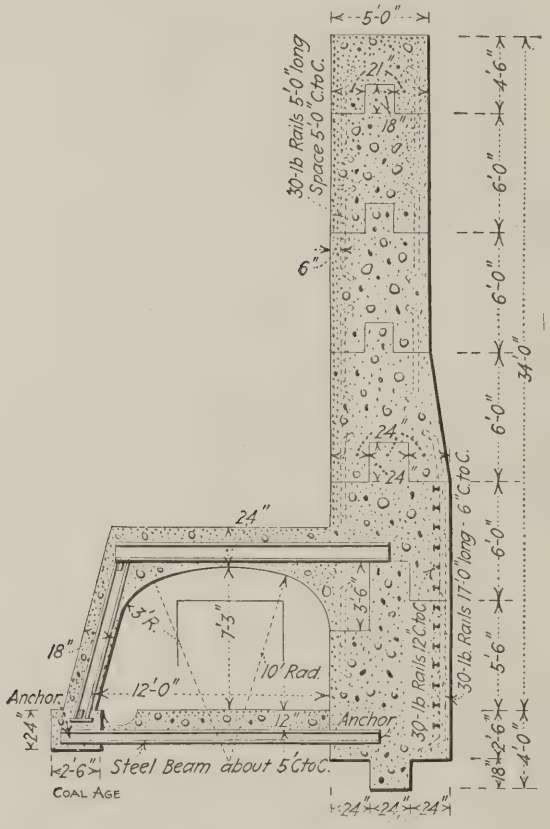


Plan and Section, Showing How Flushing Operations Will Be Conducted from the No. 3 Drill Hole through the Skidmore Vein

The second dam in the No. 3 North Tunnel is relatively small as compared with the one just described, and embodies no unusual features. Provisions will, of course, be made in both dams for obtaining the temperatures behind the structures, together with samples of the gas and any other data that may be necessary.

The Drill Holes

The complete inaccessibility of the fire has, of course, made it necessary for the company to resort to flushing through drill holes from the surface. It is planned to use only three holes, and it is believed that, together with the underground openings, it will be possible to reach all of the affected area. The holes are to be located as shown on the accompanying drawings at Nos. 1, 2 and 3. Nos. 1 and 2 will be 8-in. holes about 800 ft. deep, and No. 3 will be 10-in. in diameter and 890 ft. deep.

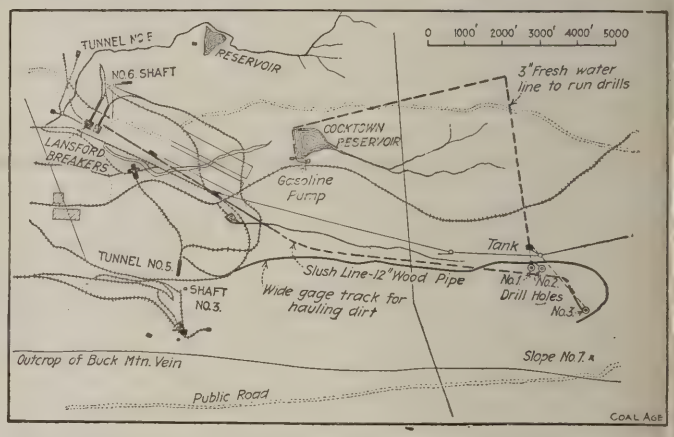


The Main Dam Located at "F"

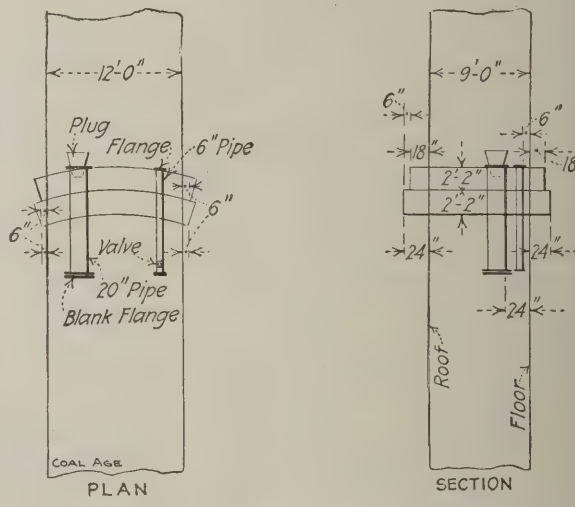
Referring again to the accompanying map, it will be noted that the holes Nos. 1 and 2 are located in the highest portion of the fire territory. It is believed that the flushing material will run out into at least all of the area in the immediate vicinity which is essentially in the center of the fire zone. The area between the large dam at *F* and the fire will be filled through drill hole No. 3. As will be observed, this hole lies outside of the sealed off area, and is therefore accessible under ground. Material from this hole will be conducted by direct pipe connections from the bottom of the hole in through the Skidmore Vein and then by rock tunnels, driven at an angle of 35 deg. up into the Mammoth Vein. A cross-section of these proposed tunnels, and the general location of them, will be found in the accompanying drawings.

Surface Plants

No figures regarding the amount of material that will be required are available but it is obvious that there will be sufficient needed to justify the installation of the most economical methods available. In the accompanying drawing, a rough map of the proposed surface installation is given. It will be observed that this involves the construction of two miles of standard-gage railroad. The



Surface Installations for Flushing and Drilling Operations



Dam in the No. 3 North Tunnel

curvature and grade of this line will be comparatively heavy, but the construction will not involve much work amounting to little more than barely surfacing the track except for one short stretch where there is a moderate fill in breaking away from the main line.

The material to be flushed will be hauled over this line and washed down the holes by the flush water from the Lansford breaker. The water line from the breaker to the drill hole will be 7600 ft. long, and made up of 14-in. wood pipe, together with whatever miscellaneous pipe is available. This water will be handled by a 42x20x72 single-acting pump manufactured in the local shops; it has a capacity of 1500 gal. per min., and will be working under a 230-ft. head. As will be observed on the drawing, a fresh-water line is provided to supply the drills.

Boilers left full of water while out of service often suffer from external corrosion because the cold surfaces condense the vapor in the air and corrosion is rapid, especially in the presence of the sulphur compounds in soot.—Bromley in "Power."

The Colorado Strike

SYNOPSIS—Further light is being obtained by the public regarding the strike in Colorado. The Industrial Relations Committee has heard a lurid account from Mrs. M. H. Thomas and Mrs. Jolly, a detailed rebuttal of the major part of their charges from Major Boughton and a painfully neurotic plea from Judge Lindsey. Meantime the latter has been unsparingly condemned by local chambers of commerce and others. On the whole it seems that an end of the whole agitation will come if the army of the United States removes all men without occupation who are strikers from the zone of trouble.

The Industrial Relations Committee received a visit on May 27 from Mrs. M. Scott, president of the Women's Trade Union League, who brought with her Mrs. P. Jolly and Mrs. M. H. Thomas, the two women who had accompanied Judge Lindsey to New York City and Washington. Mrs. J. Borden Harriman moved that the women be heard.

Mrs. Jolly testified to the excellent relations existing between militia and "strikers" early in the strike. Apparently this changed when a search was made for arms and ammunition. She declared that the miners' families were forbidden with oaths to go to the post office and that in December, when there was deep snow on the ground they were ordered to leave their tents. When a woman with a sick child in her arms tried to return a revolver was placed at her head.

Probably the report of Major-General Chase throws a clearer light on this event, if Mrs. Jolly's statement refers to the Forbes camp in which Chase declares there were no women and children. Mrs. Jolly declared she pinned red crosses over her white dress and wanted to intercede but "all I got was a bullet through the heel of my shoe."

It is needless after having published the report of Major E. J. Boughton for us to rehearse his testimony. Judge Lindsey spent much of his time denouncing John D. Rockefeller and his Colorado aides. He stated:

"The new feudalism, which deliberately refuses personal relations is only a new and novel system of suicide. The President of the United States should prevent it as a policeman seizes the poor devil who is trying to leap into the river."

The court martial of H. E. Linderfelt has been completed and John Lawson, of the United Mine Workers of America, has testified. As we suspected, Lawson showed himself rather a correct than an interesting witness. He aids and abets rather than violates the law by direct action. He did not try to get to the camp at Ludlow until some time after the fight had begun as he was at Trinidad when he learned of the shooting. He did not succeed in entering the colony, and he left it after a few hours, before the fire took place.

USED A WHITE FLAG TO PROTECT HIM AS HE TRIED TO JOIN HIMSELF TO THE ENEMY

With John Boralich, the union chauffer, and Peter Gorman, he had taken an automobile to go into the colony. He pinned a handkerchief on the front of the automobile and tried under cover of this flag to get among the tents. He was in the same condition as a man who tried to run a blockade under the white flag.

We will grant him that his purpose may have been peaceable and not belligerent, but nevertheless he could not complain if he came under fire. Had he approached, not the camp, but the militia with his white flag, the situation would have been wholly different. In fact the strikers by their own testimony have used the white flag as a means of obtaining improper ends and consequently can hardly claim for it any inviolability. Lawson declared he had no guns in his automobile.

HOISTED A WHITE FLAG TO AID IN ESCAPE

The court has returned its verdict. It is thought that it has stated among other things that Premo Larese was killed while attempting to escape with a horse and buggy from the tent colony under the protection of a white flag. He was called upon to halt and he opened fire with a revolver. It may be true that some men were foolish enough to believe that any act not directly belligerent could be performed with immunity under the white flag, but it is intended to be used for surrender or parley and its use for other purposes needs mutual agreement.

THE MILITIA IS ONLY GUILTY OF TECHNICAL ERRORS

It is further understood that the court finds that the soldiers did not know that there were any women and children remaining in the colony after the battle started, that the 11 children and two women were suffocated by exhaustion of oxygen from the atmosphere within the narow confines of the cave, that all were dead before the fire started and that the Snyder boy was shot in the forehead by a bullet from the guns of the strikers north of the colony when the child ran outside during the battle. Carlo Costa, they are said to declare, was killed at the sandhills by the Colorado & Southeastern R.R. tracks in a battle against the state troops.

It is also said that Sergeant Patrick N. Cullen is criticized for failing to give safe conduct to Louis Tikas and that Privates F. M. Mason and Dan Pacheco are condemned for not living up to the articles of war which require that a guard shall protect a prisoner with his own life if need be.

The people of Colorado generally are much stirred at the condemnation of the militia and with reason. Governor Ammons writing to L. C. Paddock of the Boulder "Daily Camera," says that for almost six months as many as 40 stations were maintained scattered over a territory greater in extent than some states without killing a single "striker."

SECRET ORDERS DEFEND MILITIA

The Ancient and Accepted Scottish Rite Freemasons at Denver, Colo., have adopted a strong endorsement of the militia and framed a defense of its martyrs while recognizing that "in this insurrection, as in all actual warfare, there may have been cases of wrong by individual members of the National Guard of Colorado."

The Junior Order of United American Mechanics, Kensington Council No. 16, Denver, Colo., has also made a strong report defending the state government, its militia and its citizens. It calls attention to several important facts and only fear of repetition keeps us from detailing them. It tells how the militia at Ludlow after the battle, despite the fact that their pay was months in arrears, collected $18 for the suffering women and children. It defends the militia from cowardice and says that there were from 400 to 800 men in the Ludlow attack and only 34 men to meet that mob of blood-thirsty foreign anarchists. What wonder we may add that a roughly collected body of men, mine guards, company men and mine workers, white and black, came down from Aguilar to defend the devoted company of militia thus in danger of extermination.

The Kensington Council likewise states: "The tent colony was purposely so located as to command an unobstructed view of the railway depot near at hand where working men were obliged to get on and off the trains. The conduct of the strikers during the winter was such that it was necessary to send a detail of soldiers to meet every train in order to protect the nonunion men from physical violence."

THOSE WHO WANTED TO WORK WERE IMPRISONED

No man wishing to leave the colony and go to work could do so except under guard of the state troops and during the winter over a hundred men were in this way taken from the tent colony under military guard at their own request.

On Apr. 20, a detail of men was sent in the usual manner to rescue a man who had called for help to get away. This time the man was not given up. Then followed the Ludlow battle which we need not again describe.

Hardly less forceful was the defense of the Cañon City Chamber of Commerce. The respectable citizens of Colorado are certainly beginning to take an interest in politics and are sweeping aside those who have used the vote for the defense of disorder.

OVER A HUNDRED EX-SOLDIERS AT LUDLOW

Speaking at Greely, Colo. Adjutant General Chase said of the Ludlow colonists, "I feel a great compassion for those men. They are ignorant foreigners. To my knowledge, 120 were trained soldiers, fresh from fighting in the Balkans and in Bulgaria. One thousand persons were in that tent colony, 700 men and about 300 women. The troops went to Trinidad in an impartial frame of mind to establish peace and order and it was done under the most trying conditions and the work will ever reflect credit on these students, school teachers, merchants, doctors and lawyers—these men who have been called gunmen.

In eight months the strike has cost from $10,000,000 to $12,000,000. This includes $700,000 expended for the state militia, $6,925,000 spent by the United Mine Workers of America and the millions lost by the operators. The total

tonnage for the first three months of 1914 was 2,817,675 tons against 3,638,436 for the same period a year ago, a decline of 22.5 per cent. only.

THE UNION BURDEN

But Lawson states that 8500 men are on strike, that is, we suppose, are on the payroll of the union. The burden of the strike is immense to that organization and it owes a vote of thanks to the U. S. Army for preventing all the army of unemployed and "won't works" from feinting a desire to work for the companies and getting the financial assistance of the union thereafter.

ATTACK ON U. S. TROOPS

The militia secured peace for six months, and also, by the way, 1947 guns acording to Adjutant General Chase. It is doubted whether the U. S. troops will do much better. At the village of Segundo in Los Animas County, near the southern state line, a U. S. soldier on May 26 had to dodge a missile thrown from the window of a scale house. He was also fired at and returned the fire. More than 20 shots were then fired on the military patrol from a hillside overlooking the camp by the gunmen of the "strikers." There has been much picketing and eight men who had been working at Sopris were prevented from boarding an interurban car for that place.

William Diamond, of the United Mine Workers of America, has announced that a number of eastern organizers will be brought into Colorado from the East. Col. Locket, of the U. S. Army, is considering whether this will be allowed.

THE LEGISLATIVE COMMITTEE

The legislative mediation committee, so called, is in doubt whether it is empowered to do any more than investigate and has finally decided that it will make an investigation and how it will be done. Senators Pierson and Stephan go to Routt County, Representatives Smedley and Wright to Boulder and Weld counties, and Senator Burris and Representative Fincher to the southern coal fields. This decision was reached May 27. It is thought the trips will take about a week or 10 days.

It is not necessary to specify in detail the action of the grand jury at Trinidad and Cañon City in the indictment of the men who were engaged in attacking the mines at Forbes and Chandler. One hundred men were indicted for the latter offense.

PROFIT SHARING AND SOCIALISM

Brilliant suggestions for ending the strike are that the Union shall open mines and operate them, making them absolutely safe and surrounding them with dwellings of a superior order. The profits can be divided among the working men who will be stockholders. The Union was urged to do this by Governor Ammons long ago, but no reply was made to his proposal. The experiments made in Wyoming by workingmen who opened mines, and perhaps in Colorado also, do not hold out much assurance of success.

The Coal Consumers' Legislative League desires to meet the problem with an amendment to the constitution by which the state board of land commissioners may open mines, extract and sell coal, paying 10c. into the school fund and another 10c. toward the amortization of the debt incurred, the bonds not to exceed $500,000.

FORBES MINE PERMITTED TO RESUME

The Forbes mine resumed operations May 25 with 95 men who were working there before the attack was made on that operation Apr. 29. On that date, the tipple, mine office and other buildings were burned and nine persons killed. The commander of the troops in that locality does not object to the mines reopening, provided no new men are brought in to replace those murdered and driven away by force of arms. Benignity supreme!

More Anthracite Articles to Come

We have been able to print only a part of the anthracite articles that were submitted by our contributors for publication in our issue this week. Other interesting matter relative to hard-coal mining will apear next week, and in succeeding numbers of Coal Age. We are sure our readers will find the articles of Messrs. Conner and Warren so interesting and instructive that they will not find fault with us for devoting so much space to them.

Gas in Anthracite Mines

By W. D. Owens.*

In connection with anthracite mining, I want to call attention to a fact that it seems to me is much overlooked, or to which proper credit is not commonly given. We often hear the statement made that there is generally more gas in bituminous coal mines than is to be found in anthracite workings.

I believe that this idea, which is contrary to my own experience, can be attributed largely to the teaching of geologists and scientists that anthracite was originally in a state similar to that of bituminous coal; and that, for a long period of time, these deposits were subjected to the modifying influences of great heat and pressure. The inference is natural that this great heat, which suggests to one's mind a condition similar to what might exist in the vicinity of a volcano, would drive all the gases out of the coal in the same manner that we know the gases are driven off from bituminous coal by heat.

Another fact hard to understand is how it happens that anthracite contains, on the average, only about one-half the amount of ash usually found in bituminous coal. It would seem that if anthracite was formed from bituminous coal by the action of great heat, not only would the gases be driven from the coal, but the percentage of ash in the anthracite might be expected to be much higher than that in bituminous coal.

From these well-established facts of science, it seems difficult to understand or explain the presence of so large a quantity of gas as is found in many anthracite districts. I have had a wide experience in the mining of many different grades of coal, in different parts of the world. For 20 years, I was engaged in mining coal in Wales, in the Bryndu colliery, Kenffig, South Wales, which was considered a very gaseous mine. The coal was entirely bituminous, and the Gribbwr seam was considered the best coal to be obtained in the British Isles, for coking purposes. Following this, I worked in the Morva colliery, near Aberavon, where the coal was of the same quality; and, later, in the Park colliery, Britoin Ferry, South Wales. The coal here was also bituminous, but the seams were thinner and on a heavy pitch. Again, I was employed in the Bwllva colliery, Aberdare, where the coal was semibituminous and worked on the longwall system. I worked for a time in the celebrated Ferndale colliery, where 181 men were killed, in the last explosion in that mine; and, again, in collieries in the upper end of the Rhondda Valley. Practically all of these mines were gaseous mines.

Coming to this country at the age of 31, my experience has since been confined to the mining of anthracite coal. As far as I have been able to discover, the mines of the anthracite valley, particularly those of the Wyoming Valley, Luzerne County, Penn., extending from a point near Pittston to Nanticoke, contained more gas than I ever saw in any bituminous or semibituminous mine. I recall an instance of 21 years ago, where the volume of air circulating in the mine was 181,000 cu.ft. per min., and a test with the Davy lamp, at the foot of the upcast shaft, gave a cap from ¼ to ⅜ in. on a ¼-in. flame. When it is remembered that a ¼-in. cap on a flame of the same height indicates about 2 per cent.

*Div. Supt., The Lehigh Valley Coal Co., Wilkes-Barre, Penn.

of gas in the current, it is readily seen that this mine was generating between 3000 and 4000 cu.ft. of gas per min.

The above is only one of many similar cases existing in the mines about Wilkes-Barre. There are many mines here circulating nearly 500,000 cu.ft. of air per min., and I doubt if similar conditions, in respect to gas, can be shown in any bituminous mine, in this country or elsewhere. I know that the same conditions do not hold in all anthracite beds, for the anthracite mines of Wales had little gas, at least as far as the development had gone at the time I was there. If bituminous workings can show more gas generated in the mines than that just mentioned in regard to anthracite mines, I would personally much appreciate learning the facts.

❖

An Interesting Anthracite Development

One of the most interesting small developments, at present going on in the anthracite region, is to be found a short distance above Wilkes-Barre. Here, the Delaware, Lackawanna & Western R.R. Co. is developing a small tract, about 130 acres, of isolated coal land.

Hoisting in the two shafts above mentioned will be accomplished by means of steam hoisting engines, which will be duplicates of each other. Ventilation will be secured through two duplicate fans of the narrow-vane type.

It is not at the mine itself, however, that the chief interest in this development centers, but in the fact that the coal will not be prepared in the vicinity of the shaft. The entire output of this mine will be hauled approximately two miles and preparation made at the Pettebone breaker.

The tramroad connecting the mine with the breaker presents many engineering difficulties. Considerable grading has had to be done and at least five bridges varying in length from those sufficiently long to carry the track over streets and street-car lines to one which spans the Susquehanna River must be traversed. A steel trestle several hundred feet in length is employed to carry the track across a small brook and the low flat lands upon either side of it. Another bridge spans six tracks of the Lehigh Valley Railroad.

Across the Susquehanna River the tramroad will be carried on arms from the trusses of the old Wilkes-Barre & Eastern R.R. (now the Delaware & Hudson) bridge.



TEMPORARY HEAD WORKS AT THE SHAFTS AND ONE OF THE BRIDGES SPANNING A STREET AND TROLLEY LINE



STEEL TRESTLE ACROSS BROOK AND FLAT, AND THE BRIDGE ACROSS THE SUSQUEHANNA RIVER WITH THE PETTEBONE BREAKER IN THE DISTANCE

Two shafts are being sunk upon this property, one for hoisting the coal and the other as an air shaft. The latter contains two cage compartments for the accommodation of men and material, one airway and a compartment for pipes and electric conductors. At the present time, these shafts are down to a depth of about 630 ft. The hoist shaft will eventually be continued to 1150 ft., while the air shaft will only be driven as far as the Baltimore seam, and the lower measures reached therefrom by means of slopes.

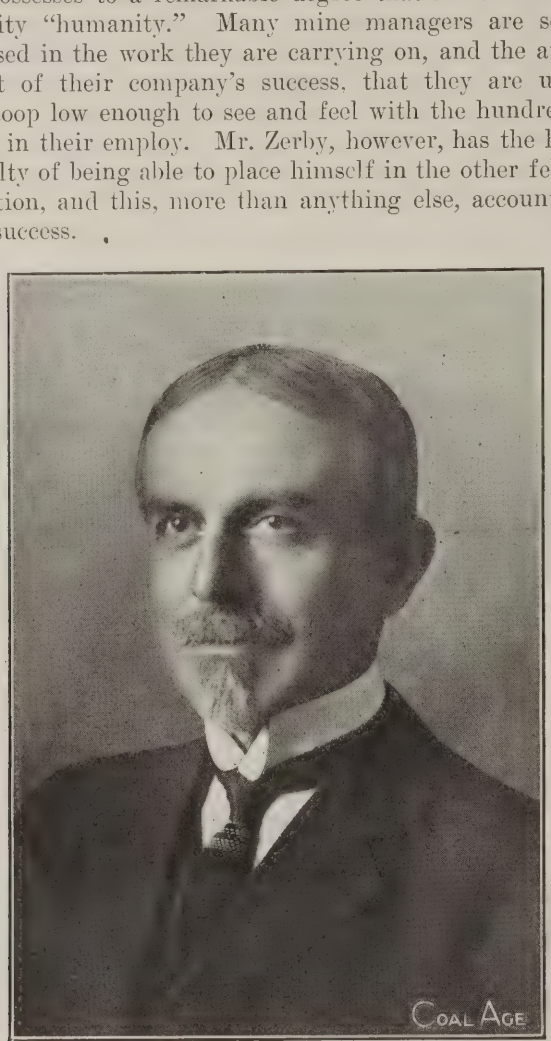
Although this bridge is an old structure much repair work was necessary to put it in shape for operation. Beyond the river proper, a considerable length of steel trestling is required before the road reaches the Pettebone breaker.

Although in many places in the coal fields the product of the mine must be hauled long distances before being placed in railroad cars, it is seldom indeed that such hauls present so many engineering problems and difficulties as does the one just described.

Who's Who in Coal Mining

Frederick E. Zerby

One of the most interesting men in the anthracite field is Fred Zerby, general manager of the Kingston Coal Co., Kingston, Penn. He is rich in original ideas, and in spite of his love of precision and insistence on details, he possesses to a remarkable degree that most admirable quality "humanity." Many mine managers are so engrossed in the work they are carrying on, and the attainment of their company's success, that they are unable to stoop low enough to see and feel with the hundreds of men in their employ. Mr. Zerby, however, has the happy faculty of being able to place himself in the other fellow's position, and this, more than anything else, accounts for his success.



FREDERICK E. ZERBY

Standing less than 5 ft. 7 in., stockily and proportionately built, with keen black eyes looking out from under heavy brows, Fred Zerby appears to be just what he actually is—a bundle of nerves—a dynamo of human energy. He is a tireless worker and an enthusiastic student of mining.

Mr. Zerby can be persuaded to talk about almost anything except himself; however, it is a fact that his first important experience in mining was secured with the Lehigh Valley Coal Co., where he was appointed superintendent of mines in the Hazleton division. Later he was transferred to Wilkes-Barre, and became superintendent of the same company's Wyoming division. When the late Robert Mercur died, the Kingston Coal Co., looking about for a suitable man to manage their collieries, settled upon Mr. Zerby, offering him the position, which he finally accepted.

The Kingston company, with several collieries in Edwardsville and one in Plymouth, under Mr. Zerby's supervision has become one of the most successful of the independent mining concerns. In his work of bettering conditions for his employees, he has erected modern homes to replace shanties formerly occupied by many of the Kingston miners. Culm banks have been removed, and in their place he has put in splendidly equipped playgrounds. Night schools have been established for the young and old, and a company band has been organized for musical entertainment. Libraries have been created and hospitals erected.

All of these improvements have been made at the company's expense, therefore it is not hard to understand why the miners of the Edwardsville section speak of Fred Zerby as the best general manager the Kingston Coal Co. ever had. It is doubtful if any mining concern in the anthracite field can boast a more loyal army of workmen than the corporation at present managed by Mr. Zerby.

John C. Haddock

We have all heard so much about self-made men that any writer using the expression must feel some trepidation. However, if there is any merit in a man's advance toward success over serious obstacles, and without the aid of helping hands, John Haddock is surely worthy of mention.

As an independent operator and president of the Plymouth Coal Co., he is reckoned as a force throughout the mining districts of the Pennsylvania anthracite field. Few men possess more dogged determination and are less compromising in battle than Mr. Haddock.

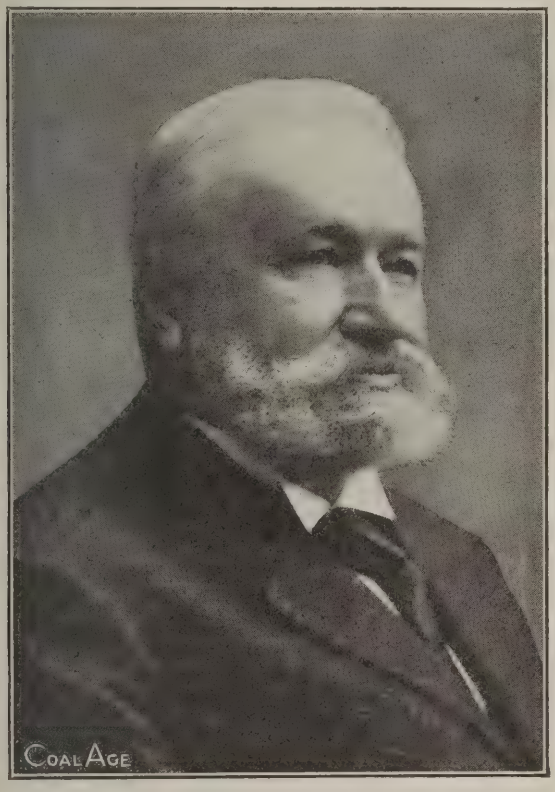
Not many men in his employ, even if younger in years, can stand the pace he sets in his business life. His work is his recreation. In summer or winter, early and late he will be found toiling away, without any apparent relaxation from the strain of his labors. Mr. Haddock was born in the north of Ireland, County Longsford, 1850. When an infant in arms, he was brought by his parents to the shores of America, and for 11 years lived in Lenox, Mass.

His first job was that of an errand boy for a commercial house in Newport, R. I. His salary was $2 per week. After 18 months of this work, he became a clerk in a wholesale grocery store and held this position for one year. Then came a chance for him to connect himself with the wholesale and retail coal business, and in 187[illegible] he was sent to Fall River, Mass., to take charge of a coal business in that town. In 1874 he went to New York to become manager of Meeker & Dean, wholesale coal dealers.

In 1877, Mr. Haddock decided to set out for himself and one year later he took over the lease of the Dodson mine at Plymouth, Penn. He successfully operated this

colliery until 1882, when he branched out and, with Charles S. Steel as partner, took over the lease of the Black Diamond mine in Luzerne, Penn., consolidating this latter property with the Plymouth colliery to form the Plymouth Coal Co.

As early as 1890, he started an agitation for the regulation of the supply of coal cars. He discussed the matter with many of the big railroads, and not feeling satisfied with conditions as they stood, he asserted public-



JOHN C. HADDOCK

ly that the railroads were discriminating against the independent operators. His contention was that the discrimination was not only a hardship on the smaller operators, but on the men who worked for them.

He then began a systematic study of this big question, and while his attack for improved conditions was directed only at the D., L. & W. Co., the contest was really one of far-reaching effect.

As a result of this fight, led by Mr. Haddock and several other independent coal men in the anthracite field, discrimination on the part of the coal railroads against the small operators apparently ceased, and the little fellows were given equal rights in the matter of coal transportation and the distribution of cars.

And Mr. Haddock's entire attention has not been devoted exclusively to purely corporation matters, forgetting the men who have made possible his success. It was through the instrumentality of his personal efforts that the Plymouth Coal Co. established a tax on its own coal to create a benefit fund for employees, made dependent on the company through mine accidents.

The boiler and the furnace are twin brothers, but they must be regarded as independent units and their efficiency separately considered. Though the boiler may be perfect, the furnace may be most inefficient. In fact, it usually is, as it is generally erected by ordinary bricklayers who are not superintended by specialists.

Industrial Peace Increases Efficiency of Miners

With the coming of industrial peace in the anthracite region of Pennsylvania has come greater efficiency among the miners and more production of coal per man. With the greater efficiency has come increased earning power, as the miners are paid for the coal they produce.

When the breakers are not running it is useless for the miners to cut coal, so the only way to arrive at a right and just estimate of their efficiency is to divide the annual output of the mines by the product of the number of miners employed and the number of breaker days. The result of this calculation, based on the figures in the last Report of the Bureau of Mines, is as follows:

Year	No. of Miners Employed	Average No. of Days Worked	Total Miners' Working Days	Output in Tons	Average Production Per Miner Per Day
1901	37,804	195	7,371,780	59,905,951	8.13
1902	36,392	116	4,221,472	36,911,549	8.74
1903	36,823	211	7,769,653	67,171,951	8.64
1904	39,848	213	8,487,624	65,709,258	7.74
1905	42,078	208	8,752,224	70,220,554	8.02
1906	41,801	206	8,611,006	64,410,277	7.48
1907	43,035	227	9,768,945	76,836,082	7.86
1908	44,340	211	9,355,740	74,592,181	7.97
1909	44,675	205	9,158,375	71,628,422	7.82
1910	43,651	212	9,254,012	74,717,852	8.07
1911	45,324	234	10,605,816	81,176,050	7.65
1912	44,696	220	9,833,120	84,426,869	8.58

Thus the miners are producing nearly as much coal per man per day as they were a decade ago, when the veins were larger and the mining easier. Owing to the suspension in the summer of 1912, the number of working days that year was less than in the previous year. In spite of this fact and the fact that fewer miners were employed, the production increased from 81,176,050 to 84,426,869 tons, and the average production per miner per day increased by nearly a ton. This implies an increase in efficiency of over 40,000 tons a day, and is a strong argument in favor of industrial peace, which benefits employer and employee alike.

Few Accidents in the Smokeless Mines

The records of the West Virginia State Mining Department, which have just been made public by Earl A. Henry, chief inspector, show that in the month of April there were 31 fatal accidents in the coal mines of West Virginia. This is a gain over the previous month.

The deaths resulting from the explosion in mine No. 5, at Eccles, West Virginia, are considered apart from the regular casualty list of the month because a disaster like that at Eccles always stands out by itself. In the Eccles mine there were 180 deaths, and this brings the total up to 211 for the month. Of the 31 deaths in the state, only seven occurred in those counties where smokeless coal, for which West Virginia is celebrated, is mined.

A classification of the list shows that 16 of the 31 were due to carelessness on the part of the miners, and these miners paid with their lives for the violation of the state mining laws and rules governing their particular mines. Of the 31 deaths, 20 were due to falls of coal and slate; five were caused by mine cars; two to electrocution; one by mining machine and four for miscellaneous causes. Of those under this latter classification, one man was kicked to death by a mule, another was crushed by a lump of coal falling off a railroad car at the tipple, and a third fell from a scaffold.

Editorials

The Strikes of 1902 and 1914

We prefer not to discuss a man with political affiliations like Colonel Roosevelt and we would urgently contend that coal has nothing to do with politics, if politics would cease meddling with coal. But it will not.

The public, rarely surprised at any action of Colonel Roosevelt, was temporarily taken aback at his declaration made recently in the suit of A. D. Wales against John Mitchell and the United Mine Workers of America, that he had proposed to create a pretext and invade the State of Pennsylvania with the United States Army.

It was all arranged, he said, that he was to give word to Matthew S. Quay and that not overscrupulous politician was to notify Governor Stone, who in his turn was to declare that he could not maintain order, and then the invasion was to take place.

Now order was being maintained and a declaration on Stone's part that it was not would have been little other than treasonable. That Roosevelt could so contrive and acknowledge his contrivance is evidence that he has a Machiavellian hand even if his intentions are of the best. Roosevelt's declaration was that he intended to send Major-General Schofield to seize the mines and operate them, ordering him to ignore the writs, injunctions or legal papers of any court and take his orders solely from the President.

Conditions are changing extremely fast, and to illustrate the change of sentiment, we recall an incident in the life of another man who later became President. He has been regarded as the personification of energy like Roosevelt but his actions were very different.

The President to whom we refer was Andrew Jackson. The war with Great Britain was barely at an end and General Jackson had reason for doubting whether peace had been consummated. A man named Louaillier had been tried in the civil courts for being a spy and had been acquitted. Andrew Jackson held him by martial law and expelled Judge Hall, who issued a writ of habeas corpus for Louaillier from the city of New Orleans, ordering him not to return till notice was properly posted or until the enemy had left the coast. The report of peace was, however, confirmed the following morning and Jackson revoked the martial law and freed his prisoner.

The judge returned and summoned Jackson before him and fined him $1000 and would have been mobbed by friends of the defendant had not Jackson intervened. The future President paid his fine, which in view of his services to the nation was not accompanied by an order for his imprisonment. The threat of Roosevelt in peace is in sharp contrast with Jackson's readiness to acknowledge the civil courts even in war.

Why did Roosevelt take so extreme a position? Because the business of the nation was severely crippled by the want of coal. The services of the coal operators and coal workers are so important that the people feel those services cannot be discontinued for any extended time.

Because the coal operator has put his money into a service of the people of more than ordinary value, his rights and his profits must be curtailed. There is no honor in serving the public. Only those whose work can be dispensed with are free from the continued harrying of the press and the man on the street. Their profits may be unrighteous, especially if the concerns are small. their dealings may be arbitrary, their product may be inferior, nevertheless, the public has nothing to say. But the coal and transportation businesses are not of that class. Because these industries really serve, therefore they must be eternally chidden.

It is remarkable how few are the millionaires in the coal business, and those you see are perhaps as little a part of the trade as the vultures which prey on the combatants are a part of a Mexican battle. These few rich coal barons have made their money not in producing coal but in leasing and selling coal lands and promoting corporations. Those operators who have money have usually made it in some side line and lost money in coal. Several are in the banking business and many were well-to-do before they learned how unsafe an investment productive development of coal land always proves.

It is interesting to note how the public has been prepared to connect the Colorado situation with Roosevelt's proposed action in the anthracite strike of 1902. In that strike, disorder was to be only the excuse; need for coal was the real cause. In Colorado, the actuating motive would be or will be disorder, for no shortage of coal exists.

The crime which is now in commission is not a coal dearth but a shortage of market. We would suggest that Major-General Leonard Wood be required to take charge of all the idle coal-consuming plants so that the coal operators may be furnished with work. Especially those manufacturers might be made to operate their factories who whimpered so childishly when the strike was in progress. This suggestion, made in jest, is not less logical than that proposed by the ex-President.

Explosibility of Coal Dust

It is seldom that readers are interested in controversies between editors, especially if the argument is based on intentional misrepresentation. Recently we were criticized for publishing a few statements from the findings of the Explosions in Mines Committee of Great Britain. An attempt was made to credit COAL AGE with the authorship of conclusions that resulted from the British experiments. It is the business of a paper to give all the news, providing the source is reliable. To question the competency or responsibility of Messrs. Cunynghame, Redmayne, Desborough, Dixon and Blackett is to insult the intelligence of coal-mining people everywhere.

Anyone interested in the question of the explosibility of anthracite dust will be interested in reading the remarks of Mr. Verner on p. 897 of COAL AGE last week. He emphasizes a point that has only been overlooked by

ıe careless reader; namely, that "*the inflammation of ust* and the *violence of the explosion* are two different ropositions."

Everyone knows that anthracite dust is difficult to in- ame; therefore, the freedom of anthracite mines from ust explosions.

Bearing on this subject, we will *quote* another part of a eport of the same British committee referred to above. hey say:

The idea seems to have been prevalent that the percentage f volatile constituents that a particular coal dust contains a direct measure of the explosive properties of that dust. The explanation usually given for this assumption is that ıe gases derived by distillation of the dust by the source of gnition are the real agents in propagating combustion. Ac- ording to this view, distillation of inflammable gas must first ake place, and it is that gas mixing with air that forms the explosive mixture." Hence it is concluded that any dust hich yields only a small proportion of inflammable gas on eating, or from which the gases are driven off with diffi- ulty, should give only moderate explosive effects; and a ust that yields no gas at all should, according to this view, e incapable of propagating explosion.

Neither of these two assumptions is upheld by experiment. coal dust containing 18 per cent. of "volatile matter" caused a explosion as violent as one containing 35 per cent., whilst ood charcoal produced an explosion as great, or even greater.

In our view there is nothing to conflict with the belief that oal dust, when suspended in a sufficiently finely divided state air, acts somewhat like a "coarse" gas, the aggregate of olecules contained in the one particle of dust corresponding the single molecule that takes part in an explosion of a ombustible gas and air, the heat energy necessary for propa- ation of explosion being derived from combustion of each ust particle as a whole without any appreciable preliminary istillation of gas therefrom In other words, heated oxygen olecules coming into collision with the combustible dust rticles form highly-heated carbon dioxide and steam mole- ules, which in turn transfer their energy, directly or in- irectly, to other oxygen molecules and unburnt dust particles nd so propagate the flame

According to this view, any finely-divided dust that is apable of being burnt is capable of propagating explosion.

Many considerations favor this opinion. The rapidity with hich explosive combustion (as distinct from inflammation) propagated in coal dust and air mixtures is hardly com- atible with the notion that distillation of gas must neces- arily first take place, and that it is the heat-energy derived om the combustion of that gas which is chiefly responsible r the explosive effects. Such a distillation requires an ppreciable time and absorbs energy.

All the foregoing is interesting, and coming from men ho are leaders of thought—so far as coal mining is con- rned—is worthy of careful consideration. It might be ell for the Bureau of Mines to pursue experiments along ıe lines naturally suggested by the eminent British en- neers.

It seems unnecessary to suggest that the conclusions ted are not original with us, and are neither indorsed r denied by COAL AGE. They are open to discussion id further investigation. We also apologize if we have nnecessarily wasted a word of valuable space in a seem- g reply to our critics. At least, we will not use our ink print veiled insinuations and self-emulation. Honesty, odesty and manners are as becoming in a paper as in individual.

A Matter of Names

What a thing is named, it often becomes and we nnot afford to disregard the importance of care in menclature. We have for a long time labored hard find names to fit the Colorado situation and cannot y that we have been markedly successful.

To begin with, can we call the difficulty in Colorado "strike?" James Dalrymple, the state coal-mine inspector, who is a union man and strongly in favor of the miners in all their clashes with the coal companies, who would, we think, be the first to resent any suggestion that he is not a labor sympathizer, states that in the first three months of 1914 there were an average of 10,149 miners working in Colorado mines compared with 14,035 for the same period in 1913, and that there were in September of last year, when the strike was called, 12,346 men. Thus the companies have lost, balancing losses with gains, since the strike was called, only about 18 per cent. of the men, though for a while, in October, 1913, the number of men employed fell to 7,696.

But even more have we felt troubled about calling the Ludlow men and the persons who created the reign of terror in Colorado, "strikers." It is certain that many of those men had never worked in the Colorado mines, perhaps were not mine workers at all, and some who were miners were not employed in Colorado when the strike commenced. In the Ludlow colony, we are told, 120 men were Balkan soldiers, fresh from the war.

It was only on July 16, 1913, that the Roumanians took the field against the Bulgarians in Europe and that the Greeks routed the Bulgars near the frontier. On the 20th of that month, Adrianople was retaken by the Turks. Not until Sept. 15 did Turkey and Bulgaria agree on the frontier question. The disbanding of the troops in all the Balkan states was quite slow.

We mention these facts to show that the large number of Greeks, Bulgars, Serbs and Montenegrins who went over to take part in the war must have returned with others of their compatriots after the strike and some of them were undoubtedly induced by the union to refrain from work and to war for the strikers.

We do not blame the union for hiring these men, if only they had not armed them: it was a good play on their part to agree to keep these men in idleness by strike pay and to endeavor to keep this and other labor from the mines. Had it been done without violence, no one could object. But it is wrong to regard these men as strikers, and the United States Army recognizes that fact by keeping them out of Ludlow. In very truth it might be more correct to term them the gunmen of the strikers, as it is correct also so to designate those outsiders who, scenting battle from afar, like Mother Jones and some Wyoming undesirables, came in of their own accord to aid in the fray.

And again the Ludlow battle, variously termed a "massacre" and an attack on a camp, was really rather a rout of the so-called strikers' forces following an attack on the militia.

These definitive statements are necessary that the reader may understand the Colorado situation, which has been beclouded to some extent by both parties. The operators have not desired to acknowledge unnecessarily the presence of mine guards and mine employees with the militia at Ludlow for fear of a misapprehension of the causes which demanded the employment of the former and rendered natural the action of the latter. On the other hand, the miners did not wish to admit that the Ludlow camp was full of gunmen and non-strikers, was in fact a perfect Alsatia for men of undesirable character.

The opponents of the coal companies have used language which cannot fail to befog the issue and the purpose of this editorial is reached if the difficulties involved in making a precise statement are made manifest.

Sociological Department

The Edwardsville Improvements

By Special Correspondence

Social inequality has everywhere, the wide world over, been the mother of discontent. It has been the unspanned abyss, which, perhaps as much as any single thing, has driven capital and labor apart. There has been a constant movement on the part of deep thinking and big-hearted men to bring capital and labor in closer relationship. And the effort has been a success in no small degree.

Students of the social question long ago discovered that one of the chief obstacles to overcome was to convince the laboring man that he was an important part in the machinery by which the world operates. This has been no easy task, for as a matter of fact the man who has lived by the sweat of his brow and whose existence has been very much of the hand-to-mouth order has been slow to appreciate that he was placed on earth with an object in view. It has been difficult, even in communities where social conditions were of the very best, to make the toiler realize that best results could only be obtained when he coöperated with capital, that the success and happiness of everyone depended in part on the work he did and how that work was done.

On the other hand, the world has had its rich and arrogant men, its industrial rulers who could see in their less fortunate brothers nothing but a duty to serve. There have been men high in the ranks of the industrial world who refused to come half way or even start the journey which would bring employer and employee in better and more brotherly relationship.

No industrial field of the universe has offered better conditions for a study of the social problem than the anthracite coal fields of Pennsylvania. And there the work is still in an experimental stage—yet so highly developed that its success is not for a moment doubted. Many of the coal-mining leaders—captains of industry in their line—have in late years made a deep and serious study of social conditions in the heart of the hard coal fields. And the transformation they have wrought is little short of wonderful.

The Old Edwardsville

Edwardsville, Luzerne County, Penn., is a community of about 7000 people, situated not far from Wilkes-Barre.

Eight years ago Edwardsville and much of the surrounding territory was a dirt speck on the coal map of Pennsylvania. Civic pride had never been fostered and in fact little considered. One out of every twenty-five property owners was his own gardener and landscape artist. The rest were mere human beings content to live in fairly clean environments with little hope or desire of ever making their village more than a mining "patch." The greater part of the male inhabitants found employment in the mines of the Kingston Coal Co., an independent concern, which operates four shafts, a few slopes and several tunnels in Edwardsville and surrounding territory.

Dust from the large breakers which this company owned spread over the entire town, giving it a grim and ugly coloring. Huge culm banks reared themselves in the midst of the village and behind and along the sides of these sprung up whitewashed "patches" in which miners and their families made their homes. There



Recreations Center and Modern Houses Built by Kingston Coal Co., to Reclaim a Waste Area, at Edwardsville, Penn.



Playground No. 1, on Main Street, Built and Maintained by the Kingston Coal Co., at Edwardsville, Penn.

ere no lawns nor shade trees. The yards of the tenants ere the grazing grounds of goats and about anything se that cared to run loose. Coal company property as used for junk heaps and all the refuse of the towns ıd the company was dumped on it.

The aim of the company was to produce as much ıal as possible without regard to sanitation or comfort. idewalks, trees and lawns were unknown things and the eed for them still unfelt. There was no attempt to pro- de sanitary conditions either in the town or on com- ıny property.

The colliery boss was invariably the czar of the town— bigger man than the burgess or any of the borough ficials. Employee and employer were far apart and the orkmen had not learned their responsibility for the ınditions existing. The gap between labor and capital as then very wide.

The New Town

But that was eight years ago. Today conditions are much changed, because there came in the town one man who believed that social inequality was the cause of great discontent, and, in fact, great suffering in the community which several thousand miners called their home. That was Frederick E. Zerby, who, small in stature, has a large conception of his opportunities and duties. Eight years ago he became general manager of the company and in that short period of eight years the town of Edwardsville has been wonderfully transformed, and today is fast becoming a town of beauty—no more an eyesore on the landscape of the Wyoming Valley.

There has been method and system to everything that Mr. Zerby has done. It took him a year or so to surround himself with a corps of workers who could assimilate his ideas and work out to perfection the plans he



Showing Equipment of Playgrounds, at Edwardsville

had in view. For a time it was slow, tedious work. When he set about his task the miners of his company regarded him as just another of the company officials who had come to rule over them—another official who had come to guard the coffers of the company and see that not a dollar of the company's money was spent imprudently.

Frederick E. Zerby is perhaps one of the most socialistic captains of the mines in the anthracite field. He justly and wisely thinks that a part of the dividends earned by the toilers should be returned to them in the bettering of their conditions and to make their lives happier. At the outset Mr. Zerby had a fight on his hands. The men did not understand him and the prying loose of money from the treasury of the company did not please the financiers. But he won out in both cases. He convinced the men to whom he was responsible that they were entitled to a fair and generous dividend on the money they had invested, and he likewise was able to make them see that by bringing employer and employee into closer relationship both sides would fare better.

Not many months elapsed before the name Zerby began to be a household word, and his bigness of heart, his concern of others, began to make itself felt. The men who had regarded high officials of the company as bosses were forced to see that in Mr. Zerby they had another type of man.

Cleaning Up the Company Town

His first attention was directed to company property. He ordered a general cleanup, and in a short time the land in close proximity to the coal breakers began to take on a respectable appearance. Here and there little patches of lawn were sown and shade trees were set out and it was startling to the people of the town what wonderful things nature can do with a little help and a little encouragement. Then came the awakening of a civic pride, and men and women joined hands with the Kingston Coal Co. in a thorough cleanup. This good work has gone on incessantly ever since that time.

Improved conditions about the collieries made the men understand that they were appreciated after all. Mr. Zerby mingled with them, got some of their ideas and systematically began to make the people in general understand that he was not their boss but their friend. And a neglected people are quick to catch any such idea. Their comprehension of his motives began the bridging of the chasm of social inequality.

Playgrounds

Finally Mr. Zerby got help from his backers in the company and sent a force of men to a company plot in the center of Edwardsville to transform it into a park. For days and weeks a force of men were kept at this place. Old fences and shanties which had marred the view were razed and the ground was nicely leveled. Concrete walks and walls began to make their appearance. Gradually hand-ball courts, swings, band-stands, fountains, settees and other equipment were erected. When the improvements were all made, Zerby called the townsfolk together, dedicated the playground and turned it over to the miners, their families and friends for the use of their children.

Three dozen or more whitewashed shanties that men had called homes were his next objects of attack, and they were torn down one by one until only the foundations were left. The Kingston Coal Co. then erected neat and cozy little homes, with some modern improvements and back and front porches. The rent for these was made the same as had been paid for the shanties which preceded them.



Employees' Bath-House



Operating Room, Miners' Hospital

No. 4 Colliery of the Kingston Coal Co., at Edwardsville, Penn.

But this was not all. Playgrounds were constructed in other sections by the company, and wherever there were waste spots of ground, flower beds and lawns were planted.

Sidewalks and Garbage Disposal

Civic pride had been awakened and everyone joined in the movement. Mr. Zerby donated about 5 ft. of the property of the company to the borough for sidewalks and enclosed the company possessions with neatly built and well painted fences so that the grim appearance which had clung to the coal breaker and its surroundings began to disappear. The company provided Edwardsville with a free system of garbage disposal. Several teams and wagons were purchased, drivers supplied, and headquarters opened. The Kingston Coal Co. removes refuse or garbage from any residence in the borough on a request from the property owner.

This system of garbage disposal was another means of nurturing civic pride and the people soon realized that health conditions were the best when refuse was not allowed to accumulate.

Bath Houses and Lunch Rooms

The Kingston Coal Co. spent thousands of dollars in the establishment of inside and outside hospitals, and in building washhouse and lunch rooms for the men. All new buildings erected on the company's property are of concrete and steel construction and are absolutely fireproof. At the No. 4 colliery there is one washroom with 36 bath tubs, a dozen wash bowls and shower baths of the latest design, and this improvement has been much appreciated. Such employees as do not have homes with bathrooms find the company bathhouse a means of saving themselves and their wives and families much labor. Steel lockers have been provided. A man is engaged to keep the bathhouse in order.

Library

Edwardsville had no public library, but the Kingston Coal Co. has set apart one of the best of the company's buildings and arranged reading rooms and study halls in it. Several thousand books have been purchased and the leading magazines and industrial journals are found on the tables. The use of the library is free. The same building is used as a night school, where young and old men attend special classes. Teachers are provided by the company.

Entertainment

The company has organized a band among its employees and supplied them with instruments. A capable instructor has been provided and the band goes from one playground to another to entertain the village folk and the children. A glee club has also been formed which enlivens the playgrounds with vocal music. An expensive Victrola or a Wurtlizer is placed in each playground and while the children enjoy themselves, the older folk are entertained by music to their liking.

Public improvement is still going on at the company's expense. New playgrounds are being mapped out and garden spots are yet to be provided for some of the surrounding towns.

Mr. Zerby has provided one of the best hospitals in the northeastern part of Pennsylvania for his men. Its equipment is so complete that it is more advantageous to perform operations there than to delay operating till a public hospital can be reached. And in fact that was the purpose in building it. The desire was to prevent the injured men from being taken a long distance to a hospital in an ambulance. The company has its own surgeons and does its own surgical work.

As another means of giving back to the men some of the money they have earned, Mr. Zerby, this spring, purchased fruit trees and presented them to the men and women of the town. The company has planted shade trees all over the town, both near its own property and that of others, and the borough in a few years will be a bower of beauty in the summertime.

The coal dust which swept over the town in years past is no more to be seen. Improved devices have made the breaker dustless and the large, black buildings that were reared for the preparation of coal no longer detract from the town's beauty.

In the short space of eight years men and women have been lifted from a low level to the plane of equality. The men know Zerby and Zerby knows the men. They are on close, intimate terms. They understand each other. It has not been necessary for Zerby to state that a good part of the surplus money earned by the men has come back to them. The men and their families understand and they appreciate.



Showing Site on Which No. 1 Playgroun Was Built at Edwardsville

And does it pay? While almost every other coal company has been troubled with petty strikes and trouble, the Kingston Coal Co. has been free of such trouble. One short strike, which was speedily adjusted, is all that has occurred in the eight years. When the mine workers have a grievance they go to Mr. Zerby as a friend and not as a boss. They talk over their troubles with him and they know that he stands with them if their claims are just.

What Mr. Zerby has done here can be done elsewhere, for this experiment proves that there is a common ground for labor and capital. He is entitled to much credit, and the men who labor with him are fully entitled to their share of praise. They are faithful, steadfast and loyal. Every man in the Zerby organization is a master of the position he holds. Valuable service is rendered by each and all, but in the entire corps there is no harder worker, more loyal man than E. L. Solomon, private secretary to Mr. Zerby.

Use the utmost care when handling explosives near electricity as a tiny spark falling on, or a small current passing through powder is all that is necessary to produce an explosion.

Legal Department

Recent Decisions

By A. L. H. STREET*

False Mercantile Report as Libel—It is actionable libel for a mercantile agency to issue a false report that a corporation has been sued for an amount in excess of its working capital. (Idaho Supreme Court, Pacific Packing Co. vs. Bradstreet Co., 139 Pacific Reporter 1007.)

Pollution of Streams—An owner of land along a stream is not entitled to an award of damages because of slight inconvenience resulting from discoloration of the water or deposit of coal or débris therein in the operation of a coal washer upstream. (Atlantic Supreme Court, Parsons vs. Tennessee Coal, Iron & R.R. Co., 64 Southern Reporter 591.)

Payment for Coal Furnished Public Contractor—Coal and wood used by a public contractor in generating power in ditching work constitutes "material furnished" in the execution of his contract, within the meaning of a bond given by him to secure payment for such material. (Minnesota Supreme Court, Fay vs. Bankers' Surety Co., 146 Northwestern Reporter 359.)

Employer's Duty to Mine Timbermen—A mine owner's duty to timber up mine roofs to make them safe for his employees does not extend to men engaged to do that particular work, since the very nature of their work involves an unsafe condition. (Kentucky Court of Appeals, Williamson's Administrator vs. Blue Grass Fluorspar Co., 160 Southwestern Reporter 920.)

Excessive Recovery for Personal Injury—A verdict for $12,000, for injury to a coal miner is excessive, and should be reduced to $7000, although the action of his right-knee joint was permanently impaired and one of his ribs was loosened in such way as to cause acute congestion of the left lung. (Missouri Supreme Court, Domineck vs. Western Coal & Mining Co., 164 Southwestern Reporter 567.)

Risk Not Assumed by Miner—A mine motorman did not assume the risk of being injured by collision with timbers projecting from another motor, which stood unprotected in an unlighted entry, if he did not know of the presence of such motor at that point and it was not customary to leave cars standing there. (Virginia Supreme Court of Appeals, Stonega Coke & Coal Co. vs. Williams, 80 Southeastern Reporter 100.)

Employee's Duty to Take Notice of Obvious Defects—A mine employee cannot recover for injury resulting from an obvious defect in such simple appliances as harness worn by a mule which he drives, since in such case he has as good, if not better, opportunity than his employer to know of any danger resulting from such condition. (Kentucky Court of Appeals, Pickergill vs. Nelson Creek Coal Co., 160 Southwestern Reporter 936.)

Effect of Bankruptcy on Attachment Liens—On a coal and coke company being adjudged a bankrupt all attachments against its property levied during the previous four months are defeated, except as against a bona fide purchaser of the property under an attachment, and except that an attachment lien may be preserved for the benefit of the estate. (United States District Court, Western District of Kentucky; In re Alabama Coal & Coke Co.; 210 Federal Reporter 940.)

Assumption of Fellow Servant's Negligence—Under the laws of Colorado a coal miner killed by being crushed in a haulway between cars and a wall did not assume the risk of negligence of fellow employees, if he used due care for his own safety. Three thousand five hundred dollars was not excessive recovery for the death, it appearing that decedent was industrious and a man of good habits. (Colorado Court of Appeals, National Fuel Co. vs. Maccia, 139 Pacific Reporter 22.)

When Coke Plant Constitutes an Abatable Nuisance—Persons who reside in the neighborhood of a coke manufacturing plant are entitled to maintain a suit to enjoin its operation in such manner that smoke is almost incessantly emitted from the ovens, dust is created handling soft coal and coke, and sleep is disturbed at night by continual noises. But a mere temporary inconvenience is not subject to redress. (New Jersey Court of Chancery, Kroecker vs. Camden Coke Co., 88 Atlantic Reporter 955.)

Scope of Employer's Indemnity Policy—A policy indemnifying a coal company against claims arising out of injuries to its employees, extended to a man whose name was on the books of the company and who was subject to the orders of the company's general foreman, though he worked under the immediate direction of a sub-boss and his wages were paid according to the amount of coal mined by the sub-boss and the men under him. (Kentucky Court of Appeals, Employers' Indemnity Company vs. Kelly Coal Company, 160 Southwestern Reporter 914.)

Damages Recoverable by Parent for Child's Death—Under the Iowa laws a parent suing a coal company for death of a minor son killed through negligence attributable to the company, is entitled to recover for loss of the child's services and expenses incurred on account of the accident, including expenses for a suitable burial. The amount recoverable for loss of services is measurable by the present worth of the child's probable earnings up to the time he would have become of age, less the probable cost of clothing, maintenance, etc. (Iowa Supreme Court, Carnego vs. Crescent Coal Co., 146 Northwestern Reporter 38.)

Responsibility of Initial Carrier of Shipments—According to a recent decision of the Kansas Supreme Court, the provision of the Carmack Amendment to the Hepburn Act which makes a railway company that receives a shipment for transportation to a point on another road in another state liable for loss occurring on the connecting lines, does not create liability on the part of the initial carrier for loss arising after the shipment has arrived at its destination and is constructively in the hands of the delivering carrier as warehouseman, as where the consignee fails to remove the shipment within a reasonable time after being given notice of its arrival.

Injury Caused by Fleet of Coal Barges—In a suit against a coal company for injury to a Mississippi river wharf and wharf boat at Memphis, caused by a fleet of heavily loaded coal barges in a collision resulting from inability of the towing boats to hold the barges, the jury was warranted in finding that the company was guilty of actionable negligence, although the current of the river was running fast and a heavy fog covered the river; it appearing that the fleet could have been tied up or separated at a point a mile or two up the river. (United States Circuit Court of Appeals, Sixth Circuit; Monongahela River Consol. Coal & Coke Co. vs. River & Rail Storage Co.; 210 Federal Reporter 611.)

When Favoritism By Carrier Constitutes Unlawful Discrimination—It constitutes unlawful discrimination for a railway company to allow one interstate shipper several months' credit for freight charges, pursuant to a previous contract, if other shippers in similar circumstances are required to make payment monthly and to give bond securing the same. The fact of discrimination is not affected because the favored shipper pays interest on the amounts due from him, nor because the shippers discriminated against have not demanded that the same privilege be extended to them, if they did not know that the discrimination existed. (United States Circuit Court of Appeals, Sixth Circuit; Hocking Valley Ry. Co. vs. United States; 210 Federal Reporter 735.)

Right to Rescind Coal-Sales Contract—Damages Recoverable for Breach—When a buyer of coal fails to pay for deliveries at the times provided for by the contract of sale, the seller is entitled to rescind the contract and to refuse to make further deliveries. But, if the seller waives this right of recision, and makes further shipments, notwithstanding the buyer fails to make payments promptly, notice that the contract will thereafter be strictly enforced must be given by the seller before he will be permitted to take advantage of the buyer's failure to make subsequent payments promptly. The damages recoverable for breach of a contract to deliver coal f.o.b. mines are measurable by the excess of the market value of the coal at the mines above the contract price. (Maryland Court of Appeals, Sullivan vs. Boswell, 89 Atlantic Reporter 940.)

---

*Attorney-at-law, 317 Commercial Bldg., St. Paul, Minn.

Discussion By Readers

The Safety Boss in Coal Mining

Some time ago, C. H. Nesbitt, chief mine inspector f Alabama, suggested the employment of a safety boss n coal mines, in a paper entitled The Value of a Safety nspector and Instructor for Each Coal Mine, COAL AGE, Vol. 4, p. 206. This was followed by an interesting dis- ussion, pp. 318, 509, 743, 827, 912 and 987, under the eneral title Education and Training of Mining Men.

Many valuable points were brought out in this dis- ussion; but, in only one of the letters submitted—that f Thomas Hogarth, p. 912, was reference made to the mployment in mines, of a large number of men wholly nacquainted with mining. To quote Mr. Hogarth, 'Shiploads of men who have never seen the inside of a nine are being landed in New York every week, and hese men come in large numbers to the mining districts nd are put to work in the mines."

There is a vast difference in the workmen of today and hose of 25 years ago. While it must be admitted that rom 80 to 90 per cent. of the men working in our mines oday are foreigners; and, further, that at least 40 per ent. of that number cannot speak or understand the English language, I believe that it is not the green oreigner who heads the list of those injured in the mines. On the contrary, the majority of those injured by avoid- ble mine accidents belong to that class of foreign labor who have worked in the mines from one to five years and ave come to think that they know more than the mine oreman or any of his assistants. Such men become in- lependent and saucy when instructed how to arrange for heir own safety. Their customary reply is: "Me know," 'Me dig coal one year," "two years," "three years"; "Me take care of meself," "He no come down," "Me shoot him lown," and many other similar expressions; but the fact remains that they are not capable of caring for them- selves.

I am not opposed to the foreigner, but am strongly pposed to the employment of ignorant workmen in mines, whether they be foreigners or Americans. Such men should never be allowed to work as miners, since, through their ignorance of the principles of mining, they may bring disaster to themselves and their fellow work- ers. I want to say, emphatically, teach all miners the principles of mining; teach them how to set props, how to sprag coal, how to mine and shoot coal, before permitting them to work as miners. Only experienced miners who have worked a long time in rooms and entries should be permitted to work on pillars.

I fully indorse the suggestion of Mr. Nesbitt, to which I have referred, that there should be employed at every mine, a man whose duty should be to spend all his time in the working places, observing closely the practices of the miners, and instructing them how to cut and mine their coal, set sprags and timbers, place their shots, charge and fire their holes, take down loose top; and, above all, to keep their working places clean, tidy and safe.

This man should be known as the "Safety boss." He should have authority in all matters relating to the safe performance of work in the rooms and other working places of the mine. His sole duty should be the protection of the mine workers against both official neglect or the carelessness or ignorance of the workmen themselves. The safety boss should have the power to suspend any workman who, in his judgment, is not making an effort to comply with the law. The safety boss should act in harmony with but not be subject to the mine foreman. Just how many places could be handled by one safety boss would have to be determined by experiment.

The mine foreman, assistant foremen, safety bosses and miners should all be thoroughly posted on the requirements of the state mining law and the mine regulations.

A good idea would be to have the mine rules printed in the various languages, on cards, which should be given to each miner when he is employed. The cards should also be hung in conspicuous places near the mine. I would further suggest the following rules.

1. When undermining coal, set sprags every 7 ft., whether or not there is danger of the coal falling.
2. When you have fired a blast wait at least 5 min. before going to see what the shot has done.
3. Do not charge any hole but especially a rock hole with both dynamite and powder.
4. Always set a temporary prop whenever you are about to knock out another prop.
5. Don't imagine because you have never been hurt that it is impossible for you to get hurt.
6. Never stand a prop further away from the working face than is permitted by the mine rules.
7. Always reset any timber that has been dislodged by a blast, before you begin to mine or load coal.
8. Whenever you chance to notice a piece of loose coal, slate or rock while on the way out of the mine, promptly notify the mine foreman.

It would be the duty of the mine foreman to see that these rules and suggestions were strictly enforced; and this, in my opinion, would greatly reduce accidents due to falls of coal, slate or rock.

JOSEPH NORTHOVER, Assistant Foreman,
Berwind-White Coal Mining Co.
Seanor, Penn.

Safety or Refuge Chambers in Mines

Letter No. 5—I have read with great interest the recent contributions to COAL AGE, relating to Safety or Refuge Chambers in Mines. The discussion calls to mind a letter on this subject, written by Jesse K. Johnston, May 10, 1910. The letter was addressed to Hon. John K. Tener, then a member of the House of Representatives and now Governor of Pennsylvania. Mr. Johnston was at the time superintendent of the Charleroi Coal Works of the Pittsburgh Plate Glass Co.

The letter, from which I submit a few extracts, was made a part of the Congressional Record of the 61st Congress; and, besides giving a large number of instances of mine explosions, in many of which, lives would have been saved had refuge chambers been available, described, in detail, a plan that was then about to be executed in the Charleroi mine, when suddenly interrupted by the destruction of the tipple by fire and the subsequent abandonment of the mine. I wish that space would permit of the publication of the entire letter, but beg to quote the following allusions to the need of refuge chambers in mines, as of particular interest in this discussion:

* * * How to get results from miners, who have no faith in science and, by ignorance, disregard precautions and safeguards and become chance takers for greed of gain, is a difficult problem for every mine manager.

I know from personal experience that the introduction of permissible explosives, systems of spraying, taking exhaust steam into the intake airways to increase the moisture in the air during the winter months and other precautions, meet with much opposition on the part of mine workers.

In every coal mine, conditions exist that may lead to an explosion or a mine fire. While we cannot hope for the entire removal of these dangers, yet by the practical application of the results of scientific study, coupled with the eternal vigilance of mine officials, the maintenance of strict discipline and the enforcement of rules and regulations, the dangers may be minimized. * * *

It is a significant fact that from Apr. 13, 1876, to Apr. 22, 1910, in this country alone, 49 mine disasters occurred during the summer months, resulting in the loss of 1300 lives. For the same period, during the winter months, there occurred in this country alone, 111 mine disasters, resulting in a loss of 3500 lives, making a total sacrifice of 4800 lives in 34 years. These figures only include mine disasters in this country, in which five or more persons were killed.

In addition to the present safeguards, I wish to offer another, having for its purpose the preservation of life, following a mine disaster. I base my suggestion on the evidence gained from miners rescued and from investigations giving conclusive evidence that miners have traveled from 1000 to 2000 ft. in the mine, after the first shock of the explosion and before being overcome by poisonous gases. * * *

My suggestion of live-saving stations underground, connected with the surface by boreholes is not new; the idea has been advocated for years. * * *

I know a great many mine managers will say at first thought, that the cost of these underground stations is prohibitive; but I have just let a contract for three 6-in. boreholes, at the rate of $1 per ft., for a depth of 300 ft. Consider, for a moment, a mine property of 1000 acres in coal that will yield 8000 tons to the acre; and compare the revenue to be derived from the mining of this coal, with the cost of sinking, say three boreholes and the instalment of the same number of underground life-saving stations. This cost will be found such a small fractional part, per ton of coal mined, as to fully justify the installation; and the outlay can generally be saved by cutting off some other expense that is less needed. * * *

An actual test made on a 6-in. borehole, 300 ft. in depth, showed a velocity of the air passing up the hole, of 2000 ft. per min. (nearly 400 cu.ft. per min.). In the recent Cherry mine disaster (Nov. 13, 1909), 21 men were rescued one week after the mine fire started; from an atmosphere in which there seems to have been upward of 5 per cent. of carbon dioxide and in which lamps would not burn. It is reasonable to conclude that if several underground life-saving stations, with boreholes to the working seams, had been previously installed at the Cherry mine, a number of the entombed miners could have reached these stations and a supply of fresh air and plenty of food could have been delivered from the surface. * * *

The letter continues to give a large number of similar instances of the possibility of saving human life by the previous installation of suitable refuge chambers, and, to my mind, is an emphatic indorsement in their favor.

V. L. Henry, Mining Engineer,
Creighton Coal Works.

Creighton, Penn.

Educating the Public

Under this same heading, Mine Inspector, in Coal Age, May 2, p. 714, says, "A striking example of the inefficiency of state ownership of mines, mentioned by Prof. Henry Louis, in an address before the Newcastle-upon-Tyne Economic Society, is that of the Wonthaggi mine owned by the Victoria government," and previous to this Mine Inspector says, "In any enterprise, whether individual or corporate, labor and capital combine through their energy, skill and financial resources to supply a product for the public in a satisfactory manner."

The *Saturday Evening Post,* under date of May 16, and under title of "The Vortex," says, "You cannot get joy out of work unless it is a sort of personal service. Unless you own your job in some sort of permanent way, you will not sing over it. My grandfather was a shoemaker and he always sang as he cobbled. My father went into a factory and he never sang. He got crusty and short over his work."

Without another comment, I believe the two quotations, coupled as they are above, would accomplish my purpose, which is to start readers thinking along constructive lines. However, as nothing stimulates thought so much as the opportunity to criticize another's thoughts, ideas or suggestions, I will offer a few ideas, hoping for such criticism.

Mine Inspector has quoted the inefficiency of state ownership of mines where it has been tried. In referring to this question, I do not wish to convey the idea that I commend either state ownership or the present form of government in the United States. Both leave room for considerable improvement; but, is it not possible through the failure of both of these plans to devise an efficient ownership wherein the public would share directly and not in the present indirect way in which there is always a doubt that the laborer is really sharing at all? Let us not be reactionary, but let us be constructively progressive.

Has the combination of labor and capital been of the participants' own free will and accord? Has it been efficient? Is it not possible to devise a system whereby the combination could become a work of joy on the part of both capital and labor? Mr. Ford seems to have at least made a start in this direction. If the news report is to be credited, the increased efficiency since the inauguration of the profit-sharing plan, in the Ford Motor Car works, is 40 per cent. Could not Mr. Ford's system be revised and applied to coal mining? I believe it possible.

We who have been in the business of mining bituminous coal, in the United States, east of the Mississippi River, know the enormous profits in coal mining, with properly equipped mines, when taken as a whole; that is to say, the profits of mining plus the profits of stores and rents. We also know the heart-breaking worries of the manager who tries to squeeze out profits from poorly equipped mines, which are so frequently over-capitalized by the over-zealous promoter.

Though some of the larger coal-mining corporations are clearly producing splendid profits, I firmly believe that the personal efficiency of the employees of the best of these companies can be increased at least 10 per cent. by some profit-sharing plan.

Mining Engineer.

———, Ky.

The Eccles Explosion

The map of Eccles No. 5, the mine which recently was the scene of a disastrous explosion, COAL AGE, May 23, p. 848, leads me to offer a few remarks on the dangerous conditions existing at that mine. A mine of this size should be worked on the long-wall-plane system, with triple entries. In fact, no other system should be considered and the exclusive use of safety lamps should be required. More splits and overcasts will, of course, be needed, but if such precautions were adopted, explosions would involve a smaller area and destroy fewer lives.

As can be seen on the map referred to above, the air entering the first right of the southern section of the mine travels, from the first to the last, through 8 entries, running up one heading and down the other, until it reaches No. 6 shaft. Now, suppose that 8 men, one in each of these headings fired a shot apiece; the quantity of coal thus shot down might release enough gas to raise the percentage of gas in those places, to the danger point. This firedamp might be ignited by a solid shot fired in the last place through which the air traveled.

The "flies" used in the mines are dangerous to men and mules and are not desirable. It is better to provide an excess of ventilation that would produce a sufficient circulation of air in the rooms, rather than depend on the use of curtains. This explosion was quite general and seems to suggest, though it does not prove the fact that the mine, which was kept well watered, had a dangerous percentage of gas present not in one portion only but throughout the workings.

I have traveled over a large part of West Virginia in the last 8 months and am afraid there is evidence that the compensation act, by distributing the blame, is decreasing the sense of personal liability. The burden of accidents, which formerly rested on those who owned the mines where they occurred, is now spread among all operators of mines; and the sense that the burden is not on the corporation but on the whole industry in the state makes some managers and foremen careless.

I visited a place in West Virginia recently and was told by one of the daymen that last August he had ordered posts to set under some bad roof. These were not supplied, and in January of this year when the men went to work, the slate had fallen and the mine was stopped for a day to clean up. The mine foreman at this place knew something about electricity and he retained his position because of this knowledge and not because his practice in coal mining was sufficient to justify his retention.

SAMPSON SMITH.

Mineral, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Proportion—A proportion, in arithmetic, is the expression of equality between two or more ratios of different kinds. A proportion may be either simple or compound.

Simple Proportion—A simple proportion is one in which both couplets are simple ratios. For example, in reference to mine airways, one airway may have twice the sectional area of another airway; the area of the first being, say 24 sq.ft. and that of the second 48 sq.ft. The ratio of these areas or the **area ratio** is 24: 48 or 1: 2.

It is evident that, for the same velocity of the air current, the quantity of air passing in the first airway will be one-half that in the second airway; the first circulation being, say 10,000 cu.ft. per min., the second will be twice that quantity of air, or 20,000 cu.ft. per min. The ratio of these quantities or the **quantity ratio** is then 10,000: 20,000, or 1: 2, as before.

The ratios just shown, though of different kind, are equal and may be written as two ratios with the sign of equality between them; thus,

$$\frac{48}{24} = \frac{20{,}000}{10{,}000};$$

or as a proportion; thus,

$$24 : 48 :: 10{,}000 : 20{,}000.$$

Instead of the sign of equality (=) used above, it is more common to write a proportion with a double colon (::) separating the two couplets or ratios; thus,

$$24 : 48 = 10{,}000 : 20\,000$$

The above is a simple proportion, because it expresses the equality of two simple ratios.

Compound Proportion—A compound proportion is one in which one or both couplets are compound ratios. To illustrate this case, suppose that both the sectional area and the velocity of the air current are different in two airways. It is evident that the quantity of air passing in each airway will vary in the same ratio as the area and velocity, respectively.

For example, assume, as previously, that 10,000 cu.ft. of air is passing in the first airway, which has an area of 24 sq.ft. The same velocity of the air current will produce 20,000 cu.ft. per min. in the second airway, which has an area of 48 sq.ft. But if the velocity in the second airway is increased, it is evident that the quantity of air will be increased in the same ratio. If the velocity in the second airway is, say three times that in the first, the quantity of air passing will be $3 \times 20{,}000 = 60{,}000$ cu.ft. per min.

In this case the area ratio is 1: 2; the velocity ratio, 1: 3; and the quantity ratio is the product of these two ratios or 1: 6. This is expressed as a compound ratio thus,

$$10{,}000 : 60{,}000 :: \begin{matrix} 1 & : & 2 \\ 1 & : & 3 \end{matrix}$$

or finally by multiplying together the terms of the compound ratio to obtain a simple ratio, the proportion is

$$10{,}000 : 60{,}000 :: 1 : 6.$$

The Coal Age Pocket Book

A compound proportion may have any number of simple ratios in either one or both couplets; but the proportion can always be reduced to a simple form by multiplying together the similar terms in each couplet.

Direct Proportion—Proportion is mostly used to compare similar terms or factors, in respect to two states, conditions, or things. A direct proportion is one in which the order of comparison is the same in each couplet or ratio.

For example, in comparing the circulation in two airways of the same section but different length; other things being equal, the pressure producing the circulation varies directly as the length of the airway. In this case, the proportion is direct; because,

$$1st\ pressure : 2nd\ pressure :: 1st\ length : 2nd\ length$$

The ratios in this proportion are each **direct ratios,** because the order of comparison is the same in each.

Indirect or Inverse Proportion—It frequently happens that, as one factor increases, another decreases in the same ratio. In that case, the resulting proportion is indirect; and the second couplet is an **inverse ratio,** because the order of comparison is reversed.

For example, for a constant velocity of the air current, in two airways having equal rubbing surface, the pressure per square foot varies inversely as the sectional area of the airway, which is expressed by an indirect proportion, as follows:

$$1st\ pressure : 2nd\ pressure :: 2nd\ area : 1st\ area$$

The second couplet in this proportion is an **inverse ratio,** because the order of comparison is reversed.

Terms—The first term of a ratio is called the "antecedent" and the second the "consequent."

In every proportion, there are four terms. The first and fourth terms are called the "extremes" and the second and third the "means." The product of the extremes is always equal to the product of the means.

Simple proportion is often called the "Rule of Three," because it contains three known terms, as **a, b, c;** and one unknown term, which is designated by **x.**

The relation of these four terms and the various operations possible in proportion, are best shown by the following simple formulas:

$$a : b :: c : x$$

$$ax = bc$$

$$x = \frac{bc}{a}$$

$$a + b : b :: c + x : x$$

$$a - b : b :: c - x : x$$

In any proportion the means can be reversed; thus,

$$a : c :: b : x$$

In the solution of problems involving a proportion, either simple or compound, much time and labor is saved by writing the several ratios as fractions and canceling factors common to both numerator and denominator, which simplifies the work.

Inquiries of General Interest

A Problem in Mechanics

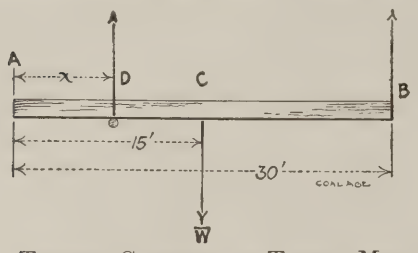
Kindly answer the following question to settle a little controversy. The question is as follows:

A stick, 30 ft. in length and of uniform weight and cross-section throughout, is carried by three men. How far from one end of the stick must a cross-pole be placed so that each of the two men holding this pole will carry the same weight as the third man lifting the other end?

X.

Hopedale, Ohio.

This is a simple problem in mechanics and is readily solved by the principle of moments. The stick *AB*, in the accompanying figure, being uniform in cross-section, its center of gravity is at the middle point *C* or 15 ft. from either end; and the weight *W* of the stick acts downward through this center of gravity as indicated by the arrow.



TIMBER CARRIED BY THREE MEN

In the solution, the center of moments may be taken at any point along its length; but, for simplicity, assume the center of moments is at the end *B* of the stick, which is carried by the one man. Then, since the weight of the stick is *W* and two-thirds of this weight is carred by two men on the crosspole at *D*, calling the distance of this pole from the end $AD = x$, we have, by the principle of moments,

$$\begin{aligned} \tfrac{2}{3} W\ (30 - x) &= 15\ W \\ 20 - \tfrac{2}{3} x &= 15 \\ \tfrac{2}{3} x &= 20 - 15 = 5 \\ x &= \tfrac{3}{2} \times 5 = 7\tfrac{1}{2} \text{ ft.} \end{aligned}$$

Therefore, the cross-pole between the two men should be 7.5 ft. from one end, so that each of these men will bear an equal weight with the third man at the other end of the stick.

A Longwall Proposition

I am much interested in the future of longwall methods for mining coal, and have read with pleasure and profit the discussion on this subject, in recent issues of COAL AGE. At the present time, I have a proposition that I would like to bring before the readers of the paper, in order to get their opinion as to whether the conditions given are favorable to longwall work.

Briefly stated, the conditions are as follows: The mine is a drift mine, with an average thickness of overburden of say, 300 ft. The coal is of a fair average quality; the seam has generally little or no inclination, and a uniform thickness of 36 in., with a fireclay bottom and a slate roof. The fireclay is hard when first exposed, but softens somewhat in contact with air and water. The bottom has a tendency to heave slowly in narrow work; but this heaving is a little more rapid in the rooms. It has, however, given us no trouble in working the rooms, except where a squeeze has started. In such cases, I have known the bottom to heave in the rooms 3 in. in a single day. Ordinarily, the bottom will not heave over 6 in. during the life of a room.

The roof slate is hard, so hard that it must be shot down, although it does not require heavy shooting to do this. Our greatest difficulty lies in the fact that the slate is overlaid with a hard "sulphur binder," which will not break and is the real cause of the frequent occurrences of squeeze or creep. We have lost considerable territory owing to this cause.

Our method of working has been to drive all entries on the double-entry system, turning the rooms off the cross-entries. Each room is driven with a 100-ft. face, there being three roadways to each room. The rooms are driven 150 ft. deep and are all posted on 4-ft. centers, to within 12 ft. of the face. Six inches of bottom is taken up on the roads in the rooms, in order to give sufficient headroom to take the cars to the face. The rooms generally fail by the roof slate caving to a height of from 4 to 10 ft., up to the "sulphur binder," which we have found it impossible to break.

When a squeeze takes place, the roof generally remains firm, but the coal is forced out into the entry and the bottom heaves rapidly, as I have stated. So strong is the overlying "sulphur binder," that I have known the rooms to be worked out for a distance of 600 ft. along the entry and to a depth of 150 ft., all the posts and room pillars having been drawn back. In all this area, the roof did not cave and the bottom heaved but 10 in.

What I particularly desire, is information in regard to the manner and cost of building packwalls, and an expression of opinion as to whether or not the conditions I have described are favorable to longwall work.

H. R. HARTSUFF, Supt.,
Beaver Coal & Coke Co.

Wampum, Penn.

[The manner of building packwalls and cribs, chocks, or cogs, in longwall work, as well as the general method of procedure, has been fully explained in the letters on Longwall Mining Methods, COAL AGE, Jan. 10, p. 99, and Feb. 21, p. 339. As the subject of longwall mining is growing in interest every day, we shall be glad to publish further suggestions relating to the mining of the coal in this particular seam.

The chief difficulty is encountered in the hard "sulphur binder," which correspondent states "will not break." Assuming that this rock will support the overburden without being broken, over a large area, say 50x200 yd., what measures should be adopted for the safe working of this seam, so as to insure the complete extraction of all pillar coal.—ED.]

Examination Questions

Anthracite Mine Foremen's and Assistant Mine Foremen's Examination Held at Pottsville, Penn., May 25, 26, 1914

Ques. 1—What are the qualifications for mine foreman and assistant mine foreman, to fully fit them for the position, and what are their duties?

Ans.—Candidates for the position of mine foreman or assistant mine foreman, in the anthracite district of Pennsylvania, are required by law to pass a satisfactory examination and to give satisfactory evidence of at least five years' practical experience as a miner, good conduct, capability and sobriety, before they can obtain a certificate from the examining board, qualifying them to hold that position in any mine in the state.

In addition to the legal requirements, the successful mine foreman must be intelligent, industrious, observing, a good judge of human nature and of what constitutes a day's work. He must be thoroughly acquainted with mining conditions and methods of working. Aside from their legal duties, both the mine foreman and his assistants must devote their entire time to the inspection of the working places in the mine and the oversight of the men. Their duties include the inspection of all the machinery and equipment employed in the operation of the mine.

Ques. 2—What practical experience have you had in the anthracite coal mines of Pennsylvania? State in what mines employed, the character of the mines and the nature and length of your service in each.

Ans.—This question is answered from the candidate's own experience.

Ques. 3—What duties does the law impose on the mine foreman and his assistants?

Ans.—The duties of the mine foreman, as described by the present anthracite mine law, are given mostly in Art. 2. The mine foreman has charge of all matters pertaining to ventilation; he must examine, at least once a week, all accessible parts of those abandoned portions of a mine in which explosive gases have been found. The mine foreman or assistant mine foreman must examine carefully, every morning, all working places, and traveling roads in the mine, before the men are allowed to enter. This examination must be made with a safety lamp, within three hours of the time for beginning work, and must be recorded in a book kept at the mine for the purpose. The person making the examination must mark plainly the date of same at the face of each working place examined.

Beside the daily morning examination, the mine foreman or his assistant must visit and examine carefully, at least each alternate day, every working place in the mine while the men are or should be at work in such place, and must give all necessary instructions for the safety of the men. The mine foreman or some other competent person designated by him must examine, at least once every day, all slopes, shafts, main roads, traveling ways, signal apparatus, pulleys and timbering, to ascertain that they are safe and in good working condition.

Ques. 4—On what scale does the law require the maps of a mine to be made, and how are the distances represented—horizontally or as measured on the various pitches?

Ans.—The anthracite mine law (Art. 3. Sec. 1) requires that an accurate map may be made of the workings of every coal mine, on a scale of 100 ft. to the inch. In general, mine maps are constructed on a horizontal plane of projection, all distances on the map being horizontal distances. The law requires that the map shall state, in degrees, the general inclination of the strata, together with any material deviation therefrom in portions of the workings. The map must also state the tidal elevation of the bottom of each shaft, slope, tunnel and gangway and other important points in the mine or on the surface, as required by the mine inspector of the district in which the mine is located.

Ques. 5—What are the conditions that should be taken into consideration in determining the width of breasts and pillars? Should these be of equal width, under all circumstances?

Ans.—The principal factors that determine the width of breasts and pillars in mine workings are the following: Depth of cover, as determining the roof pressure; thickness and inclination of the seam; character of the roof, floor and coal; the existence and condition of overlying or underlying seams of coal; and the existence of water or gas in the strata. No uniform or universal width of opening and pillar can be employed under all conditions as these vary widely.

Ques. 6—If the map shows a distance of 200 ft. between the gangway and the landline parallel to the gangway; how far can a breast be driven without crossing the line, where the pitch is 48 deg.?

Ans.—The length of the breast measured on the pitch, from the gangway to the landline is:

$$\frac{200}{cos\ 48^\circ} = \frac{200}{0.669} = 298.9\ ft.$$

Ques. 7—What is natural ventilation; and is such ventilation reliable for mining purposes? State why.

Ans.—The ventilation in a mine is said to be natural when the circulation of the air current throughout the mine is created and maintained by natural means or agencies; such, for example, as the formation of air columns in the shaft, or in the rise or dip workings; the action of a waterfall in a shaft; or surface winds deflected into the mine workings. The means last mentioned are seldom employed and, then, only when the conditions are exceptionally favorable. Natural ventilation is unreliable for mining purposes, owing to the constantly changing conditions that make the circulation of the air in the mine uncertain and not easily regulated to meet requirements in the workings.

Coal and Coke News

Washington, D. C.

It is believed that during the current session of Congress some action will be taken designed to create a more centralized government for Alaska or at all events to centralize the power of controlling that territory insofar as relates to industrial developments, in a smaller number of hands. It has been doubtful for a good while whether Congress could be spurred up to taking the necessary steps, but Secretary Lane with, it is understood, the approval of the President, is now exerting himself to get some attention for the matter and to secure the examination of bills which are pending for vesting the management of Alaskan affairs as he desires, in the Interior Department.

Attention has been attracted to a special report recently filed by Mr. Lane in which he recommends the appointment of "a development board" for Alaska, such board to have complete control of all affairs connected with natural resources and the development of the territory. The board would consist of three members with headquarters in Alaska and its function would be to carry on the work of the general land office, the road commission, the bureau of mines, the bureau of education, and the Secretary of the Interior.

Special stress is laid upon the work that would be done by the board in connection with the management of mines. Mr. Lane offers severe criticism regarding red tape in Alaska. He points out that at present each of at least a score of government bureaus in Washington have something to do with the government of Alaska, resulting in a vast amount of red tape and circumlocution in the administration of public affairs. He cites instances of delays of several years in the handling of uncomplicated land, and other matters which should have been disposed of.

"Our present system of government in Alaska, is heterologous," says the Secretary. "Instead of one government there are a number, interlocked, overlapped, cumbersome and confusing. Experience has demonstrated that efficient administration is best secured by centralizing responsibility and authority in the hands of a few men, who can be held to strict accountability for the results of their actions. The proposed development board for Alaska follows this modern and well tested plan for securing efficient administration."

The Tap-Line Cases

More and more importance is being attached to the decision of the Supreme Court in the tap-line cases handed down a few days ago. The growing opinion among lawyers is that the decision since it affects the relation of trunk lines and industrial roads will necessitate the Interstate Commerce Commission's revising its decision respecting the division of through rates between the trunk lines and the short industrial railroads owned by the United States Steel Corporation and the coal roads as well as by other concerns which are in like position. The effect would be to alter considerably the circumstances of transporting ores and coal.

What is considered the essential part of the opinion in the light of further study, is found in those paragraphs which have to do with the definition given by the commission to the tap lines. In discussing the question, "Are tap lines plant facilities or common carriers," the court says that it was insisted that the roads were not common carriers because most of their traffic was in their own items of production.

The final draft of the opinion as published, however, goes on to note that the conclusion already indicated above, "loses sight of the principle that the extent to which a railroad is used does not determine the fact whether it is or is not a common carrier. It is the right of the public to use the road's facilities and to demand use of it, rather than the extent of its business which is the real criterion determinative of its character. . . . . We think the commission exceeded its authority when it condemned these roads as a mere attempt to evade the law and secure rebates and preferences for themselves.

It is doubtless true as the commission amply shows in its full report and supplementary report in these cases that abuses exist in the conduct and practice of these lines and in their dealings with the carriers, which have resulted in unfair advantages to the owners of some tap lines and to discrimination against the owners of others.

Because we reached the conclusion that the tap lines involved in the appeals are common carriers and as such entitled to participation in joint rates with other common carriers, that determination falls far short of deciding, indeed does not at all decide, that the divisions of such joint rates may be made at the will of the carriers involved and without any authority of the commission to control them. . . . . If the divisions of joint rates are such as to amount to rebates or discriminations in favor of the owners of the tap lines, because of their disproportionate amount, in view of the service rendered, it is within the province of the commission to reduce the amount so that the tap line shall receive just compensation only for what it actually does."

The effect of the decision upon some of the revised rates on iron and steel, iron ore and coal will, it is expected, be direct and immediate, necessitating revision by the commission of the decisions it has handed down in a number of such cases within recent periods.

HARRISBURG, PENN.

Governor Tener, on May 27, made announcement of the Lake Erie and Ohio River Canal Commission, authorized by the last Legislature. The purpose of the board is to take up the preliminary work for the construction, if possible, of a ship canal from Pittsburgh to Lake Erie, through the Beaver and Mahoning Valleys. The members of the board were named as follows:

President, W. A. Magee, Pittsburgh; A. S. McSwigan, Pittsburgh; Col. Thomas W. Symons, Washington, D. C.; T. P. Sloan, Lock No. 4; and James A. Chambers.

The first duty of the board will be to have a survey made, the sum of $150,000 having been appropriated by the state for this work. The board has jurisdiction over the entire work and is given authority to appoint a secretary, a treasurer, a chief engineer and such other assistants as may be necessary. It is to make a report to the governor each year of the progress made. The governor has the right to remove any member. Each member is to furnish bond in the sum of $25,000 for the faithful performance of his duty. The president will receive a salary of $5000 per year and each member $4000 a year. The appointments take effect at once.

The sister states of Ohio and West Virginia last year enacted some unusual legislation conferring the right virtually of eminent domain upon the Canal Commission which the Commonwealth of Pennsylvania would organize. Thus the Pennsylvania board will supervise the whole project which now seems absolutely after long agitation to be beyond stoppage.

The Legislatures of West Virginia and Ohio authorized counties contiguous to the canal to bond themselves at elections for a pro rata amount of the $60,000,000 which it is estimated the big waterway will cost. This amount, however, is to cover the interest on the bonds until such period when the tolls on the traffic shall have provided for the annual installments of interest.

PENNSYLVANIA

Anthracite

Minersville — Anthony Bushing was killed and Anthony Koshokskie probably fatally injured in addition to being blinded by a premature dynamite blast in the Buck Ridge colliery on May 27. The men were hurled a long distance above a gangway.

Hazleton—Andrew Matti, vice-president of the United Mine Workers of the Hazleton district, was arrainged before an alderman on May 28, charged by the State Police, with disorderly conduct and inciting to riot at McAdoo. Matti was held under $500 bail. The case is the direct result of the Hazleton trolley strike. Matti had trouble with two of the strike breakers who had him arrested.

Failure to insulate a wire in the Harleigh mine of the Harleigh-Brookwood Coal Co. has cost that corporation $5325, which must be paid to Mrs. Bridget Gallagher for the death of her son who was killed from an electric shock.

Scranton—A number of outside employees at the West Ridge colliery of the Scranton Coal Co. went on strike recently complaining that they were not being paid the scheduled rate of wages.

The examination of candidates for mine foremen's and assistant mine foremen's certificates in the anthracite region of Pennsylvania which was previously announced to be held Apr. 15 and 16 and later postponed until the latter part of May was held May 23 and 26. An unusually large number of men took the examinations which were held at Scranton, Old Forge, Pottsville and other points.

Brinkerton—Declaring he recognized no law, but the law f God, William T. Fox, a miner, opened fire on four members f the State Constabulary on May 29, and was riddled with ullets by the troopers. Fox has previously shot F. C. Rob-ts, superintendent of the Fairmount Coal Co.

Lattimer Station—Employees of the Cranberry Colliery, of . Parddee & Co. on May 27, voted to continue the strike to rce six miners into the union. The statement was made at to collect dues of delinquents amounting to approxi-ately $16 the employees have lost by idleness wages aggre-ating about $21,000.

Maysville—During a storm on May 27, lightning wrecked e top of the Scott shaft and power plant, also the Richards d Hickory Ridge collieries, of the Susquehanna Coal Co., using operations to be suspended. A number of men had arrow escapes.

Tamaqua—Six miners were killed and two badly injured at e Mary D colliery on May 29 when the cage in which they ere riding to the surface turned turtle after it had gone) ft. past the landing where the men were supposed to sembark. One man jumped while the cage was several et in the air landing upon a beam and crushing his skull. he other five dropped 700 ft. into a sump at the bottom of e shaft. One man saved his life by catching a chain, hile another caught upon a projection and escaped with a oken leg. It is not known whether this accident was due to egligence or some mechanical defect.

Bituminous

Connellsville—When arraigned before a justice on inform-ion made by Inspector Alexander McCanch, Andy Pohts, a iner employed at the Black Diamond mine near Mononga-ela, entered a plea of guilty to violating the mining laws. e had refused to obey an order to place a post at a danger-us point in one of the rooms and was sentenced to pay the sts and a fine of $25.

It is reported that the Connellsville and lower Connellls-lle regions with 22,678 ovens in blast out of a total of 37,-5 are running at just 50 per cent. of rated capacity. Against is, however, is the assurance of some optimistic steel men at business is certain to improve especially if the railroad te case is favorably decided.

Washington—Another suit as a result of the explosion in e Cincinnati mine Apr. 23, 1913, was filed here May 25 hen Mrs. Mary Hager began action to recover $50,000 dam-es from the Monongahela River Consolidated Coal & Coke). for the death of her husband, Charles Hager. She alleges at the coal company was negligent and failed to comply ith a law providing for the safety of miners.

Brier Hill—Mine inspectors I. G. Roby, J. P. Walsh and . H. Howarth, together with a number of mine superintend-ts, foremen and pit bosses recently inspected the new auto-atic safety lock for mine cages invented and patented by . J. Phelan. This device has been in operation at the Brier ll works for some time past and has proven highly suc-ssful.

Rockwood—The Maher Coal & Coke Co., which was re-ntly organized, has reopened the old Shamrock mine and has ployed about 30 miners, but expects in the near future to ploy a much larger number and will ship from 150 to 200 ns of coal per day.

WEST VIRGINIA

Charleston—After the action of union representatives lling a strike of the miners in the Kanawha district, effec-e, Monday, June 1, represntatives of four large operators Paint Creek met Saturday with the officials of the United ne Workers, and effected a tentative working arangement, lependent of other mines in the district, under which the nes on Paint Creek will be continued in operation for the ne being. The Paint Creek Collieries Co., the largest of the ir companies, entered into an agreement carrying with it operation of the check-off, the only point in dispute, as as the district as a whole is concerned, and leaving to bitration later on a dispute over the wage contract in the int and gas seams. The Standard Splint and Gas Coal , the Imperial Colliery Co. and the Christian Colliery Co., o were also in the conference, have the same plan under nsideration, and will probably adopt it, it is understood, ile the National Bituminous Coal & Coke Co., operating at kdale, on Cabin Creek, is said to be willing to consider a e arrangement.

Wheeling—The city of Wheeling drilling for water re-ntly struck coal at a depth of 113 ft. This deposit appears be extensive, and so far as can be learned was never pre-usly known to exist. The well being drilled for water s abandoned as a dry hole.

KENTUCKY

Fleming—The Mineral Fuel Co., operating at Fleming, Haymond and Hemphill, on Potters Fork and Yount's Fork respectively, has changed its name to the Elk Horn Mining Corporation. Thomas S. Haymond continues as manager. New increases and extensions are also planned for the near future.

Lookout—The Rockhouse Coal Co. announces increases in its coal operations here and will increase from 50 to 75 cars per day.

Whitesburg—Five hundred or more miners have been added to the forces employed in the Jenkins and McRoberts fields, according to information received here. Most of the mines in this district are running to full capacity.

OHIO

Murray—A small coal mine has been opened near this place by the North Hocking Coal Co.

Steubenville—The fire in the Robert Hill mine which has burned for years recently spread to the Henry Wilson mine, compelling the suspension of operations in this development.

Martins Ferry—The Aetna-Standard mill mine and the Blockhouse mine have agreed to the 1914 wage scale contract calling for the miners' prices for mine run coal. These were the first contracts to be signed under the new wage scale demanded by the miners. The Aetna mill mine has been working under a provisional agreement for some time.

Coshocton—The Locust Grove Coal Co., of Coshocton, will be the first firm to be sued by the state for an award for injury to an employee because of failing to contribute to the Workmen's Compensation Fund of the state. John Smalley, an employee, met with an accident which laid him up for four weeks. Applying for workmen's compensation his employers were ordered by the State Industrial Commission to pay him $48. This the company refused to do, and the state will sue for this amount, plus a penalty of 50 per cent.

INDIANA

Indianapolis—The program for the annual meeting of the Michigan-Ohio-Indiana Coal Association, which will be held at Indianapolis, June 23 and 24, has been announced by Secretary B. F. Nigh, of Columbus. The program calls for long business sessions the two days of the convention with a varied entertainment program. The officers of the organization are urging all of the members and guests to attend the business sessions as a number of interesting addresses have been provided.

Evansville—C. N. Coupland, London, England, has been making trips from here into western and central Kentucky taking options on thousands of acres of coal lands. He says he represents a syndicate willing to spend $20,000,000 in Kentucky coal properties.

Jasonville—The Lattas Creek mine, employing 300 men, has resumed operations. The Bogle mine, northeast of here, is being dismantled and will be abandoned.

Linton—The Vandalia Coal Co. has started two more of its mines, employing 500 men.

ILLINOIS

Johnston City—The Cambria Coal Co., a shaft for which was sunk northwest of this place several years ago, is about to open up the property. J. L. Mitchell, of Coffeen, has the controlling interest, and it is understood the contracts will be let shortly for the equipment. Connections are anticipated with the Burlington, C. & E. I., Iron Mountain and Illinois Central.

Benton—The Middle Fork Coal Co., a new undertaking, is sinking a mine a few miles southeast of this place. It is understood the mine will have a capacity of 4000 tons a day, and the work of sinking the shatf is now in progress.

Marion—The work of raising the tipple of the West Virginia Coal Co. 10 ft., and building a superstructure is now under way.

Springfield—Owing to the failure of the special sub-committee to agree, the scale committee of the miners and operators of the Springfield district, on May 27, held a perfunctory session at the City Hall. The sub-committee is expected to formulate a tentative contract governing machine mining in the near future, after which a report will be made to the general committee.

Pekin—Following the action of several of the miners of the Champion Coal Co. in filing an involuntary petition in bankruptcy against the company, Judge Jesse Black has filed an answer in the United States Court. This asserts that the assets of the company exceed liabilities by $10,000, and that it is absolutely solvent, and if relieved from the court restrictions will proceed as a going concern.

MISSOURI

Kansas City—The annual meeting of the Southwestern Interstate Coal Operators' Association will be held at Kansas City on June 9. The joint meeting of the scale committees from the association and from the three districts affected will be held later in the same week, according to present intentions.

ARKANSAS

Fort Smith—A committee, appointed by the United Mine Workers, which inspected the nonunion mines in Johnson County, will report to a general conference of operators and union miners in Kansas City on June 10. It is understood that 12 coal mines in Arkansas and Oklahoma, employing about 3000 men are to be unionized if the plans as advocated here are successful. It is further understood that negotiations have been started with the Missouri, Kansas & Texas Ry. Co., relative to the reopening of its mines at Colgate, Okla., in which 800 miners were formerly employed.

Russellville—Two hundred miners recently went on strike at Russellville, giving as a reason the failure of the mining company to comply with the state mining laws, after it had been instructed to do so by state mine inspector, Thomas H. Shaw. Efforts will be made shortly to settle the strike.

OKLAHOMA

Okmulgee—Col. J. L. Peacock, while drilling for oil upon one of his holdings, recently struck a rich bed of coal at a depth of 1200 ft. This fuel is of excellent quality, and the deposit is several feet in thickness.

Owners and operators of coal mines in the segregated mineral belts of the Choctaw and Chickasaw nations after Aug. 1 next, upon the order of the Department of the Interior, and at the suggestion of the Bureau of Mines, will not be allowed to use any but permissible explosives in carrying on mining operations.

McAlester—A six-man team of coal miners from Savanna recently won the silver trophy cup offered by operators and miners in the McAlester field for the best showing in mine rescue work. Nine teams, in addition to two boys teams and one ladies team, were entered in this contest.

FOREIGN NEWS

Leeds, England—Eleven coal miners were killed and a numbers of others injured, May 30, by an explosion of gas in the Silkstone colliery at Wharncliffe. The accident occurred at a time when the full force of miners were not at work.

Sabinas, Mexico—Acting on what they declared were direct orders from General Carranza constitutionalist officials on May 27 confiscated five coal mines. These mines, owned by French and American capitalists, are the largest in Mexico. At constitutionalist headquarters, at Piedras, it was stated that these mines will be operated as public property.

PERSONALS

W. A. Lama, formerly traveling salesman for the Hocking-Domestic Coal Co., of Athens, Ohio, has accepted a similar position with the Hatton Brown Co., of Columbus.

George F. Hart, treasurer of the Guardian Savings & Trust Co., of Cleveland, it is reported has been appointed receiver of the Goshen Coal Co., of New Philadelphia, Ohio.

Colonel I. V. Dye for several years connected with the Coal & Coke Ry. as General Freight and Passenger Agent, has been appointed General Manager to succeed J. M. Smith resigned.

Willis T. Thomas has been appointed general superintendent of the Iowa District of the Consolidated Indiana Coal Co., with headquarters at Electra Mine near Melcher, Iowa, in full charge of the operation and maintenance of the property.

Andrew Leckie, who has for some time acted as superintendent of the Panther Coal Co., at Panther, W. Va., has resigned his position and accepted the agency for the McBee Powder Co., of Pittsburgh, for the southwestern portion of West Virginia.

Upon the application of S. A. McManigal, president, W. S. Courtright has been appointed receiver for the W. J. Hamilton Coal Co., of Columbus. Mr. Courtright was formerly president of the Union National Bank and was recently elected vice-president of the W. J. Hamilton Coal Co.

Frank C. Bevans, who has been superintendent of several mines in the Pittsburg, Kan., coal district, has been made manager of the city of Mulberry, the appointment effective June 1 Mr. Bevans will conduct the affairs of the town as he would a private business, and will have supervision over both the municipal electric light and water plants.

At the annual meeting of the South Wales Branch of the Association of Mining Electrical Engineers, Sydney, E. Walker was presented with a testimonial, in the shape of a handsome gold watch, by the members of the branch, "as a token of their esteem and respect," in connection with his presidency for the first four years of the Association's existence.

Following the resignation of Everett Drennen, as manager of the Elkhorn Division of the Consolidated Coal Co., the following promotions effective June 15 are announced; G. M. Gillette will become manager of the Elkhorn Division; Jonathan Jenkins is promoted to assistant manager of the Elkhorn Division; and Garner Fletcher becomes manager of Miller Creek Division, vice G. M. Gillette transferred.

Tim McDonough, mine guard at Irwin, Penn., recently dove down a 400-ft. mine shaft to the successful rescue of Tony Andy aged two, who accidently toppled into the shaft. After seizing the child McDonough after striking the side of the shaft finally got hold of the cable sliding down it to the top of the cage from whence he climbed to the landing. He sustained several broken ribs, a broken ankle and concussion about the entire body. The child he rescued was unharmed.

Trade Publications Received

Walter A. Zelnicker Supply Co., St. Louis, Mo. Bulletin No. 153, "Special Offerings and Other Used Material."

Borroughs, Wellcome & Co., London, Eng. "The Age of Speed;" 57 pp., 4x6½ in., illustrating Tabloid first-aid supplies.

Wilson-Snyder Centrifugal Pump Co., Pittsburgh, Penn. "Wilson-Snyder High Efficiency Centrifugal Pumps;" 40 pp. 6x9 in., with many illustrations and curves.

Keystone Lubricating Co., Philadelphia, Penn. "119" for Lubricating Mine Car Wheels. Folder of 8 pp., 3½x9 in., describing the use and advantage of "119" Keystone grease.

New York City—The Second International Exposition of Safety and Sanitation will be held Dec. 12 to 19, 1914, in the New Grand Central Palace, under the auspices of the American Museum of Safety, 29 West 39th St., this city.

CONSTRUCTION NEWS

Logansport, Penn.—The Shawmut Mining Co. is reported planning two new mines on the opposite side of the Allegheny River from Logansport. It is said that $800,000 will be expended in opening these properties.

Hamilton, Ohio—The Cincinnati, Hamilton & Dayton R.R. will soon begin the erection of large coal docks at Hamilton to be located on the site of the old round house which will be removed to a new location. The improvemnts at this point will mean an expenditure of $100,000.

Sandusky, Ohio—The large docks of the Pennsylvania R.R. Co., at this point are nearing completion and will be put in service soon. When the docks are completed the capacity of the loading machinery will be increased three-fold. A force of 400 men has been at work on the new docks.

Columbus, Ohio—The Essex Coal Co. of Columbus is opening two mines on the Kanawha & Michigan R.R. about a mile apart in the Pomeroy district. These mines will have a combined capacity of 3000 tons per day. About $150,000 is to be spent on improvements by the company which anticipates building about three miles of railroad.

Fairmont, W. Va.—To augment the power furnished the Monongahela Valley Traction Co., the Consolidation Coal Co. will shortly add to its central power plant a 1000-kw. gas engine unit. A contract for this equipment has been let and shipment of the machinery is guaranteed for Sept. 9. It is expected that the erection should be completed in the month of October.

Fleming, Ky.—The Pottersfork and Yount's Fork branches of the Louisville & Nashville R.R. into Haymond and Hemphill, new cities of the Elk Horn Mining Corporation, will

completed within a week and the shipping of coal begun on a considerable scale. Already nearly 200,000 tons of coal awaits the completion of these branches, while lively mining activities continue.

Floodwood, Ohio—Ground has been broken for the big central power station to be erected by the Ohio Electric Power Co. for the purpose of supplying electric current to the numerous coal mines in this section of the Hocking Valley district. It is expected that the plant will be in operation by late fall, so far as to be able to furnish current to a number of mines.

Scranton, Penn.—The contracts for the purchase of 750 new steel hoper coal cars that will cost $350,000, by the Delaware, Lackawanna & Western R.R. Co. were let on May 29. This order of coal cars is one of the largest ever placed by the Lackawanna. The American Car & Foundry Co., of Berwick, was awarded the contract for 400 of the new cars, while the Cambria Steel Co., of Johnstown, got the remainder of the order, 350 cars.

Duluth, Minn.—The Reiss Coal Co. is erecting a new unloading rig on its dock No. 1 at West Superior. This will be the second largest unloader on the lakes. Erected by the Heyl & Patterson Co. the rig will be 100 ft. high and will have a 450-ft. span handling an 8-ton clam shell bucket.

The United States Steel Corporation's unloading dock at Duluth will be widened 300 ft. this season and three more, Mead-Morrison rigs with 3-ton buckets will be installed. This extra dock capacity will take care of the coal supply for the steel plant at New Duluth.

The Great Northern Power Co. at Thompson, near Duluth, is installing more machinery and increasing its power by one unit, which will give this firm one-third greater power output. The application of electricity to almost all the large coal unloading docks in Duluth and Superior created the necessity for more power.

NEW INCORPORATIONS

Denison, Ohio—The capital stock of the Union Coal & Fire Clay Co. has been increased from $10,000 to $100,000.

Columbus, Ohio—The Maynard Coal Co. has filed amended articles of incorporation increasing its capital stock from $181,000 to $350,000.

Norfolk, Va.—The Norfolk & Chesapeake Coal Co. has been organized in West Virginia with a capital stock of $100,000. Tazewell Fitzgerald of Norfolk, Va., is statutory agent.

Columbus, Ohio—By a number of amendments filed by the Maynard Coal Co., of Columbus, with the Secretary of State the capitalization of the company has been increased from $200,000 to $350,000.

South Bend, Ind.—The I. S. C. Co., of South Bend has been organized with a capital stock of $20,000 for the purpose of coal mining. The directors are Thomas W. Slick, J. K. Glasgow, and W. A. Slick.

Toledo, Ohio—The Ohio Gas, Light & Coke Co. has been incorporated with a capital stock of $250,000 for the purpose of manufacturing gas. The incorporators are Joseph A. Sloan, J C. Vanderbroeck, B. A. Sloan, G. B. Orwig and L. A. Sloan.

Volga Post Office, W. Va.—The Little Mountain Coal Co., of Peel Tree, Barbour County, has been organized to mine and sell coal. The capital stock is $50,000 and the incorporators are B. C. Buffington, Albert Wostenholme, of Fall River, Mass., C. R. Lynch and E. P. Gosling, of Newport, R. I., and Robert A. Lynch, of Malden, Mass.

Lexington, Ky.—The Elmendorf Real Estate Co. was recently organized here. The incorporators are James B. Haggin, C. H. Berryman, James A. Todd and William F. Warren. The company is authorized to purchase and deal in coal, timber and mineral land, construct business houses, apartment houses, factories, warehouses and operate stores.

INDUSTRIAL NEWS

Duluth, Minn.—The Duluth office of the H. W. Johns-Manville Co. has been removed to larger quarters at No. 327 West First Street, in order to take care of its increased business.

Washington, D. C.—The Interstate Commerce Commission on May 27 declared that $1.85 per ton was a reasonable rate of freightage for coke from the Connellsville region in Pennsylvania to Buffalo.

Montgomery, Ala.—The Alabama Railroad Commission has postponed until June 22, the application of the Louisville & Nashville R.R. to be allowed to increase rates on coal to Decatur and New Decatur.

Toledo, Ohio—The General Western Sales Offices of the Pittsburgh-Buffalo Coal Co. will be moved to Toledo shortly. T. P. Jones, of Pittsburgh, Vice-President of the company, will be in charge of the local office.

Hamden, Ohio—The Elk Horn Coal Co., which is owned principally by C. K. Davis, of Detroit, has sold to a syndicate of Columbus men a tract of 902 acres of coal land near Hamden, which will be developed the coming summer.

Dayton, Ohio—The S. J. Patterson Pocahontas Coal Co., of Dayton, Ohio, which was incorporated recently with a capital of $75,000, has acquired a tract of 1200 acres of coal land in Mercer County, W. Va., which will be developed the coming summer.

Oklahoma City, Okla.—The Atchison, Topeka & Santa Fé has secured a five-year lease on the Oklahoma Central Ry., with the option of purchase for $2,000,000. The Oklahoma Central extends 130 miles through the Southern Oklahoma coal fields, and connects with the Santa Fé at Purcell, Okla.

Duluth, Minn.—Coal handlers employed by the Clarkson Coal & Dock Co. walked out on a strike for higher wages, May 23, but before afternoon most of the men returned to their jobs. Several agitators attempted to get the men to quit again, but were unsuccessful. The increase in pay demanded was not granted.

St. Paul, Minn.—The application of the Peabody Coal Co. of St. Louis to have the order modified under which the receivers of the Frisco system were authorized to rescind a coal contract made with the Peabody company was denied in the United States District Court May 23 by Judge Walter H. Sanborn. Exception was taken by L. O. Hawker, counsel for the coal company, and a formal appeal is in prospect.

London, Eng.—D. A. Thomas recently arriving in London on the "Lusitania", said that he had been asked by the big coal mining interests of the United States to formulate a scheme for developing their coal areas as economically as the Cambrian Trust, and that he plans to form a great United States coal trust, provided the Government does not interfere, which will reduce prices and make the United States a large coal supplying center to the world.

Toronto, Ont.—The Dominion Coal Co., of Sydney, N. S., having increased its shipping facilities intends to bring 2,000,000 tons of coal into Montreal this season or about 300,000 tons in excess of last year It has a charter list of 24 stemers with an aggregate tonnage of 168,000 and up to date has brought up 200,000 tons. One boat a day is being handled at the company's plant at Windmill Point and five boats per week at Hochelaga pier. Boats are also running with coal to Three Rivers and Quebec.

New York, N. Y.—The A. S. Cameron Steam Pump Works, 11 Broadway, New York, has opened branch offices and warehouses in the following cities: Birmingham, Ala., American Trust Bldg., H. M. Perry, mgr. Chicago, Ill., People's Gas Bldg., M. P. Frutchey, mgr. Cleveland, Ohio, Williamson Bldg., W A Armstrong, mgr Duluth, Minn., Providence Bldg., S. H. Hill, mgr. Houghton, Mich, Thos. F. Lynch, mgr. Knoxville, Tenn., Holston National Bank Bldg., L. F. Thompson, mgr Los Angeles, Calif., W. A. Townsend, mgr. Philadelphia, Penn., Arcade Bldg., Phil. Weiss, mgr. Pittsburgh, Penn., Farmers' Bank Bldg., W. B. Brendlinger, mgr. St. Louis, Mo., 300 N. Broadway, A. A. Bonsack, mgr. Seattle, Wash., Colman Bldg., R. W. Douglas, mgr.

Uniontown, Penn.—Pursuant to an order of the Court of Common Pleas of Fayette County, the Fayette Title & Trust Co., trustee under the mortgage of the Sunshine Coal & Coke Co., will offer for sale at public outcry, on Friday, June 12, 1914, at 1 o'clock p.m., on the premises at Lynn Station, the plant known as Cyrilla No. 5, and on Saturday, June 13, 1914, at 2 o'clock p.m., on the premises at Martin Station, the coke plant known as Francis No. 1. The first named plant consists of about 180 acres of Pittsburgh coal, 157 acres of surface, 142 beehive coke ovens, 23 blocks of double houses, 8 other houses, a store building, barn, tipple, engine house, engines, boilers, electrical equipment, 12 horses and mules, and all tools and appliances used in connection with the said plant. The second plant, or Francis No. 1, consists of about 120 acres of Pittsburgh coal, 330 acres of Sewickley coal, 475 acres of surface, 240 beehive coke ovens, 20 eight-room houses, two 10-room houses, two 12-room houses, 8 other houses, three shanties, store building, tipple and washer, brick boiler house, two 100-kw. generators, three 100-hp. boilers, two electric mining machines, two electric locomotives, etc.

Coal Trade Reviews

General Review

Anthracite opens the new month moderately active but will not be able to maintain the pace. Complete lethargy in bituminous.. One of the largest soft-coal corporations curtailing operations for the first time in its history. No improvement is in sight before fall.

The last of the month witnessed the customary spurt in anthracite coal, but as a rule the mines are not operating at all strong, and it is doubtful if they will be able to maintain a full-time basis through the current month. A rather insistent demand at tidewater indicates that the New England trade is still capable of absorbing considerable coal, but this is confined mostly to stove size and all other sections seem to be well supplied, so that there is not much real activity. May production was comparatively good, with delays reduced to a minimum. The steam sizes are being stocked by nearly all the companies.

The soft-coal market continues in the grip of a complete lethargy. The large consuming interests are still keeping stocks down to the smallest possible margin, and propositions on the part of the operators to contract on the same basis as last year, are not favorably received. While there have been some inquiries from consumers not yet closed, the effects have been so trifling as not to influence the general market in any way. Announcement of the fact that the Berwind White Co. is working under curtailed production for perhaps the first time in the history of the concern, is significant evidence of the trend of conditions in soft coal.

Contracting in the Pittsburgh district is below normal, consumers holding off because of their light requirements and the surplus stock on hand. Price cutting is being done on both prompt and contract business, although the cuts are not heavy. As a result of a slight improvement in lake shipping, there has been a moderate increase in operations which are probably now on a basis of 60 per cent. capacity. With the Ohio operators and miners in conference under the auspices of Governor Cox, the trade is marking time pending the results. The general impression prevails that the next ten days will see the labor situation definitely cleared up. Because of the general reluctance of dealers to stock up, trade conditions have failed to improve. Complications in the labor situation in the Kanawha district will ultimately have a beneficial effect, should the deadlock prove as complete as it now seems.

Conditions at Hampton Roads are somewhat duller in spite of a fair week's dumpings. There are only a few steamers awaiting cargo, while the accumulation in the local railroad yards is rather above normal, and there are now well defined rumors of concessions on the regular circular. As a rule, the market is moderately firm, due to a rather heavy demand from north of the Ohio River, which is having a steadying influence. In the Southern trade, buyers seem to have relinquished hope of a break in the market, and now appear ready to buy. A number of the Southern railroads will also be in the market shortly, and there is a general feeling of optomism throughout the trade. Operations in the Middlewestern field are on about half-time basis, and jobbers and retailers are pressing sales unusually hard.

EASTERN MARKET

BOSTON

New low prices at New England distributing points; market cargoes continue to arrive. Light movement of contract coal, spot demand practically nil, and quotations f.o.b. merely nominal. Georges Creek and Pennsylvania grades unchanged.

Bituminous—While some of the producing interests are trying to patch up the price situation on Pocahontas and New River alongside and on cars in this territory, their efforts are thus far barren of results. New low figures are heard this week at the various distributing points and yet coal continues to come forward without disposition orders in hand. Buyers who are following the market closely are waiting for still lower prices and admittedly the argument is mostly in their favor. It is understood that the Pocahontas field is operating only three days a week but apparently a stiffer curtailment will be required before the situation can improve.

The movement of Southern coals on contract is very light. The corporations and other large buyers are postponing their usual quotas and there is continued anxiety on the part of shippers who have steamers and barges under long-term charters. Meanwhile there has been no pronounced change in quotations f.o.b. Hampton Roads on the standard coals. The demand for spot shipment to New England, however, is practically nil and quotations f.o.b. are merely nominal.

Georges Creek and the Pennsylvania coals are without any new feature. Prices are held on about the season basis, the operators apparently realizing there is a market for only so much coal anyway and what is sold will command one price about as well as another. On the part of a few shippers there has developed an inclination lately to take business at delivered prices that are competitive with Pocahontas and New River and it is reported that some comprehensive orders have been closed in that way.

Anthracite—Deliveries in May were slower than was expected and a fair number of orders will go over to June. The mines are still on full time and some of the companies feel so confident of June business that they are unwilling as yet to release their transportation for freighting bituminous. Stove is still in shortest supply and the proportion in any one shipment is held within close limits.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.90@1.50	$1.20@1.65	$1.67@1.77	
Philadelphia*	2.15@2.75	2.40@2.90	2.92@3.02	
New York*	2.45@3.05	2.70@3.20	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.80@2.85
Boston†				3.35@3.63
Providence†				3.40@3.73

* F.o.b. †On cars.

NEW YORK

Cancellations on bituminous orders more numerous, but market is free of demurrage and consignment coal. Anthracite slowing down as the season advances and a restriction in production expected this month.

Bituminous—The soft-coal market continues monotonously dull and if anything a trifle more flat. It is simply a case of no business whatever, and the industry will do well to prepare for a continuance of lgiht conditions until preparations for the fall trade create an increased demand. If anything, cancellations have been more numerous during the week and operations have been still further curtailed about 40 to 50% probably being the average. One of the most significant features in the situation has been the development of the fact that one of the largest and most powerful bituminous companies in the country, which has never been known to curtail operations generally, has been forced by the slack conditions to reduce to four or five days a week.

But even in the face of all these discouraging conditions, operators are as determinedly and consistently adhering regular circulars as ever. It is also a notable fact that consignment coal has disappeared almost entirely from the market, and there are scarcely any more sales of demurrage coal now reported. It is not unlikely that the producers may ultimately benefit by the present indifference on the part of the buying and consuming interests It is a well known fact that the large corporations are working with stocks reduced to the smallest possible margin, and should they adhere to this policy through the summer the opening of the fall trade will witness a sharp rush for coal. Although scarcely any spot business is being negotiated, the prompt market still continues quotable on the same basis as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—Hard coal continues to slow down steadily but easily under the compelling influence of the advancing

n, the increasing price, and the pressure incident to the al retrenchment in all lines of industrial activity. While ime operations have so far been consistently maintained ie large companies, there are now definite signs of a ng up, and it is highly improbable that they will be to hold out through the current month. The holidays day of last week and Monday of this week, were gen- welcomed by the operators.

ove coal continues strongest, being in sharp demand at oints. In the all-rail trade both egg and stove are in demand. At tidewater egg is moving fairly well, al- h individuals are forced to sell at a sacrifice. Nut can- e moved at all. Pea is in weak demand, and operators voiding sending it down as much as possible. In the grades, buckwheat is as demoralized as ever, while the er grades of rice are almost as bad. Individual oper- who have no contracts for barley are dumping it on the bank rather than send it down to tide.

e now quote the New York hard-coal market, on which ew June circular is in effect, on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
	$4.80	$4.55@4.80	$4.75	$4.50@4.75
	5.05	4.95@5.05	5.00	4.85@5.00
	5.05	5.05	5.00	5.00
ut	5.30	5.10@5.30	5.25	5.00@5.25
	3.55@3.60	3.45@3.60	3.45@3.50	3.10@3.50
heat	2.80	2.60@2.80	2.50@2.75	2.10@2.75
	2.30	2.25@2.30	2.00@2.25	1.65@2.25
	1.80	1.60@1.80	1.70@1.75	1.30@1.75

PHILADELPHIA

nthracite market still lacks tone; mining continues full but demand for steam sizes is falling off. Slight im- ment noted in bituminous, but curtailed operations still rce.

nthracite—The first week in June finds this branch of the in fairly good condition. While there has been talk spension of mining, due to the preponderance of small operations continue as yet, and extra efforts are put to take care of the surplus. The New England market, ng from the demand at Tidewater, can still handle con- able coal, but the demand centers on stove coal. Chest- eems to be the disturbing factor. This has usually been led by diverting this size to the lakes, but it is doubtful her this policy can be carried out because of the large s in the Northwest.

ie month of May, as far as production is concerned, is to equal if not exceed, the tonnage of the correspond- period of last year, but it is doubtful if June shipments equal those of last year. An inducement in the way of isual discount seems to have small weight with the do- ic trade now. Retail dealers find, with but few excep- , that householders are postponing deliveries until later ie season, and this is naturally reflected in the whole- market. It is believed, before the month is out, that al suspensions will be necessary.

uotations at Tidewater are as follows:

	Circular	Individual
	$4.45	$4.45
	4.70	4.70
	4.70	4.80
ut	4.95	4.70 @ 4.85
	3.25	3.00

ituminous—There is some inquiry by establishments that not as yet closed their contracts, but are shopping id the market trying to secure some cheap coal. This had a tendency to tighten prices, but the difference is ig. A sale in sight, can usually secure coal at prices tiling for the last couple of months, and it is possible to e good bargains, by looking the market over carefully. ositions to close contracts at the same basis as last year, ot looked on with favor, and few large ones have been ed as yet.

BALTIMORE

he trade generally lacks vigor. Bituminous coal occa- lly offering at below cost. Export outlook continues ex- at. Anthracite slow but even.

here is a general absence of snap and vigor to the trade. minous coals are offering at times below the profit line, buyers undoubtedly have all the best of it. Quotations id largely upon the exigencies of the particular deal.

n forced sales in West Virginia the past week, slack was at from 45 to 55c. Three-quarter gas coal was weak, some sales around 80 and 85c. The West Virginia steam were freely offering at from 85 to 95c. The Pennsyl- situation on bituminous was a little steadier although was plenty of medium grade fuel to be had at from 95c. .10. Export coal was a strong feature straight through. ng May the total exports exceeded 83,000 tons, an increase out 9000 tons over the month previous. With the large number of charters already announced for June loading the May figures are expected to be exceeded.

In anthracite the supply is even, and a fair seasonal trade is being done although it does not come up to some previous years. Most dealers call conditions slow, but believe that the middle part of the summer will come well up to former seasons. An increase of 7c. per ton on inside the cape deliveries was announced to the trade here the present week. The new rate for deliveries in Baltimore Harbor and to points along the Patapsco River and Chesapeake Bay will be $1.42.

CENTRAL STATES

PITTSBURGH

Slight increase in production, the district operating at about 60% capacity. Considerable contracting at cut prices. Slack being stocked by leading interest. Connellsville coke dull with prices irregular. Shipments and production equal, after two months of production exceeding shipments.

Bituminous—There has been no improvement in the local demand for coal, but a slight increase has occurred in Lake shipments, so that mining operations have increased slightly, and may average a trifle in excess of 60%, taking the Pittsburgh district as a whole. One leading interest reports its operations at 85% as heavy as a year ago, when it was doing quite well. There is a moderate amount of contracting and some of the contracts are taken at materially lower figures than those expiring. On the whole, contracting has not been as active as a year ago, some buyers showing a tendency to hold off because their requirements are light and they still have some stocks. Some interests report that their contracts taken from the beginning of the year to date are substantially as heavy as the business done in the same period last year. For prompt coal regular list prices are cut more than on contracts, but there is cutting even in contracts for slack, which is usually supposed to hold to the full price in the case of twelvemonth contracts because the shipper has relatively little slack in the winter when there are no lake shipments. The Pittsburgh Coal Co. has long followed a practice of stocking slack during the lake-shipping season, and began doing so last week. Its attitude is that it will not shade the 90c. price on twelvemonth contracts for slack. Subject to some cutting on contracts and more on prompt lots we quote regular circular prices as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

Connellsville Coke—The market continues extremely quiet, considering that nearly all contracts expire at the end of this month, and in ordinary times there would now be a great deal of contracting for delivery beginning July. There are a few inquiries for both furnace and foundry coke, but concessions from the nominal market are so common that buyers have difficulty in making up their minds. The market stands substantially as follows: Prompt furnace, $1.80@1.90; contract furnace, $1.85@2; prompt foundry, $2.35@2.50; contract foundry, $2.35@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 23 at 257,630 tons, a decrease of 37,085 tons, and shipments at 276,072 tons, an increase of 242 tons. Shipments exceeded production apparently by 18,442 tons, the balance having been in the opposite direction for eight weeks previous, to the total amount of 84,860 tons.

BUFFALO

Much bituminous still in consumers' hands. Railroads likely to require more coal before long. Coke still quiet. Fair movement of anthracite.

Bituminous—There is some indication that the railroads will be in the market for more coal before long. The Grand Trunk is estimated to have a month's supply, but the Lackawanna has about used up its surplus, while the Lehigh Valley still has some, but no great amount. Some contracts are making, but as a rule the buyer asks that delivery be suspended for a month or so. All bituminous mines are obliged to run on short time, often not more than two or three days in a week. As a rule the operators are cautious, not allowing their output to exceed orders. There is complaint that buyers are not above throwing up purchases if they are offered demurrage coal at sacrifice prices.

Buffalo is taking a good amount of coal. The ore receipts by lake are fair for the season and the iron furnaces are practically all active. Canada is not absorbing a normal amount of coal and there are reports that pig iron is selling slower at other points than here. All private factories are running at a slow rate, but only a few of them are shut down.

Although dealers commonly report business dead, when asked if he has cut prices he is pretty sure to reply that he has not.

So long as certain of the bituminous dealers maintain that they are getting full prices for their coal, the circular will have to be given as the proper basis, no matter if it is well known that a great part of the coal is selling for less. Quotations will therefore be on the basis of $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.15 for slack, with slack no more active than sizes. Allegheny Valley prices are about 25c. lower, except slack, which sells on a par with most Pittsburgh slack.

Coke—There are still reports of furnaces in this district blowing out, so there can be no greater activity in the coke market and none is looked for at present. The pig iron product of Buffalo and neighboring furnaces is selling fairly well. Best 72-hr. Connellsville foundry coke sells at $4.50.

Anthracite—There is not much real activity to the trade, as the consumers, even in the country, are well supplied. A slight spurt took place on the rail lines at the close of the month as usual, though it was much smaller than the average. Shipments by lake are much smaller than the average, though the present showing is fair. Some winter-loaded cargoes are still here, as the vessels are not anxious to sail. Shipment for the week (six days) amounted to 125,000 tons.

TOLEDO

Increase in the lake movement and an improvement in the steam demand injects a better tone into the trade. Supplies still excessive, however, and prices ruling low.

There is more lake coal moving than for some weeks past. A number of large freighters have cleared this week, and others are now in the process of loading. There is plenty of coal in the yards and no scarcity is noticeable in any line save Pocahontas which is hard to get in nut and egg sizes. The usual 20c. advance on Pocahontas was announced June 1.

Outside of smokeless coal there is plenty of fuel on the Toledo market despite the fact that the Ohio mines have been closed for two months. It is generally believed that the mines will again be running by the middle of June. West Virginia coal is taking the place of southern Ohio grades. Outside of Pocahontas there has been no change in quotations and most concerns claim to be getting circular prices for what coal they sell.

Crop prospects in Ohio are unusually good and it is probable that there will be a heavy demand for threshing coal. Factories are running as usual and it would appear that the demand for steam coal must be large as soon as the supply purchased in anticipation of the strike runs out which must be soon. Domestic demand is light but it will soon be time for the laying in of anthracite at summer prices.

CINCINNATI

Market increasingly dull, with slower demand for domestic grades and a continued slackness in steam coal. Lower prices are indicated, although it is hoped that the West Virginia strike will shortly stimulate the market.

Contrary to the expectations, the market in this vicinity has failed decidedly to improve. Reports from the upper lakes indicate that while the docks are being slowly cleaned up, there is great difficulty in getting boats to handle shipments, as return cargo of ore cannot be had at this time. The domestic demand is threatening to slump off both here and throughout the state, reports being to the effect that dealers are inclined to delay stocking until later on. They are also hopeful of getting even lower prices than now offered, which in many cases are already below circular figures.

The strike in the Kanawha field is confidently expected to result in a marked stimulation, however, as it will cut off a large part of the present surplus, and make the entire market dependent upon a comparatively small part of the West Virginia and the eastern Kentucky fields, with what river coal is available. As this means a heavy reduction in the supply, the trade has every reason to hope for a stiff reaction shortly, probably during this week, if conditions are not changed.

COLUMBUS

Attention centered on conference of operators and miners. In the meantime practically all Ohio mines continue idle. Slight increase in the demand for coal in some sections.

Since Governor Cox has taken a hand in the mining suspension in Ohio, the conference of the operators and miners is expected to produce some tangible results. Miners in certain districts are more anxious than ever before to compromise and the same is true of the operators.

Miners in certain localities are not backing up their officers and open friction is reported. It is hinted that a compromise of a rate some place between 44c. and 49.64c., which is the figure insisted upon by miners for machine mined coal on the mine-run basis, may be effected.

There is a slight increase in the demand for coal, due to the depletion of surplus stocks. This is especially true of the larger steam users and as a result a considerable tonnage has been shipped into Ohio from West Virginia and Kentucky. Prices on these shipments have been very low, however. No a great deal of inconvenience has been caused up to date and none of the manufacturing plants have had to close.

There is also a better demand for domestic sizes, especially the fancy grades such as Pocahontas and splints. Some of the larger householders are laying in a good supply of fuel and dealers have had a fair trade for this season of the year. The lake trade shows no strength of consequence. Reports from the upper lake ports are that a considerable tonnage has been carried over from last season and as a result shipments to the Northwest via the lakes are not large.

A few of the smaller mines in the Pomeroy and Crooksville districts have resumed operations and signed up at the 49.64 scale. But these are not important and will have little bearing on wage scale negotiations.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50@$1.40		$1.50@$1.40	$1.45@$1.
¾-inch	1.35@ 1.30	$1.20@$1.15	1.35@ 1.30	1.30@ 1.
Nut	1.30@ 1.25		1.25@ 1.20	1.25@ 1.
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.
Nut, pea and slack	0.85@ 0.80		0.85@ 0.80	0.80@ 0.
Coarse slack	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.

CLEVELAND

Prices just holding their own at the low level. Reser supplies mostly used up, but the demand still off. The la trade quiet and damage at Duluth-Superior docks has r duced shipments.

The spot market shows little change and the range prices is about the same. Youghiogheny slack is selling track here at $1.60@1.65 and Fairmount gas slack the sam There is no demand for coarse coal. Storage stocks at t factories have been depleted in most instances, but the plan are not working to capacity and the demand is therefo dull.

The real interest in the Cleveland market centers on t joint conference of operators and miners at Columbus. seems likely a settlement of the Ohio strike will be ma shortly and the rate will probably be somewhere near t mine-run basis of western Pennsylvania. So far no contra ing of any consequence has been done for Ohio coals, and the season is well advanced, operators are getting anxious

Pocahontas operators and jobbers are quoting lump a egg at an advance of 10c. over May prices. They are r taking any more orders than they can help for prepared siz Slack is not readily disposed of and mine-run orders a scarce. The local market will not take much Pocahont until the latter part of this month when domestic deliver begin.

Lake Trade—Lake shippers are having no difficulty g ting all the boats they can use. The smaller type of vess was not equal to the demand a few weeks ago, but with t rush over, ship owners are willing to hold boats two or thr days to get coal cargoes. The lake trade has opened ve slowly, but a slow start usually results in a rush in the fa

A sudden gale last Monday toppled over several unloa ing machines at Duluth-Superior. The Northwestern Fu Co. was the hardest hit when its new dock was wrec Practically every dock at the head of the lakes suffered so damage and the entire Clarkson dock was put out of co mission. As a result of this damage, shipments amounti to nearly 750,000 tons will be deferred.

Shipment prices are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.15		
Lump, 1¼-in.		$2.35	
Lump, ¾-in.		2.25	$2.10
Mine run	2.60	2.10	2.00
Egg	3.15		
Nut		2.15	
Slack	2.20@2.35	1.60	1.65

DETROIT

Business quiet but a more hopeful feeling prevails. Su plus stocks are being gradually exhausted and consumers a now looking for tonnage.

Bituminous—There is a noticeable change for the better the situation here. Not so much from actual sales as fr the general feeling that business is sure to improve short Inquiries are coming in from a great many steam coal co sumers which denotes that the buyers are beginning to not their supply is diminishing rapidly.

The supply of track coal is steadily becoming less,

ugh there is sufficient to satisfy all possible demands for ne time to come. The demand for slack has shown some provement and prices have been much better than for some eks. About the same conditions exist on the coarser steam ls, except that quotations are still off on mine-run and -in. lump. Should the Ohio mines remain closed for a few re weeks the general feeling is that prices on all grades of st Virginia and Kentucky coal will show an advance.

In the domestic trade, the situation has changed but little. wever, there have been some fair orders on 2-, 3- and 4-in. np and some egg. Some of the shippers report more suc- s in getting the dealers in the smaller towns to place lers; this is especially true of some of the large dealers, o figure that at current prices they are making good gains. The threshing season is not far away and some of s coal will move during July.

Anthracite—The anthracite business is still quiet in De- it, at least from shippers' end. There is, however, quite a ge amount being delivered, mostly to apartment houses l churches.

HAMPTON ROADS

Situation somewhat duller in spite of a fair week's dump- s. Few steamers waiting, accumulation on hand rather ge and there are well defined rumors of concessions on the cular.

While conditions at tidewater are not extra bright at the ne time there has been a fair amount of coal dumped dur- the week. The greater part has gone to the Northern ts with one large cargo loaded by the government into collier "Cyclops" for the fleet now in Mexico. The largest pment foreign was taken by the Italian S.S. "Vesuvio" for noa. Other foreign cargoes moved to Canal Zone, Naples, vana, Dakar, Venice, St. Thomas and Barbadoes.

In addition to New River and Pocahontas there has been ne shipments of high volatile to the New England market only one or two small cargoes and these it is understood re on contract. The accumulation of cars on the railway ds is somewhat above the average with little tonnage in stream waiting for berth.

Although there is no confirmation it is understood that ne sales are being made below regular circular the price some small parcels being cut to $2.70 or even a few cents s. As has been the case for some time the greater part of shipments moving have been by steam barge the schooner vement being fairly light.

LOUISVILLE, KY.

Large demand from north of the Ohio River has stimu- d the market. Most operators able to keep up operations ly steady. Prices steady.

An increased demand for domestic coals has greatly im- ved the situation in the eastern Kentucky field, though dullness continues in the western part of the state. ge shipments are being ordered daily for points north of Ohio River. Domestic coals continue sluggish in the tern part of the state, with a corresponding tightness of steam sizes and screenings. Industrial demand is not roving to any extent. Many of the operators are booked l ahead for later deliveries and are finding it possible to p operations going with a fair degree of regularity. The lement of the labor differences in the western part of the e does not appear to have had any effect on the market.

Prices show some advances on the domestic coals, those ch sold during May around $1.40 a ton, f.o.b. mines, hav- made about a ten-cent advance The steam sizes in the tern field show little change, though in the western dis- t pea and slack is quoted at from 40 to 50c. a ton and the and slack from 65 to 75 cents.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Navy business helps Alabama market. Coke somewhat nger and lump coal outlook more encouraging. Number Southern railroads will contract during June.

There is a general feeling of optimism among Alabama men. This is due in part to the fact that the Navy is rted to be in the market for a large amount of Pratt m coal and as soon as the order is placed the Blue Creek es will have to run full-time.

A two-year contract has been received from a New Or- s concern for a large tonnage of byproduct coke which been found to be superior in many ways to the old bee- hive product. A good tonnage of coke is also going to Western points.

As the retail dealers have not found the operators willing to cut prices on lump, it is expected they will soon begin to put in their summer stocks; a 10c. advance went into effect June 1 and another 10c. is scheduled for the first of July. A number of the Southern railroads let their annual fuel contracts during June and Alabama mines will receive a large share of this business.

INDIANAPOLIS

Mines on about half-time and trade at normal summer basis. Largest consumers in market again, but all the surplus coal not consumed yet. Retailers active in pushing summer sales.

Indiana mining conditions are not much changed. Here and there a mine is reopened, but this seems to be offset by more restricted operations at the plants which have been working. Production seems to be at about half capacity. Not all the stored coal is yet cleaned up, although a majority of the large consumers are in the market again. The wage troubles in this state are settled, except at the five strip mines, which employ about 200 men. This is a new element that has now to be considered, the business beginning to assume some importance. The mine workers association is recognizing these miners and will represent them in making a wage agreement.

Retailers all over the state are pushing sales unusually hard on the expectation that there will be a car shortage next fall and early winter. The movement to consumers' bins is perhaps a little more than normal for the season. In fact, the number of users of the domestic grades who buy their winter's supply in summer seems to grow year by year.

ST. LOUIS

Coöperative mines a disturbing feature in the middlewestern situation. Market generally dull and unsatisfactory.

Continued quietness covers the local situation. There is practically no coal moving, with the exception of a very small tonnage for steam, and this sells at anything but a profitable figure. Several of the mines in the 5th and 9th Districts are going on the coöperative basis.

The United Mine Workers seem unable to contract their mines in the 5th and 9th Districts, and the operators are making a proposition to the men to put the mines on a cooperative basis. The miners pay the operators so much a ton royalty in some instances, and so much per ton for the use of the property, and put the coal on the market at whatever figure it will bring. It is figured by some operators that the miners are producing coal for about 38 to 41c. a ton, whereas the scale is about 55c. This, of course, practically puts a quietus on any operations other than those on a coöperative basis, which is bringing about a demoralization in these districts.

At the present time nearly one-fourth of the mines in Williamson County are bankrupt, and according to rumor some of the operations in the Franklin County field are likely to follow.

There is a small tonnage of anthracite coming into the St. Louis market, and smokeless is also beginning to move in. Some outside coke has arrived during the past week, or ten days, but other than that the market is quiet.

The market is now quotable as follows:

	Carterville and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	$1.20	$0.85 @ 0.90	$1.15
3-in. lump	.....	.....	1.25	.....	.....
6-in. lump	$1.20 @ 1.35	.....	1.30	1.00 @ 1.10	1.35
Lump and egg	1.85 @ 2.15	$2.00	.....	.....	1.15
No. 1 nut	1.20 @ 1.35	.....	.....	.....	.....
Screenings	0.80 @ 0.85	.....	.....	0.65 @ 0.70	0.75 @ 0.80
Mine-run	1.10 @ 1.20	.....	.....	0.80 @ 0.85	.....
No. 1 washed nut	1.50	2.25	1.50	.....	.....
No. 2 washed nut	1.40	.....	1.25	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.80 @ 0.85	.....	.....	.....	.....

The June circular at St. Louis will be as follows:

Anthracite—Chestnut, $8.20; egg and stove, $7.95; grate, $7.70; Arkansas semi-anthracite, $6.50.

West Virginias—Lump and egg, $5.50; nut, $5; mine-run, $4.75.

Illinois Coal—Carterville lump and egg, $3.25; Mt. Olive lump and egg, $2.75; Standard lump, $2.50.

KANSAS CITY

Movement of coal improved due to preparations for threshing wheat. Steam lines in good demand. Lump still weak, and moving slowly.

Preparations for harvesting big wheat crops in Kansas and Oklahoma has resulted in more snap to the coal trade

in Kansas City. Cutting already has begun and will continue for the next six weeks. Threshing will start up about June 15, and will lap over into July and August.

The movement into Kansas and Oklahoma is already showing improvement, though the bulk of the business will be handled in the next few weeks. Missouri threshermen are also buying coal, though Missouri products are so diversified that wheat is only one of a number of crops and coal demand is therefore lighter than in other states. Lump is still showing lethargy, and concessions are being made in order to move it.

PORTLAND, ORE.

Demand light as result of warm weather. Storage prices went into effect June 1, with reduction of 50c. per ton.

The market is exceedingly quiet and dealers are not looking for much activity till after summer prices go into effect. This will mean a reduction of 50c. per ton and it is expected that this will result in a considerable volume of business.

Whether or not the hope of lower fuel prices, as a result of the opening of traffic through the Panama Canal will deter consumers from placing orders early, is a question that only time will answer.

PRODUCTION AND TRANSPORTATION STATISTICS

BITUMINOUS COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during March and the first three months of the last two years, in short tons:

	March		3 Months	
Anthracite	1913	1914	1913	1914
Baltimore & Ohio[1]	77,049	149,483	434,392	407,542
Chesapeake & Ohio[1]	309	945	2,167	3,051
Erie[3]	672,153	740,234	1,958,048	2,128,608
Pennsylvania[1 3]	741,209	1,086,344	2,743,504	2,706,391
Virginia[2 1]	166	43	311	102
Total 5 roads	1,490,886	1,977,049	5,138,422	5,245,694
Bituminous				
Baltimore & Ohio[1]	2,710,031	3,338,058	8,531,184	8,952,917
Buffalo, Roch. & P.[1 2]	766,576	923,513	2,293,627	2,495,420
Buffalo & Susq.[1 2]	155,706	150,187	450,064	432,926
Chesapeake & Ohio[1]	1,392,590	1,596,093	3,961,230	4,390,821
Erie[3]	61,538	6,096	184,852	28,203
Hunt. & Br'd T. Mt[1 2]	102,337	127,110	381,600	329,957
New York Central	770,165	918,706	2,443,985	2,492,765
Norfolk & Western[1 2]	1,751,158	2,112,118	5,694,576	5,744,407
Pennsylvania[1 3]	4,050,247	4,740,313	12,117,747	12,414,492
Pitts. & Lake Erie[1 2]	956,138	1,304,413	2,909,651	3,090,822
Pitts. Shaw. & North[1 2]	229,341	256,971	681,982	791,255
Virginia[1 2]	380,091	336,952	1,233,244	1,003,817
Western Maryland	271,286	285,601	760,985	751,045
Total 13 roads	13,597,204	16,096,131	41,644,727	42,918,847
Coke				
Baltimore & Ohio[1]	405,220	356,164	1,215,751	896,499
Buffalo, Roch. & P[1 2]	55,911	28,878	164,007	79,699
Buffalo & Susq.[1 2]	27,401	41,162	77,763	110,859
Chesapeake & Ohio[1]	32,207	40,658	92,614	111,108
New York Central	5,775	.....	17,429	.....
Norfolk & Western[1 2]	147,730	103,070	448,828	317,684
Pennsylvania[1 3]	1,247,451	1,027,339	3,756,325	2,700,237
Pitts. & Lake Erie[1 2]	612,095	521,626	1,859,847	1,341,139
Pitts. Shaw & North[1 2]	3,084	.....	9,292	.....
Virginian	.....	.....	.....	.....
Western Maryland	6,381	9,402	19,038	24,138
Total 10 roads	2,543,255	2,128,299	7,660,894	5,581,363

[1] Includes coal from connecting lines.
[2] Includes company's coal.
[3] Does not include company's coal hauled free.

Note:—The Southern Railway hauled 292,179 short tons of bituminous coal during February, and 648,842 short tons during the two months.

BALTIMORE & OHIO

The following is a statement of coal and coke tonnage moved over this system and affiliated lines during March and April of this year and last year:

	March		April	
	1914	1913	1914	1913
Coal	3,173,972	2,538,039	2,131,812	2,516,367
Coke	356,164	405,220	343,862	400,317
Total	3,530,136	2,943,259	2,475,774	2,916,684

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R.R. Co.'s lines east of Pittsburgh and Erie for April and the four months of 1913 and 1914, in short tons:

	April		Four Months	
	1914	1913	1914	1913
Anthracite	1,070,562	930,592	3,776,953	3,674,096
Bituminous	3,699,928	3,796,432	16,114,420	15,914,179
Coke	916,369	1,230,979	3,616,606	4,987,304
Total	5,686,859	5,958,003	23,507,979	24,557579

VIRGINIAN RAILWAY

Total shipments of coal over this road for the month March was 336,552 tons as compared with 380,091 tons the same month last year.

COAL FREIGHT DECISIONS

I. C. C. No. 4762—Poehlman Bros. vs. Chicago, Milwaukee & St. Paul Ry.

Defendant's rate of 40c. per ton, applicable from Galewood, Ill., to Morton Grove, Ill., on interstate shipments of coal received from connecting lines at the former point not shown to be unduly discriminatory or prejudicial. The traffic involved is through traffic. The through rate is not drawn in question nor are the participating carriers made defendants. The Commission therefore declines to express any opinion upon the question of the reasonableness of the rate under attack. Complaint dismissed.

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending May 30:

	Week's Range			Year's Range
Stocks	High	Low	Last	High
American Coal Products	85¼	85	85	96¼
American Coal Products Pref.	....	....	105	106
Colorado Fuel & Iron	28¼	27⅞	28	34½
Colorado Fuel & Iron Pref.	....	....	140	140
Consolidation Coal of Maryland	....	....	102½	....
Island Creek Coal Com.	48¼	48¼	48½	....
Island Creek Coal Pref.	86⅜	86⅜	86⅞	....
Lehigh Valley Coal Sales	170	150	165	....
Pittsburgh Coal	19½	19½	19½	23½
Pittsburgh Coal Pref.	89	88	88⅜	93½
Pond Creek	18⅜	17	17½	....
Reading	166½	165⅛	166	172¼
Reading 1st Pref.	89	89	89	89
Reading 2nd Pref.	89	89	89	93
Virginia Iron, Coal & Coke	..	..	45	52

	Closing Bid	Asked	Week's Range or Last Sale		Year's Range
Bonds					
Colo. F. & I. gen. s f g. 5s	90¼	99	92	May '14	91½
Colo. F. & I. gen. 6s	105	..	107¼	June '12	..
Col. Ind. 1st & coll. 5s. gu.	73½	75	73¾	75	73
Cons. Ind. Coal Me. 1st 5s	..	74	73	Mar. '14	73
Cons. Coal 1st and ref. 5s	89	91½	90½	90½	89
Gr. Riv. Coal & C. 1st g 6s	89	..	99⅛	Feb. '14	99⅛
K. & H. C. & C. 1st s f g 5s	..	..	102⅝	Apr. '06	..
Pocah. Con. Coll. 1st s f 5s	89½	..	93	Mar. '14	93
St. L. Rky. Mt. & Pac. 1st 5s	86½	87¾	87½	May '14	84
Tenn. Coal gen. 5s	78	80	77	Apr. '14	77
Birm. Div. 1st consol. 6s	103	..	103½	May '14	97½
Tenn. Div. 1st g 6s	101⅜	103	101⅜	May '14	101½
Cah. C. M. Co. 1st g 6s	101⅝	103	102	Mar. '14	101
Utah Fuel 1st g 5s	101	..	101½	Mar. '14	101½
Victor Fuel 1st s f 5s	..	84	73	Apr. '14	73
Va. I. Coal & Coke 1st g 5s	91	Sale	91	91⅜	90

FOREIGN MARKETS

GREAT BRITAIN

May 22—The market has an improving tendency especially for June loading. Quotations are approximately as follow:

Best Welsh steam	$4.68	Best Monmouthshires	
Best seconds	4.44	Seconds	
Seconds	4.20	Best Cardiff smalls	
Best dry coals	4.20	Seconds	

The prices for Cardiff coals are f.o.b. Cardiff, Penarth, Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry $4.80@5.52; furnace, $4.08@4.56.

British Exports—The following is a comparative statement of British exports for April and the four months of the last two years, in long tons:

	April		4 Months	
	1913	1914	1913	1914
Anthracite	235,650	178,704	937,166	9
Steam	4,708,475	3,837,620	17,317,543	16,5
Gas	983,697	878,877	3,593,943	3,6
Household	146,273	82,798	581,727	4
Other sorts	276,774	236,019	1,159,499	1,0
Total	6,350,869	5,214,018	23,589,878	22,4
Coke	70,200	67,615	352,390	
Manufactured fuel	184,145	164,095	691,347	
Grand total	6,605,214	5,445,729	24,633,615	23,6
Bunker coal	1,795,946	1,624,282	6,747,177	6,0

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 24
Issued Every Saturday
Hill Publishing Company

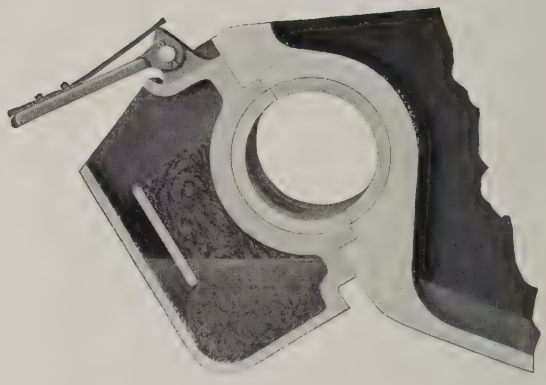
NEW YORK, JUNE 13, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page

Fourteen Foot Blowing Fan
Direct Connected to Engine
New Pittsburg Coal Co., Murray City, Ohio







What Users Say About the Bronze Sleeve Bearings Supplied on

Baldwin-Westinghouse

Electric Mine Locomotives

The modern bronze sleeve bearings with oil and waste lubrication used in the motors on Baldwin-Westinghouse Electric mine locomotives give such satisfactory life that many testimonials have come from satisfied users commenting upon this feature.

One large mining company in Arizona operating eight 15-ton locomotives for a period of two years advises that they never replaced an armature bearing and a careful test on one set of bearings at the end of two years showed the wear to be only .003 inch.

A company in Utah, which has had in operation four 18-ton locomotives since 1910, states that none of them have ever been out of service for repairs to the armature bearings and that all motors are still running with the original armature bearings. Some of these locomotives have operated three shifts a day for three years, handling 1250-ton miles per shift.

A very large mining company in Montana has had nine 3-ton locomotives with sleeve bearing motors in operation for three years working three shifts a day and all armatures are still in the original bearings.

Several large companies in Pennsylvania which have used all types of bearings prefer the modern bronze sleeve bearing.

These facts prove that bronze sleeve bearings satisfactorily meet the exacting demands of mine locomotive service.

Specify Baldwin-Westinghouse Barsteel Electric Mine Locomotives and you are assured of reliable operation.

Address either company for full information.

The Baldwin Locomotive Works, Philadelphia, Pa.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JUNE 13, 1914 NUMBER 24

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 955

Some men are so busy holding onto their jobs and watching the other fellows who appear envious, that they get out of touch with progress in their profession. There are times when the "fittest survive" much to their own sorrow.

REINFORCED CONCRETE AS ADAPTED TO MINE TIMBERS: *Pages* 956-959

Wood is unsuitable for mine timbering where permanency and noncombustibility are requisites. Under such circumstances, reinforced concrete appears to possess many advantages over steel, chief among which is its lesser cost. R. H. Rowland. COAL AGE, Vol. 5.

**WILDCAT FINANCING IN THE PENNSYLVANIA ANTHRACITE REGIONS: *Pages* 960-961

Description of what appears to be a record-breaking coup in fraudulent mining enterprises. The scheme was greatly facilitated by the complicated geology, characteristic of the Pennsylvania anthracite fields, but had the investors taken the trouble to consult local engineers, they would have been promptly informed as to the true status of the situation. A. T. Shurick. COAL AGE Vol. 5.

*NOTES ON SURVEYING METHODS IN THE ANTHRACITE REGIONS: *Pages* 961-963

A brief sketch of the engineering methods of the Lehigh Valley Coal Co. Anthracite surveying methods vary considerably from those of the bituminous engineers, and the suggestions offered herewith will be of interest to the soft-coal men. Thomas Quinn. COAL AGE, Vol. 5.

*AN EFFICIENT STEAM HOISTING ENGINE: *Pages* 963-964

INDUSTRIAL INSURANCE BY THE LEHIGH COAL & NAVIGATION CO.: *Page* 964

*ECONOMIC PIPING: *Page* 965

*A NEW TYPE OF BREAKER ENGINE: *Page* 965

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 982

COAL AND COKE NEWS: *Pages* 983-986

*ELECTRICITY IN COAL MINING—IV: *Pages* 966-967

This is the fourth article of the series on this subject, and emphasizes the importance of care and forethought in preliminary work before actual power-plant construction is undertaken. David R. Shearer. COAL AGE, Vol. 5.

D. A. THOMAS AT HOME: *Page* 967

THE W. VA. COAL MINING INSTITUTE: *Pages* 968-970

The Institute met at Cumberland, Md., and discussed more fully than ever papers of unusual merit. The question box was a source of much animated discussion. The next meeting will be held in Huntingdon, W. Va. COAL AGE, Vol. 5.

*A NOVEL SHAFT LINING: *Page* 970

THE RELIABILITY OF ELECTRIC ACOUSTIC SIGNALS IN MINES: *Page* 971

WHO'S WHO IN COAL MINING: *Page* 972

Brief sketch of the life of Charles Enzian, mining engineer of the U. S. Bureau of Mines.

EDITORIALS: *Pages* 973-974

The Kanawha Dispute—West Virginia Mine Outputs—Rambling Mines—Governor Cox Now Favors Ohio Operators—Hazards of Coal Mining.

THE LABOR SITUATION: *Page* 975

COAL MINING INSTITUTE OF AMERICA: *Page* 975

SOCIOLOGICAL DEPARTMENT: *Pages* 976-977

The Illinois Miners' and Mechanics' Institutes. E. C. Lee. COAL AGE, Vol. 5.

DISCUSSION BY READERS: *Pages* 978-980

*Checking System for Miners' Coal. Letters Nos. 1 and 2—Calculation of Coal-Washing Efficiencies—The Air Factor in Mine Explosions.

STUDY COURSE IN COAL MINING: *Page* 980

INQUIRIES OF GENERAL INTEREST: *Page* 981

*An Oil-Well Problem—Working Coal Seam Having Heavy Parting.

COAL TRADE REVIEWS: *Pages* 987-992

ADVERTISING INDEX: *Page* 26

NUMBER OF COPIES PRINTED THIS ISSUE 10,250

None sent free regularly, no returns from news companies, no back numbers.

Ever Look At It This Way?

The Weekly Ad-Talk Page

"There's too much advertising here,"
The Reader grumbled, with a sneer,
"The other matter's good, no doubt,
But see how it is hedged about
With ads of engines, hoists and pumps,
Of locomotives, cars and dumps
And pipe and screens and fans and things
Until my poor head fairly rings!"

—He flung the magazine aside.
"Maybe you're right," his friend replied,
"And yet one article last week
Helped you to stop a serious leak
In haulage costs. You know that's true,
You told me of it, didn't you?
You nod!—well, let me tell you, flat,
'Twas advertising paid for that!

"Each week before you is unfurled
The news from all your special world
From North and South and East and West
The brightest talent and the best,
However high, however dear,
Is hired to fill these pages here
And—get this underneath your hat,
It's advertising pays for that!

"And here's a fact you ought to heed
The *ads themselves* are good to read,
They help to keep you up to date
And when you buy they guide you straight,
Spreading before your seeking eyes
A wide and varied merchandise
Of all materials you use—
The stuff is there—it's yours to choose!

"Somehow I think you're scarcely right
In cursing all the ads in sight!"

The Reader grinned with sheepish mien
—And then picked up his magazine!

COAL AGE

Vol. 5 NEW YORK, JUNE 13, 1914 No. 24

Undoubtedly one of the most overworked phrases in the English language to-day, is the one that reminds us of the "survival of the fittest." Please observe that we do not insinuate that the fittest do not survive; we simply wished to call attention to the fact that everybody seems to be telling everyone else that the fittest do survive.

Yes, the fittest do survive, but there are times and circumstances, when the fittest have survived, very much to their own sorrow.

A few weeks ago we had occasion to pay a visit to a vanishing mining town, which is even now a town, only by right of past remembrances.

Many years ago, it boasted the most prosperous mining community in the state, and it was not all boast, either. We, the scribe, happened to be the camp's mining engineer at that time, so we sort of know whereof we speak. But now—mostly a roosting place for bats—every house in the camp, save one, is deserted and tottering.

The one exception is occupied by the caretaker of the property. Lower seams that may be available some day make it desirable to keep the property intact, and so, to guard against squatters, the caretaker and his wife are retained. We found them working in their garden just back of their home; an old, weary couple, very much in harmony with all their surroundings.

Imagine our surprise when the old man fell on our neck, weeping, calling us by name.

Yes, it was Tobin (we will call him Tobin), the master mechanic of the camp in the good old days, now left high and dry, forgetting and forgotten.

Here's the story:

He was a good master mechanic, proud of his camp, and of his job; too proud in fact, which explains the tragedy. He became suspicious of his men, fearing constantly that they were trying to undermine him, scheming for his job. He changed men constantly, planning thus to outwit them.

He builded better than he knew. He succeeded so well that no one was ever able to displace him. But years slip by quickly and, while Tobin was so busy holding onto his job and watching the other fellows who appeared envious, he failed to realize that the camp's usefulness was rapidly coming to an end, and, naturally, he got out of touch with progress in his profession.

When the end came Tobin had still survived and there he remains to this day.

Thomas Moore moved the world to tears with "The Last Rose of Summer."

That's because his rose was symbolic of so many Tobins.

Reinforced Concrete as Adapted to Mine Timbering

By N. H. Rowland*

SYNOPSIS—Wood is unsuitable for mine timbering where permanency and non-combustibility are requisites. Under such circumstances, reinforced concrete appears to possess many advantages over steel, chief among which is its lesser cost.

The chief advantages of timber for underground mining operations have been its wide distribution with ease of access to place of use, its consequent cheapness, and the simplicity with which it can be framed and fitted to service.

With modern improvements in mining methods and the application of wider intelligence in the use of men and materials to promote the greatest efficiency in operation, and therewith the largest returns on capital investment from the minimum ultimate expenditure in construction and maintenance, there has come a keener appreciation of the fact that timber is not universally adapted to all the construction incident to mining operations, and that in many situations its use may be attended with large economic waste.

The laws of true efficiency in mining operations call for the prevention of waste both economic and human, and therefore demand for mine timbering economy of material, space and time; of material in order that each piece may do work up to its full capacity; of space for the prevention of useless and profitless excavation; of time needlessly spent in repairs and renewals on materials not truly adapted for mine timbering purposes. Some of the economic wastes involved in the use of wooden timbers for underground mining operations under conditions of loading or temperature wherein they cannot be expected to endure for more than a limited period of time are as follows:

1. Waste in sizes: The compressive strength of wood is much greater than its transverse strength, and under ordinary conditions there is absolutely no technical reason why the legs of the timber square set should be made the same size of the collar; the extra amount of material that goes into the legs is wasted, and means direct extra expense in the way of freight and handling.

2. Waste in framing and decay: The material cut away and lost in framing involves considerable waste, sometimes a part of the piece is injured, and the entire member rendered useless. Waste also occurs in the use of timbers under temperature conditions where decay and destruction by insect action are a matter of relatively short time. Ten per cent. of all the mine timber, according to the U. S. Dept. of Agriculture, is destroyed by insect action and 45% by decay. The enormous quantities of timber consumed in the mines and the necessity for the replacement of the entire equipment inside the workings of an anthracite mine in 12 to 18 months emphasize the unsuitability of wood for this purpose, and the economic waste involved by its use.

3. Waste by fire: Waste also occurs from the exposure of timber to situations where fires may be expected. The long line of disastrous mine fires calls attention to this ever present danger in coal mining operations, the necessity of continual vigilance for its prevention, and the importance of the use at recognized points of danger, of materials of construction that are fitted to reduce, if not to entirely avoid, the economic waste due to the use of wooden timbers in locations for which they are not in all respects adapted.

4. Waste from lack of re-use: Waste also occurs owing to the failure to draw or re-use the timbers of completed rooms, abandoned headings, etc. Under present conditions in this country, wooden props and gangway supports are seldom withdrawn and are usually utterly worthless when the time comes for their replacement. They form an excellent place for the origination of fires or their maintenance when once started. In England and on the Continent it is the custom to withdraw and re-use all the timber, and the prevention of waste by the use of material for props and gangway supports which is capable of repeated re-use has been thoroughly justified by ultimate economy in expenditure.

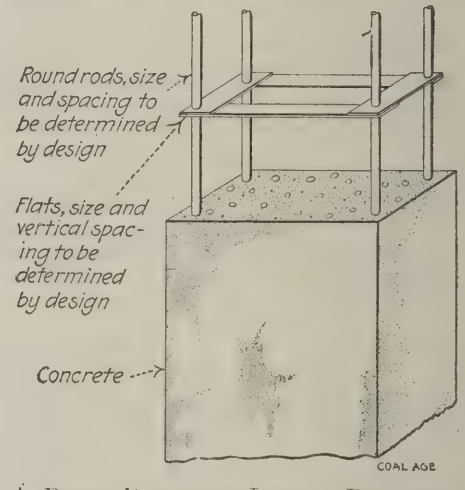


Fig. 1. A Prop Designed Like a Building Column

Substitutes for Wood

The rapid exhaustion of suitable timber for use in underground operations and the desirability of some substitute readily adapted to the requirements of mining, and economical in the total cost of production, which would eliminate the above mentioned wastes has led to the consideration of substitutes for timber. Every consideration which may be adduced for fire-proof construction above ground avails with even greater force for the elimination of inflammable materials, so far as possible, from underground structures. Fireproof buildings underground mean safety, and therewith reduction of expense in maintenance and replacement. Steel or reinforced concrete structures mean mine insurance.

The superiority of reinforced concrete to wood is due to the fact that it possesses all the latter's well known advantages with none of its disadvantages. The substitution of this material of greater strength and endur-

*50 Church St., New York.

ance for a similar one of less tenacity avoids, moreover, all those elements of economic waste to which timber is liable, entailing meanwhile less excavation, better ventilation, and greater permanency.

Wooden shapes which have proven themselves suitable for mine-timbering purposes can be exactly duplicated in reinforced concrete. A set of reinforced concrete gangway supports may alternate with wooden timbers; wood may be taken out and reinforced concrete put in its place, and vice versa.

Some highly successful applications of concrete construction, reinforced and plain, have already been made in mining operations. The advantages secured are noninflammability, the possibility of obtaining a large portion of the ingredients in close proximity to the mines themselves and the readiness with which concrete can be prepared to sustain either light or heavy stresses.

If there were no other reasons for the use of reinforced concrete in mines, the preservation of the vital parts of the operations from fire loss merits the most careful consideration, while another great advantage lies in its great strength and stiffness. In many cases its use in underground operations in mine timbering means decreased cost of production and therewith increased returns on capital investment. The theoretical conditions which prove this statement are just those which account for its extended use in the construction of bridges, buildings, etc., and which make truly economical its use in the building of mine structures above ground.

Many modern mines are using steel for supporting gangways, and satisfaction has attended these examples. Even where loads are not great and the fire hazard low, the use of metal in place of wood has been found a profitable investment on the basis of the ultimate economy in the expenditure, which results from low maintenance charges and infrequent renewals.

Steel Mine Timbers in Ohio

Extensive installations of this character are found in the 8th and 9th mining districts of Ohio; for instance, in the mines of the Roby Coal Co., at Adena. In the 35th Annual Report of the Chief Inspector of Mines of Ohio, page 430, it is stated:

> The mines have a very tender roof and at one time the haulways were considered the most dangerous in the district. . . . The main entry is now timbered with steel I-beams. . . . The management informs me that the cost of production is a great deal less than when they attempted to operate without properly timbering the haulways.

At Barton during 1909, the mines of the Youghiogheny and Ohio Coal Co. were likewise being timbered with steel I-beams in place of wood, eliminating the chance of accidents from falls of roof along the haulways, and the inspectors report that conditions have been thereby decidedly improved.

In the anthracite coal mining region there are to be found long stretches of steel-timbered gangways in the mines of the leading companies, particularly those of the Susquehanna Coal Co., and its subsidiaries, the Lehigh Valley Coal Co., etc.

Inasmuch as steel, however, is considerably more expensive than reinforced concrete, and as the latter possesses all the advantages of the former, it would appear that reinforced concrete would be well adapted to gangway timbering. Of course, it might be contended that on account of its low tensile strength and relatively high resistance to compression and crushing, that concrete would not be as suitable as steel, which has a high tensile strength, and is therefore fitted to carry large loads over wide spans with a minimum ratio of dead weight to external loading.

In most mines, however, the gangways are so driven that it is unnecessary to cover wide spans. If it were found necessary to meet such conditions, a more complicated system might have to be considered, and a few props could be so placed as to reduce the span while leaving the passages as unobstructed as possible.

It might also be claimed that concrete preparation calls for the employment of skilled labor, and that entirely satisfactory principles of design have not yet been finally determined.

Reinforced-concrete collars and props, however, in my opinion, can replace wooden construction fully and

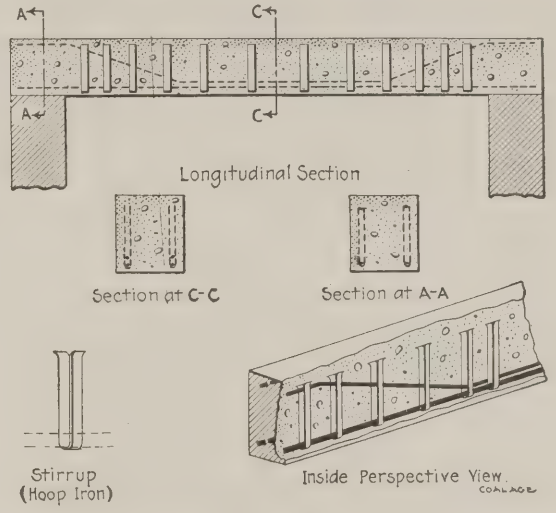


Fig. 2. Collars Are Reinforced Like Beams in Building Construction

satisfactorily, and with a systematic handling of the problem, at a considerably decreased cost from that of steel timbers. The extra amount of space necessary for erection over that required for steel is so small as to merit little consideration, since the excavation in roof, floor or side of the gangway would be little, if any greater.

Proper design for reinforced concrete used in mine timbering should be based on correct principles of engineering. Props could be planned according to the principles of columns used in the erection of buildings, as shown in Fig. 1, consisting of rods embedded in the concrete near the periphery. These are connected by means of ties, or flats, hoop iron or wire. Thus the radius of gyration is increased and the rods take care of the tensile stresses which occur from eccentric loading or from deflection of columns. The horizontal ties prevent the buckling of the rods and increase the strength of the concrete. They form a hooped column.

Local Conditions Determine Size of Members

The size and dimensions of these props or columns must be determined by the nature of the roof of the mine they have to support and on the height of the slope or entry wherein they will be used. Above ground it is possible to calculate the loading and the stresses involved with mathematical correctness, but underground there seem to be no well defined rules by which for example the

strength of square timber sets or props may be calculated.

Experience governs the use of wooden mine timbers in such conditions, and it is an easy matter for the engineer to design reinforced-concrete columns or props of equivalent strength so that there may be absolutely no waste of material. Where the strata is horizontal or approximately so, the loads are applied normal to the collar of the gangway support with a practically uniform distribution and produce therein bending moments with compressive stresses in the legs. The minimum amount of material is employed when the collar is exactly proportioned to the bending stresses encountered and each leg to the half load of the collar. Where the dip of the strata is great or where the ground is swelling, legs and collars may be called upon to take both bending and compressive stresses at the same time, and allowance must be made in the design for this joint action.

Regarding the construction of these reinforced-concrete members, inasmuch as suitable sand and gravel can be found in almost any locality, it would only be necessary to ship to the mine the steel and cement. The props and collars could be made in the quantities desired on the surface in close proximity to the mine.

The method of procedure followed would be along the

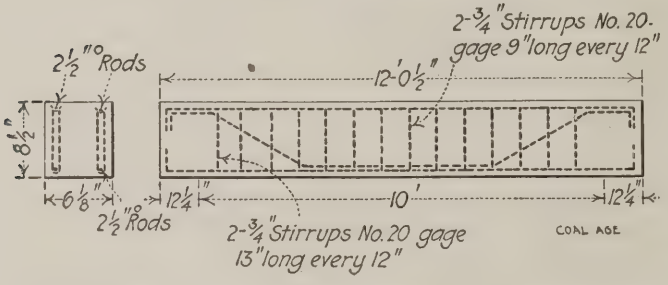


FIG. 3. DESIGN OF A BEAM TESTED TO DESTRUCTION

lines of that pursued in the manufacture of concrete telegraph poles, and the form work would be similar in construction. The lumber used for forms should be of either 1-, 1½- or 2-in. boards, securely braced by 3x3- or 4x4-in. braces, and bolted in order to prevent bulging. The greatest economy is secured by constructing the forms so that they can be used over and over again. Economy can also be gained by fastening form work together with the minimum amount of nailing.

After a number of props have been poured, they should be left to thoroughly set before removal from the forms, after which they may be transported to the desired location in the mine.

As shown in Fig. 2, the collars might be formed, similar to beams in building construction, the concrete being relied upon to resist the compressive stresses in the upper part of the beam, while the steel rods resist tension in the lower portion. These rods, however, should be of two kinds—straight and bent. The bent rods, besides taking their proportions of the direct tension and of the shear, receive any tensile stresses in the upper portion due to a negative moment over the support.

THE TEST OF A BEAM

Regarding the strength of these collars or beams, and the small quantity of steel employed in their construction, Fig. 3 shows the design of a beam made in the open air and not wetted after pouring. The forms were removed just before the tests were made at the end of 60 days. The beam remained in the open air during that time and was not moved until tested.

The following is a result of this test: Length of beam over-all 12 ft. ½ in., clear space 10 ft., breadth 6⅛ in., depth over-all 8½ in., depth to center of steel 7½ in., weight of beam 614 lb., mixture 1:2:4, compression strength, 60 days, 1747 lb. per sq.in.

Area of steel in tension.....	1.60% of cross-section of beam
Area of steel in compression..	0.80% of cross-section of beam
Total	2.40% of cross-section of beam

Load, Lb.	Deflection, In.	Remarks
1350	1/16	
2350	1/8	
3350	3/16	
4350	1/4	
5350	5/16	
6350	3/8	Faint hair cracks on either side of center, very faint
7350	1/2	
8350	13/32	
8650	7/16	Failure by concrete buckling, at top in center

The relative proportions of strength of reinforced concrete, steel and timber are based on the ordinary method of calculation, as shown in Figs. 4, 5 and 6, and the use of their equivalents produces much stronger and stiffer mine sets than the comparison would seem to indicate. Stiffness is as important as strength, and the spacing should be such as to compel the different sets to act together as a unit under any sudden stress or shock. Light designs with close spacing will therefore be preferable to heavy ones with wide spacing, the roof itself serving as a beam to distribute the load over two or more sets, whereas on wide spacing there is more danger of the roof falling in between the sets. The closer spacing also permits of much lighter lagging.

The prevention of economic losses in reinforced concrete requires the avoidance of waste in fabrication and simplicity in framing. The three-piece wooden timber set is simplicity itself; all that is necessary in erection is to cut the material to length, hew out notches in the collar, and put the three pieces in place. The reinforced concrete sets may also possess the same simplicity which enters largely into the cost of the structure.

The simplicity in construction is shown in the fact that the framing material may be bought at the mill, and the fabrication done by the company's own workmen on the ground. Conditions met with in mining operations may, however, require different arrangements, and the design must be made to suit the circumstances.

THE COSTS VARY WIDELY

Regarding the costs: Conditions in the mine as to sizes of timbers used, the nearness to a supply and the cost of lumber vary widely, and an infinite number of comparisons as to the relative costs of reinforced concrete, steel and wood could be instituted, results of which might not be of exact value. Under the present market conditions, the cost of steel in Pennsylvania is nearly three times the cost of wood used in the square timber sets, and the cost of reinforced concrete may be taken at about one and one-third times the cost of wood. In the first cost of the installation, therefore the advantage will lie with wood.

Where, however, a gangway has to be maintained over a number of years and the workings are in any way permanent, consideration should be given to the capitalized value of the material as compared with the first cost of the installation; and reinforced concrete will be found economical in most cases on the basis of ultimate cost by reason of its long life and endurance.

Taking as a basis of estimate the present price of structural steel at $1.405 per 100 lb. f.o.b. cars Pittsburgh, with the usual extras for workmanship, etc., a comparison of the relative costs of the form of gangway supports shown in Figs. 4, 5 and 6, is as follows:

The cost of the timber sets, as shown in Fig. 4, was $7.50, erected. The cost of the steel sets, as shown in Fig. 6, would be $22, erected. If painted, the cost would be about $2 per ton additional. The cost of the reinforced-concrete set would be $10, erected.

Reckoning 6 per cent. compound interest, on the low assumption of 15 years life, the steel set at the end of this period will represent an investment of $52.72, and the reinforced concrete set $23.97. During the same length of time, based on past experience and on the present cost of timber, six wooden sets would be required at a capitalized value of about $100.

On this basis, the saving on the steel timbers can be set down as $47.28 per set, which means a saving per year of $3.15; on the reinforced concrete, the saving per set is $76.03, which amounts to a yearly saving of $5.07 over lumber, and over steel of $1.92 per year per set.

A reinforced-concrete design is shown in Fig. 7, and the above cost is figured as follows:

Steel rods, including stirrups, labor and material....	$2.25
Aggregates, sand, cement and stone, hauling, mixing concrete and placing, including foreman's wages...	3.28
*Forms, carpenter work, labor and material (assume forms used three times, equals one-third of $6.25, equals)	2.25
	$7.78
Transporting to mine and erecting (30% of $7.78)....	2.22
Total	$10.00

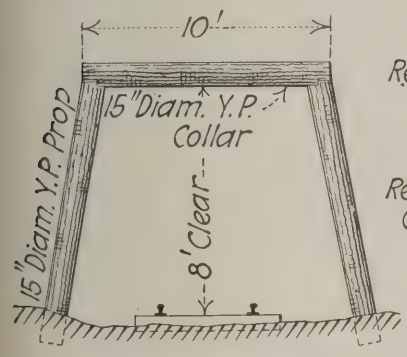
*This item includes removal and resetting of forms.

Regarding the handling, the following is a comparison of the weights per set: Timber 2200 lb., steel 650 lb., reinforced concrete 1800 lb. From these figures it will be seen that the advantage as regards weight lies with steel, but this handling would only figure in the cost of transportation from the surface in proximity to the drift, slope, or shaft mouth to the destination in the mine, and would not in any way, enter into freight charges, the transportation costs on the plain concrete material being considerably less than on the steel set. It will also be seen that concrete compares favorably in weight with lumber.

Noncombustible material has already demonstrated its usefulness in mines where explosions and fires have occurred. Reinforced concrete cannot support combustion, and the blowing down of a few sets by explosive action cannot occasion the caving in, and the heavy expense which comes as a result of the burning out of wooden timbers. Another item in favor of reinforced concrete is the possibility of its re-use. It can be taken out and reused many times, and its durability and economy due to its long life are large factors in the prevention of economic waste.

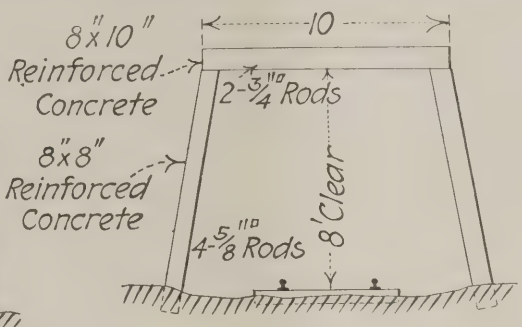
The assumptions above made in discussing relative costs of mine timber sets are believed to be extremely conservative, for the reason, first that steel mine timbers exposed to temperatures and moisture conditions existing in mines have been in use in this country without deterioration since 1897; and second, because English and Continental practice has given us records extending over a much longer period of time. The average life of steel props in Warwickshire, England, for instance, varies from 10 to 13 years as compared with three months for timber.

It may be reasonably assumed therefore, that reinforced-concrete sets will last as long as required in any one mine, however large the property and however long it is necessary to maintain the gangway or shaft. Furthermore, in three-piece gangway supports, as indicated in Fig. 5, complete fireproof protection is obtained.



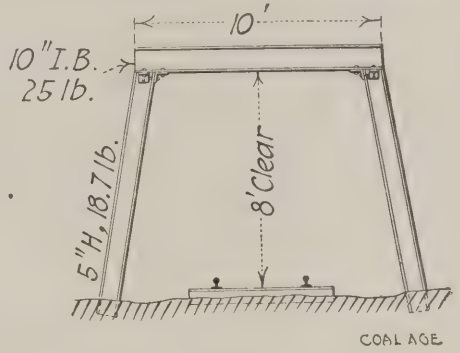
Timber Set

FIG. 4



Reinforced Concrete Set

FIG. 5



Steel Set

FIG. 6

COMPARATIVE SIZE OF WOOD, STEEL AND REINFORCED-CONCRETE TIMBER SETS

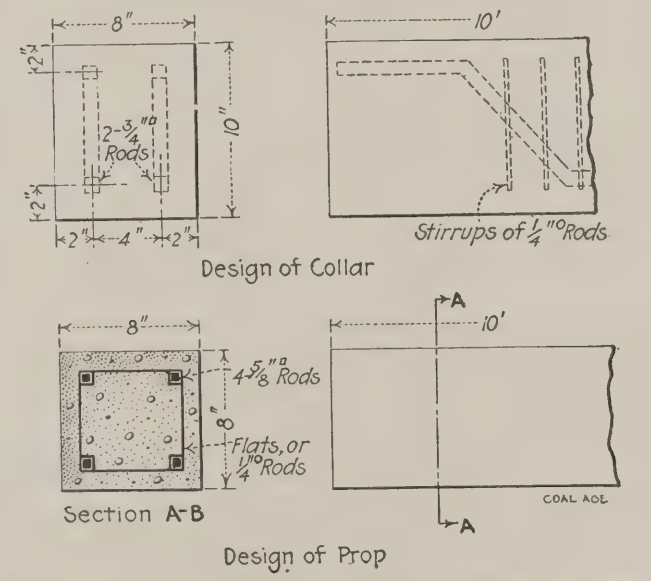


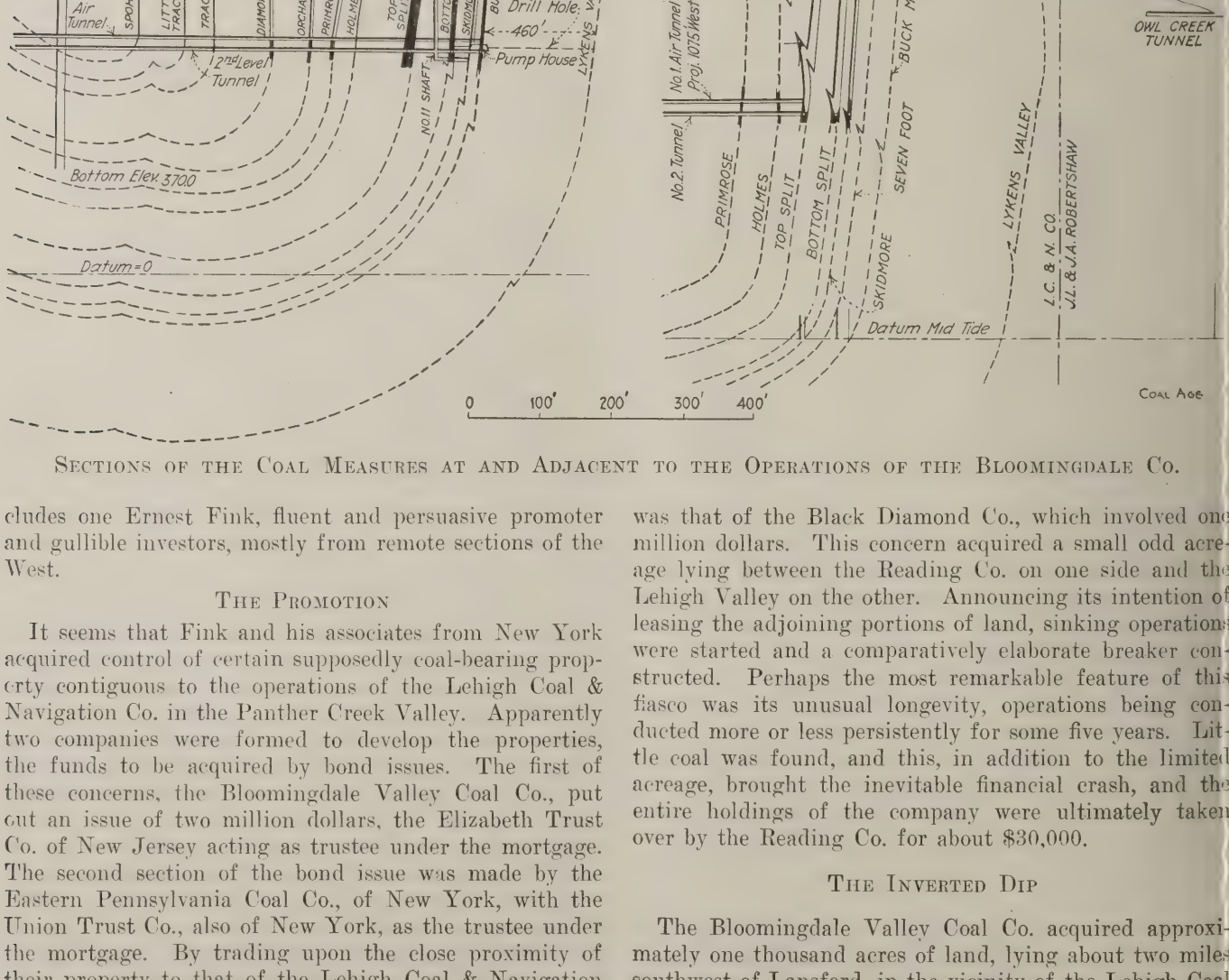
FIG. 7. DESIGN FOR A REINFORCED-CONCRETE TIMBER SET

Wildcat Financing in the Penn. Anthracite Regions

By A. T. Shurick

SYNOPSIS—Description of what appears to be a record-breaking coup in fraudulent mining enterprises. The scheme was greatly facilitated by the complicated geology, characteristic of the Pennsylvania anthracite fields, but had the investors taken the trouble to consult local engineers they would have been promptly informed as to the true status of the situation.

When Sheriff Heartneady, of Carbon County, Pennsylvania, attached the property of the Bloomingdale Valley Coal Co., on May 13, the curtain was rung up on the last act of the largest coal-mining swindle in the history of the United States. The scene of the play was not inappropriately laid on the very rim of one of the richest anthracite-bearing sections in the country and the cast includes one Ernest Fink, fluent and persuasive promoter and gullible investors, mostly from remote sections of the West.



Sections of the Coal Measures at and Adjacent to the Operations of the Bloomingdale Co.

The Promotion

It seems that Fink and his associates from New York acquired control of certain supposedly coal-bearing property contiguous to the operations of the Lehigh Coal & Navigation Co. in the Panther Creek Valley. Apparently two companies were formed to develop the properties, the funds to be acquired by bond issues. The first of these concerns, the Bloomingdale Valley Coal Co., put out an issue of two million dollars, the Elizabeth Trust Co. of New Jersey acting as trustee under the mortgage. The second section of the bond issue was made by the Eastern Pennsylvania Coal Co., of New York, with the Union Trust Co., also of New York, as the trustee under the mortgage. By trading upon the close proximity of their property to that of the Lehigh Coal & Navigation Co., together with the prestige and high financial standing of the latter concern, it is believed that practically the whole of both these bond issues were successfully placed.

Although it was generally known in the local mining circles that the properties in question were almost, if not completely, barren of coal, the unusual geology of the district was peculiarly advantageous to the purposes of the promoters. It is, therefore, not so surprising that presumably conservative investors were inveigled into the proposition.

For an obviously fraudulent enterprise, the anthracite industry has never before been the scene of one of such magnitude, and it is probably the largest in the history of the coal industry of this country. The previous most important operation of this kind in the hard-coal regions was that of the Black Diamond Co., which involved one million dollars. This concern acquired a small odd acreage lying between the Reading Co. on one side and the Lehigh Valley on the other. Announcing its intention of leasing the adjoining portions of land, sinking operations were started and a comparatively elaborate breaker constructed. Perhaps the most remarkable feature of this fiasco was its unusual longevity, operations being conducted more or less persistently for some five years. Little coal was found, and this, in addition to the limited acreage, brought the inevitable financial crash, and the entire holdings of the company were ultimately taken over by the Reading Co. for about $30,000.

The Inverted Dip

The Bloomingdale Valley Coal Co. acquired approximately one thousand acres of land, lying about two miles southwest of Lansford, in the vicinity of the Lehigh Coal

& Navigation Co.'s tunnel No. 11.* The two detailed sections in the accompanying figures show the geology of the district in this immediate vicinity. As will be observed, the geology is rather unusual in that the measures have been turned completely past the vertical, in such a manner that the outcrop is an inverted dip. To the casual observer, not familiar with the idiosyncrasies of the anthracite measures, there would be absolutely nothing to indicate that the coal outcropped on a reverse dip.

Apparently the promoters of the enterprise seized upon this condition to establish the claim that the seam dipped directly into their property. There is little or no excuse for a competent engineer to have been misled by these assertions. Even were his field observations of too cursory a nature to determine the real conditions, there are sufficient published data on this district to have at least made him suspicious of the true situation. In fact, had the investors consulted any of the local engineers, they would have been informed of the true condition of affairs

About the only actual development work done by the Bloomingdale company was the driving of the 240-ft. tunnel crosscutting the measures, apparently with the intention of tapping the Lykens Valley vein. A cross-section of the measures taken on the center line of this tunnel is shown in the accompanying illustration on the right. The exact location of the Lykens Valley vein at this point is more or less a matter of conjecture, but, according to other well established sections in this immediate vicinity, it certainly cannot vary materially from the location here shown.

Bloomingdale Property Barren

It will be observed in this section that it is highly doubtful if the Lykens Valley seam crosses the line into the Bloomingdale Co.'s property at all, and even though it should, it certainly will not be there in sufficient quantity to justify developing. It should also be remembered that the Lykens Valley marks the very bottom of the coal-bearing measures in this vicinity, which forms the conclusive proof that the Bloomingdale company's property is practically barren of coal. In fact, it might be remarked in general that no coal deposits of commercial importance have ever been found to the south of the Sharp Mountains, which form the crown of the sections in the accompanying drawings.

The section on the left is taken through the No. 11 Tunnel of the Lehigh Coal & Navigation Co., and is based on actual developments and surveys. It may, therefore, be assumed as a true exhibition of existing conditions. The section lies 1400 ft. to the east of the other shown at the right, and is at least typical of the conditions in this latter section.

While the No. 11 Tunnel was not driven out to the Lykens Valley vein itself, a horizontal drill hole was driven through to test the coal. This showed only 2 ft. 6 in. of coal, 6 in. of which was coal and slate, and the 2 ft. bone and slate. The shaft shown in the section also cut the Lykens Valley vein, which showed a thickness of only 3 ft., 1 ft. 6 in. of which was shelly, dirty coal, such as would produce rice and barley only, and the balance of 1 ft. 6 in. was a fair coal only.

It is thus evident from these last sections that even had the Bloomingdale company sufficient of the Lykens Valley vein to justify operations, the grade of the coal was such that it could not have been commercially mined in any event.

*For a detailed map of this district, see "Coal Age," Vol. 3, p. 724.

Notes on Surveying Methods in the Anthracite Regions

By Thomas Quinn†

SYNOPSIS—A brief sketch of the engineering methods of the Lehigh Valley Coal Co. Anthracite surveying methods vary considerably from those of the bituminous engineers and the suggestions offered herewith will be of interest to the soft-coal men.

As the methods used in the mining of anthracite coal differ from those in bituminous, so also do the methods used in surveying differ in the respective fields. Practices common in one field could not be used in the other. Where the veins are horizontal, entries and rooms should and are in most places driven on line while at other times where the coal occurs in pitching veins this is an impossibility. As local conditions govern the methods of mining, so also do they govern the system of surveying. The methods described herewith are those used by the Lehigh Valley Coal Co.

All survey work is, of course, based on the true meridian and the continuous vernier system of azimuth readings is used, south being taken as 0° 00′, west, north and east 90°, 180° and 270° respectively.

Field Operations

Stations are numbered continuously, each new station receiving the next higher number, regardless of its position in the mine. A small circle is painted around the spad and the station number is painted in a conspicuous place near-by, white lead being used for this purpose. All stations are carried in the roof except on rare oc-

SURVEY OF EAST MAMMOTH GANGWAY

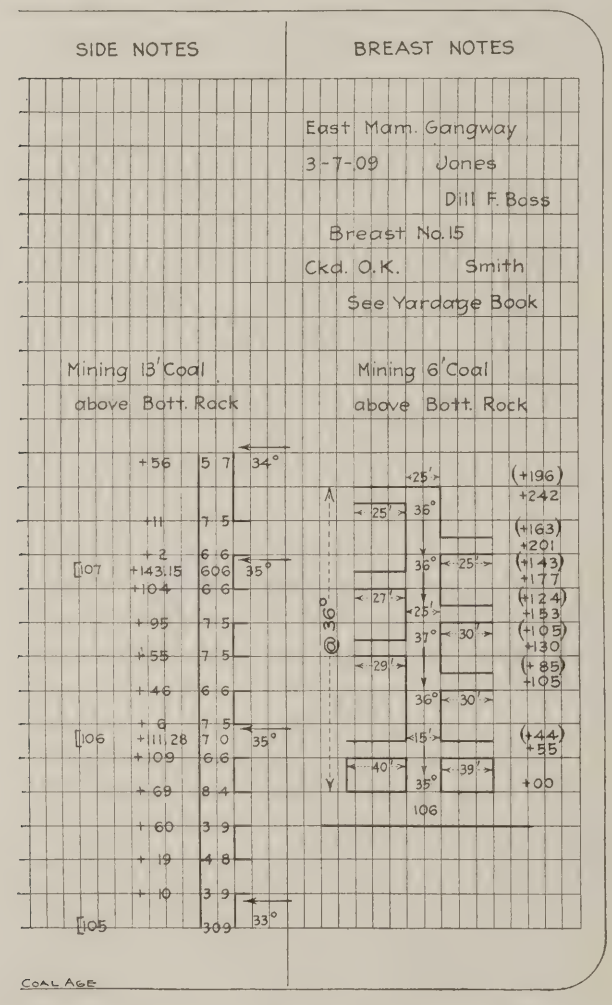
Ref. Vol. 77	Sta.	Azimuth	Bearing	Distance Meas.	Distance Horz.	Horz. Dist.	Vertical Height	Elev.	Total East	Total West	Total East	Total West	North	South	Total North	Total South	Remarks
Page 10	101							613.72				312.72 (Page 2)				176.31 (Page 2)	
	102	179°51′	N0°09′W	0°09′	79.07	79.07	+0.21	613.93		0.21		312.93	79.07			97.24	
	103	172°07′	N7°53′W	0°12′	210.72	210.72	+1.74	615.67		28.90		341.83	208.73		111.49		
	104	169°10′	N10°50′W	0°54′	49.76	49.76	+0.78	616.45		9.35		351.18	48.87		160.36		
	105	178°53′	N1°07′W	0°32′	216.23	216.23	+0.38	616.83		4.22		355.40	216.19		376.55		
	106	180°54′	N0°54′E	0°20′	111.28	111.28	+0.65	617.48	1.75			353.65	111.27		487.82		
	107	181°01′	N1°01′E	0°21′	143.15	143.15	+0.87	618.35	2.54			351.11	143.13		630.95		
	Pt.	182°00′		0°25′	56.00	56.00	+0.41	618.76									

†406 W. Poplar St., Harrisburg, Ill.

casions when conditions will not permit. A 300-ft. steel tape, graduated to every foot, is used, tenths and hundredths being obtained by the aid of a pocket tape.

In beginning a survey the azimuth of the stations started from is always checked by setting up at the next to last station. Should a different azimuth be found than recorded, the survey is followed back until stations are found whose azimuth corresponds with the notes. As a great many stations are set in timbers, it is not uncommon to find some that have been moved by the gradual settling of the roof.

The vertical angle is read on every sight and the elevation of the sight, above or below the height of instrument, is noted. The compass is read frequently as a check on the azimuth and all gangways and every fifth breast



Methods of Recording Breast Notes and Side Notes

are surveyed, the intermediate breasts being measured. A clinometer is used to get the dip of the vein, which is taken at each station; this with the section of the vein at the face is recorded in the sidenotes, as shown in the accompanying illustration.

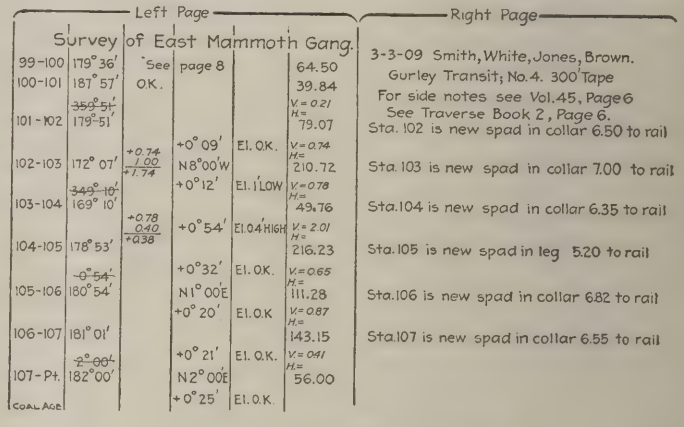
Horizontal distances and vertical heights are computed in the office and recorded in the transit notes in red ink, shown in the accompanying illustration in slanting letters. These data are then copied in the traverse book and the elevation and coördinate value of each station computed. Gurden's traverse tables are used in the latter computations and all work is carefully checked.

Levels are run with the transit when it is desirous to drive a gangway or tunnel on a special grade.

Mapping

A high-grade mounted paper is used for the maps and all surveys are plotted on a scale of 100 ft. to the inch. Coördinate lines are drawn dividing the map into 1000-ft. squares. As each station is plotted from its coördinate value, and checked with the protractor, the possibilities of errors in calculating and plotting are practically eliminated.

As many as eight overlying veins are worked at some mines and since a complete map showing all the veins would in many cases be very confusing, separate ones are made of each. Water colors are used on all maps and tracings, a different color being adopted for each vein. Rock work and buildings are outlined and cross hatched in black; on tracings this is done on the back

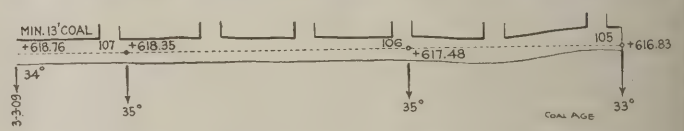


Transit Survey Notes

of the parchment. In places where the pillars have been removed the date is marked and the pillars cross hatched.

Tracings of each vein are sent to the mining engineer, state mine inspector and mine manager. The maps are all brought up to date every three months, this being the interval of time between postings. The state mine inspector's tracings are extended every six months in compliance with the state law.

The workings of the different veins may be compared by fitting one tracing over the other, which is done by making the corresponding coördinates on each tracing coincide. A separate map is made of the surface features and anything likely to be affected by the underground



Side Notes in Adjoining Illustration, Plotted

workings is plotted on the mine map. Blueprints are made from the tracings for the use of the survey parties and company officials.

When any work is to be stopped or if it is desired to give instructions of any kind to the mine foreman, he must be notified by letter or the orders are not binding. After the letter is written it is copied in a special book kept for reference. A slip is sent with the letter to the foreman, who fills it out, noting the date of receipt, and it is then returned to the engineering department and filed. By following this system the responsibility for mistakes made cannot be shifted from the engineering department to the mine foreman or *vice versa*.

When a breast is finished the foreman fills out a slip

showing its location, number, when it was finished and total yardage paid on it. This is forwarded to the engineering department and a chainman is sent to check the measurement. His notes are kept in a special book from which the yardage is checked and the breasts plotted. If the vein has a regular pitch the dip is taken every 50 ft., this being the length of the chain used in measuring. Any irregularities in the vein are located and noted, and the measurements are reduced to horizontal distances and recorded as shown in the accompanying illustration. As all yardage on gangways must be measured from survey stations it is easy to check this work in the office.

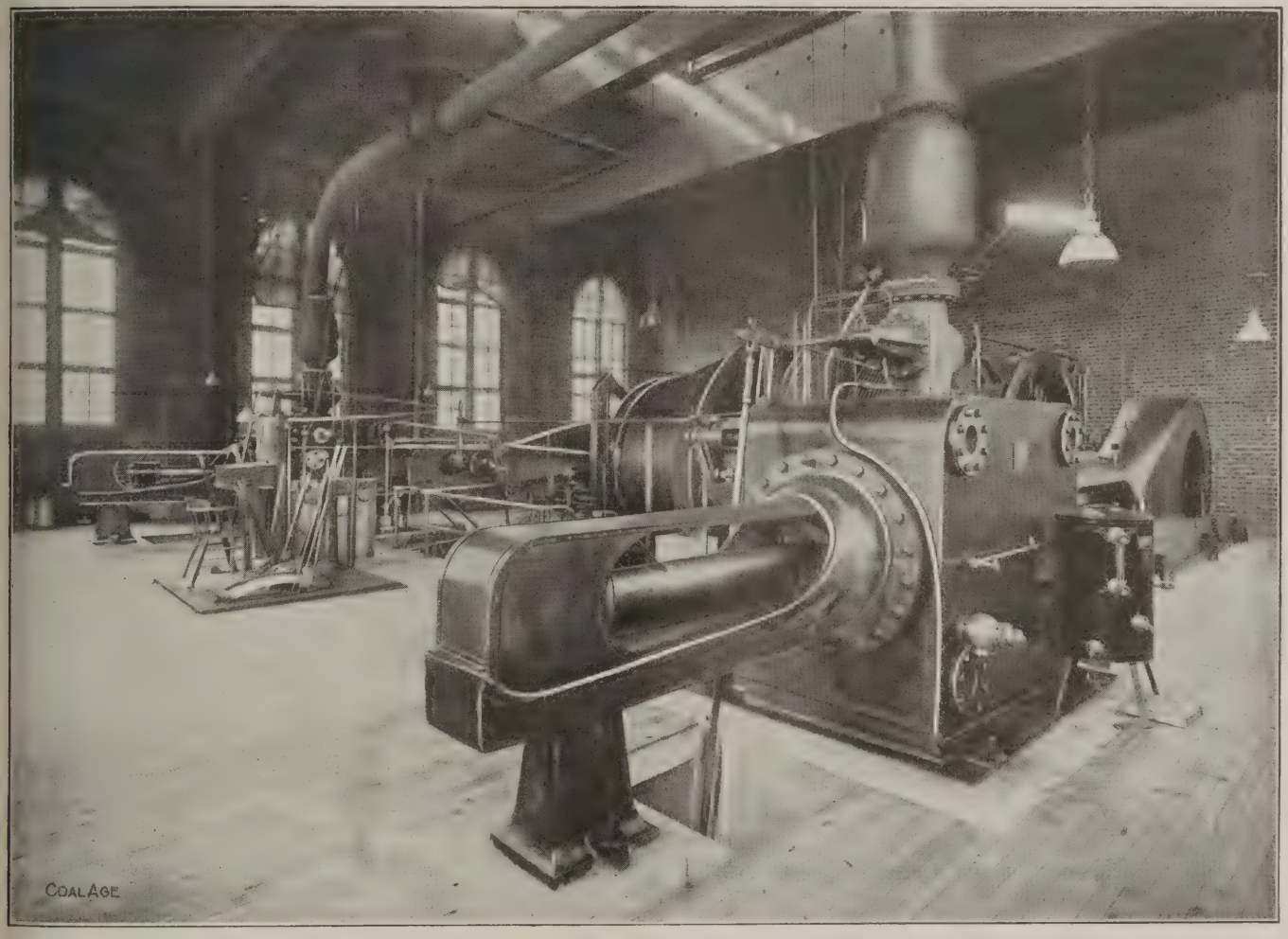
Where the surface is removed from the coal the work is generally done by contract. As the contract calls for a certain sum to be paid per cubic yard, it is the work of the engineering department to estimate the amount of material taken out. Before a stripping is started, section lines are run from a base line outside of the land to be worked. These sections are generally 20 ft. apart, although this is governed entirely by the topography of the surface. Each month the portion of these sections that has been worked are rerun and plotted As the distance between the sections is known it is a simple matter to calculate the amount of surface removed. All scalings and computations are carefully computed, the planimeter being used as an additional check on the area of the cut at each section. As the total amount of material removed to date is calculated each month any previous errors in computations will be picked up

[It is hoped shortly to publish a detailed article on engineering practice in connection with stripping operations.—Ed.]

An Efficient Steam Hoisting Engine

Few steam hoisting engines produced within the past few years exceed in interest that built by the Vulcan Iron Works and installed at the Loomis colliery of the Delaware, Lackawana & Western R.R. Co. This hoist is driven by 34x48-in., first-motion, link-reversing, heavy-duty, Corliss type shaft hoisting engines.

The unit is provided with two conical drums tapering from 14 ft. to 10 ft. in diameter, each of which will coil 1300 ft. of 1½-in. rope in one layer. One drum is tight upon the shaft, while the other is loose to facilitate hoisting from different levels. The loose drum is made fast to the shaft by means of a clutch which grips a spider or clutch wheel.



The Engine as at Present Installed. Note the 1-In. Steam Supply Line

This clutch is so arranged that it cannot be released until the brake is set up hard on the drum. The engines are provided with a steam reversing gear and steam brakes, with auxiliary hand-operated brakes. The brakes themselves are of the post type with a parallel motion.

Double throttles are employed, the lower ones, or those just above the steam chests, being used under ordinary conditions, while the upper or central throttle may be employed in case of emergency.

As has been stated above, the valve-gear is of the Corliss type. This is built without a governor, the trip motion being connected with the throttle lever. The engines are brought up to speed in the course of the first two or three revolutions. The throttle lever is then thrown over to the limit of its travel, and the Corliss gear which has been previously adjusted to the load being handled regulates the cutoff and continues in operation until steam is shut off at the end of the hoist.

Some idea of the quality of material and workmanship put into this machine may be judged from the fact that the reverse links are case-hardened, while the cranks and crossheads are of steel castings. The machine is also provided with through piston rods and tail crossheads, as may be seen in the accompanying photograph.

The engine is constructed to hoist 100 one-car trips per hour. The depth of the shaft is 1050 ft., the weight of the cage is 13,000 lb., that of the empty car, 3000 lb. and the coal contained therein 8000 lb.

Two overwind preventers or governors are employed, one being placed upon each drum. Two Mason regulating valves are also placed upon the cylinders. These are employed in lowering materials. Should the throttle refuse to work, the steam pressure could be equalized by means of these valves and the cage stopped. They may also be used to govern the speed of the cage when coming into the foot of the shaft.

The building in which this engine is housed is of brick with a concrete roof, and measures approximately 48x50 ft. inside. An idea of the economy of the Corliss valve-gear, as applied to a hoisting engine, may be obtained from the fact that, at the present time, the steam piping from the boiler house to the hoisting plant is not complete, and the engine is now operated upon a 4-in. temporary line, the size of the steam throttles above the cylinders being 8 in. With this 4-in. temporary steam line, loaded cars are hoisted at the rate of one per minute.

Industrial Insurance by the Lehigh Coal & Navigation Co.

By A. T. Shurick

The solution of a method by which protection will be afforded equally to employers and employees in the event of industrial accidents is coming gradually, but steadily, into greater prominence. In fact, some of the most powerful corporations in the United States have taken the lead in this direction, as for instance, the Pennsylvania Railroad, which has materially broadened the scope of their insurance and beneficial fund propaganda in recent years, and the establishment of a like arrangement by the American Telephone & Telegraph Co. No doubt the disillusioned cynic will ascribe the adoption of these altruistic policies to the drastic anti-trust legislation being enacted by both the state and Federal governments, and the fact that many of these larger corporations are fighting for their very existence.

But, whatever the reason, all enlightened students of the subject are viewing the changed conditions with deep satisfaction. That the old system of endless litigation in the case of industrial accidents has proved not only ineffective in its results but enormously extravagant as well, is generally agreed by all. The baleful solicitor fo retainers in industrial accidents is too well known to re quire comment; much unnecessary litigation results fro his activities, throwing additional burdens upon the tax payers while it is a fact that the plaintiff receives bu a small proportion of the ultimate award for damage

While considerable publicity has been given to the re cent developments along this line, particularly as regard some of the large outside corporations already mentioned it is probably not generally known that equally altruisti policies have been in effect with some of the large coa corporations for more than a quarter of a century; a least such is the case with the Lehigh Coal & Navigatio Co., one of the largest of the hard-coal companies ope ating in eastern Pennsylvania. This concern has a bene ficial fund, mutually supported by the employers an employees, which has been in operation since 1884.

The L. C. & N. Co.'s Method

During this interval benefits aggregating $846,709.3 have been paid, while the administrating expenses hav amounted to only $29,168.02. It is particularly interest ing in this connection to note the small ratio of the ad ministrating expenditure to the benefits derived by th employees, these expenditures amounting to only abou 3½ per cent. Had these cases been carried into th courts, it is probable that this 3½ per cent. would repre sent more nearly the actual damages which the plainti ultimately received.

The fund is supported about equally by the compan and the employees, the former having contributed $428 813.93, and the latter $430,290.72 since the inception o the fund. The maximum cash balance ever accumulate occurred in 1893, and amounted to $46,935.72. In mor recent years the fund has apparently fallen into evil way a deficit ranging from $4000 to $23,000, showing durin the period from 1902 to 1907, and again during 191 1912 and 1913. However, this deficit which last yea amounted to only about $6000 is apparently more tha compensated for by certain securities, donated by th company in 1900, amounting to $25,000.

The rules of the fund provide that the Lehigh Coal & Navigation Co. donate eight mills per ton of commercia coal produced, while inside men contribute 0.8 of on per cent. of their earnings, and the outside men 0.4 o one per cent. provided, however, that no workman sha contribute more than $1 per month.

In event of injury resulting in inability to work fo one week or longer, the workman receives benefit amounting to one-half his customary wages, althoug such payments are limited to six months except under ex traordinary conditions. In case of a fatal accident, $ is contributed toward funeral expenses, and a sum equa to one-half of the victim's wages for 18 months from th date of the accident will be paid where there are near re atives. It is also provided that in no case shall the bene fits paid exceed $50 per month.

Adequate provisions are of course made providing fo the presentation of certificates from reputable medica men, as to the extent of the injury. The fund is admin istered by a board of trustees, composed of responsibl business men, and company officials, all of whom are ap pointed by the president of the company. Participatio in the fund on part of employees is not compulsory.

Economic Piping

The coal operator, like many another business man and manufacturer, is constantly striving to increase his output and diminish its expenses. In no department of mine operation is this perhaps more forcibly manifest than in the purchase of material and equipment. Here, as elsewhere, however, it is sometimes difficult to break away from precedent and the custom of past years.

For the conveyance of fluids about the mine, particularly the mine water itself, ordinary iron or steel pipes deteriorate at a high rate of speed, due to the acidity of the water. Even if not attacked from the inside, if buried in soil, ashes, or mine refuse, ordinary piping frequently pits and decays from without, particularly if it is made the ground return of an electric system. Piping for these purposes must, therefore, either be of a heavy and comparatively inert material, such as cast iron, a nonconducting material, such as wood, or must be protected by an inert covering, such as coal tar.

The Abendroth & Root Co., 45 Broadway, New York City, have for some time furnished spiral riveted pipe to various collieries throughout the coal regions for the conveyance of water, air and exhaust steam. This pipe is constructed of a sheet which is wound spiral-



LIVE- AND EXHAUST-STEAM PIPES OF AN ANTHRACITE COLLIERY

ly, each separate turn lapping its neighbor by about 1 in., this joint being single riveted upon a comparatively short pitch. It will be readily seen that this gives an extremely strong construction for the weight of the metal employed, since the spiral seam acts precisely as does the metal wrapping of an armored hose, strengthening and stiffening the body of the pipe.

After this pipe is made up it is immersed in a bath of special asphalt coating and remains there until this material permeates the seams and pores of the metal, protecting the pipe both inside and out. This preservative forms a thick layer which will not crack or flake off and is capable of resisting hard handling. For conveying exhaust steam or hot liquids when the temperature exceeds 105° F., or for high-pressure air service, the pipe may be galvanized by immersion in pure molten zinc. This pipe is furnished in lengths of from 20 to 30 feet and this combined with the simplicity of its special connection, permits of considerable saving in installation expense, as skilled labor is not required to lay it satisfactorily.

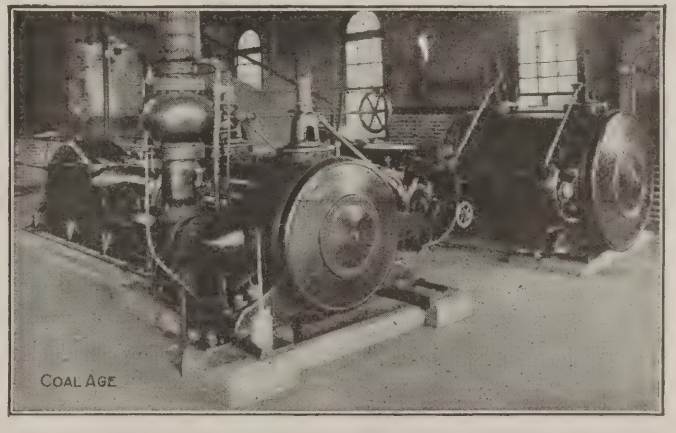
Many mine operators are strongly in favor of using spiral riveted pipe for removing foul air from the workings in place of the old-style wooden-box arrangement. Although the first cost of this pipe is slightly higher than the wood sluices, there is considerable saving in the labor of installing riveted pipe, and, in addition, the upkeep expense of wooden conduits which require continuous repairing is eliminated.

The accompanying illustration shows a plant in the anthracite region using spiral riveted pipe to convey the exhaust from the fan engine to the feed-water heaters in the boiler plant. This pipe is the lower one seen in the photograph.

Pipe of this kind either galvanized or painted is extensively used throughout the anthracite region for the conveyance of exhaust steam, since for a given strength it is somewhat lighter in weight and consequently lower in price than ordinary piping.

A New Type of Breaker Engine

When the Kingston Coal Co. recently found itself in need of a new breaker engine, after careful consideration the Lentz engine was finally decided upon. The order for this machine was placed through the Erie City Iron



THE LENTZ ENGINE, SHOWING A PORTION OF THE VALVE-GEAR

Works, this purchase giving that company the American rights for the engine.

The size of the engine is 19½x32½x21 in.; the machine is cross compound and provided with poppet valves. The original patents for this type of engine were issued to Hugo Lentz, the first machine being built in 1899. Since that time over 4,000,000 hp. of this type of prime mover have been installed in Germany alone.

The engine is entirely inclosed and lubricated by the splash system. No elastic or metallic packing is employed, the valve stems being kept steam-tight by a system of labyrinth water-seal packing.

The engine in question develops 360 i.hp., and the balancing is so nearly perfect that it is possible to balance a nickel on edge upon any part of the engine casing. It is the first machine of this type ever installed in the anthracite region.

The flame in a boiler should not lap the tubes because flame only exists where there is incomplete combustion and the temperature of the gases should not be reduced by cooling surfaces till the gas is completely burned.

Electricity in Coal Mining

By David R. Shearer*

SYNOPSIS—This is the fourth article of the series on this subject and emphasizes the importance of care and forethought in preliminary work before actual power-plant construction is undertaken.

When a corporation or individual decides to open a mining operation it is taken for granted that the work will be done with the intent to make the proposition a paying investment. With this end in view careful tests are usually made and quite an amount of prospective work is done prior to regular construction. As a usual thing most of this preliminary work is done for the purpose of locating the mine shafts or drifts in the most convenient place relative to the seam of coal. The money thus spent is usually considered as an investment, and such it is, for the future economy of the mine depends to a great extent upon the location of the works relative to the coal bed.

In a similar manner, money spent in locating and designing a layout of machinery and mechanical mine accessories is usually well invested, for should some error be made by which an uneconomical operation or handling of material becomes necessary, a monetary drain throughout the entire life of the plant is entailed, unless an amount should be appropriated to make the necessary changes in the existing equipment. Thus, a dollar spent in careful design may mean many times that amount in annual savings.

Considering the matter from a business standpoint, no firm can afford to build permanently without carefully mapping out the whole plan and so designing the details entering into its construction that a maximum operating economy is assured. This statement, although pertinent to the general mine layout, applies particularly to the necessary electrical appliances, since faulty design here means either expensive changes or a continual operating and upkeep expense.

The first point to be decided upon with regard to the power plant is the most economical available source of energy. This, for a mine operation under ordinary circumstances, will be either water power or steam. If it is found possible to make an economical development of water power within a reasonable distance from the operation it will be well worth while to make a thorough investigation. In some instances if central-station power be available, it may be a matter of economy to purchase electric current and install a small substation in place of a power plant.

Frequently a coal producer overlooks the fact that he can sell the fuel he burns to supply his own power, and ship it at a profit, feeling, as he does, that his fuel costs are not worth considering. Instead of thus assuming certain cost relations for parts of the plant, the entire proposed design should be rigidly investigated and questioned as to future economy in the general operating scheme.

An Engineer Will Usually Be Required

This work will usually fall to the lot of some engineer and to it should be given the most painstaking attention. Few mine operators or owners have the technical training or engineering experience to work out logically the many details of a proposed installation. The field of the operator is to produce coal at the opening of the mine at a minimum cost with the equipment supplied. The province of the engineer, on the other hand, is to design the power plant and supervise the erection and installation of such machinery as may be necessary or advisable in order to secure a maximum production at a minimum operating expense.

We hear much of late regarding motion study in industrial enterprise, and though this method of securing economical production is often censured, there is no doubt that opportunity for realizing great gains in speed and economy by close attention to methods in handling the output exists in coal-mining work. The several parts forming the working equipment should operate as a unit each element supplemental to the others, and working with maximum economy under given conditions.

As the writer has previously noted, a mine has individuality, practically no two being alike as to location, general contour or natural resources. It is, therefore, of paramount importance that the details be carefully planned and every feature bearing upon the future operation of the development be carefully considered before the actual work of erecting the plant begins.

The power plant is an extremely important factor in the general layout, as from it is drawn electricity for haulage, for lights, and often for fans, pumps, mining machines, and in fact for all power necessary in or about the mine. Again the cost of operation of the electrical equipment is continuous month by month. It may, of course, vary considerably during periods of greater or lesser activity, but means just so much toward gross running expenses. We find frequently that power-plant operation costs bear a greater proportion to the entire operative expenses than any other item, labor excepted.

A mine owner or operator preparing to open a new property and invest his money as well as that of other stockholders without having a well defined plan and the assistance of competent engineers, is laying himself and his company open to a great danger—that of buying and installing unnecessary, inadequate or unsuitable machinery. Frequently, however, the danger is in another direction, that of securing cheap or shoddy equipment. At either extreme may be found trouble and expensive operation, not only from the operating costs themselves but from upkeep and repair expenses.

Too often a manager or superintendent is induced to purchase certain machines by some smooth-tongued salesman, who, of course, knows his own line better than any other, and naturally believes it to be the best, regardless of conditions to be met or previous operating experiences with the same machine. However, it is far better for the owner if the proper equipment can be determined upon in advance regardless of what the salesmen have to say concerning their various lines of accessories.

Another danger looms up in the way of the man seeking a cheap installation, that of taking advice from an

*Knoxville, Tenn.

untrained or a mine-operating engineer. There are many men in charge of mining power plants who are fully competent to do their work and can secure efficient operation from a suitably designed plant, but few of the number have had the diversified training along such lines as would enable them to adequately advise regarding a new installation, or the equipment of the plant with additional machinery made necessary by expansion. It is far preferable that an outside engineer, who by continually coming in contact with various conditions in different sections of the country becomes accustomed to reason logically and plan accurately, be called upon to design the original plans and superintend installation in all its details. The operation of an engine and generator is one thing; the wiring layout, switchboard design and line-loss calculations are other matters entirely.

The Kind of Prime Mover Is Important

The type of power to be used having been definitely decided upon, the next step to be determined is the particular kind of prime mover to be purchased, for upon this will be based the design of the remainder of the plant. If a waterwheel, shall it be a pelton, vertical, horizontal, or twin turbine, or some other type more suitable to that particular installation? If a steam-driven plant, what kind of engine shall be used, simple, corliss, compound or turbine? And what kind of boiler or boilers shall be employed, or which of the many makes of pumps and accessories? Shall the generator be a.c. or d.c., belted or direct-connected, high or low voltage? What switchboard equipment will be necessary for this particular plant? What accessories will add to economy or satisfactory operation?

All such questions come up and must be definitely settled. The failure to consider any one factor may detract from the economy of the complete plant, and it is upon the efficiency of production that we must depend for dividends. It is true that one may place almost any kind of layout in operation and may secure some sort of service from the equipment, but there might be other equipment from which it would be possible to secure a maximum efficiency, and it is that plant that should be installed.

First cost, though it looms large to a promoter, is not the final test of plant expense, but is merely a basis from which to start. A better method of calculating costs is to assume a certain useful life for the mine development, based on the report of mining engineers or those thoroughly acquainted with the territory and location of the coal seams, and install equipment which experience and careful calculation indicate to be the most economical over the assumed period of time as a whole. All the items of expense and of possible economy must be followed out to their conclusion and a design of the proposed plant should be drawn adapted to given conditions. If, after careful consideration, no weak points are found in the layout, it is taken for granted that the designs are suitable and the work may be commenced.

This is an age of specialization, and no man can expect to master the details of several branches of learning. Even were it poossible for him to do so, he could not gain experience in more than one pursuit at one time. Thus, the outside engineer fills a distinct and necessary place in the mining industry. It is the primary business of the mine owner to take the equipment as turned over to him and produce rapidly, economically and continually, but it falls to the engineer, electrical, mining, civil or mechanical, to carefully work out the multitudinous details to be accounted for and overcome the obstacles or mistakes that otherwise might be in evidence.

This is not written for the purpose of eulogizing the engineering profession, but to call attention to the fact that any mining power plant, or any other plant for that matter, requires for its design experience, knowledge, time and careful thought, if a maximum operating economy and a minimum upkeep expense are to be obtained.

D. A. Thomas at Home

The "Liverpool Journal of Commerce" under date of May 26 publishes the following interesting interview with the British coal baron, D. A. Thomas:

In regard to the enterprises of D. A. Thomas in the United States, very little of a definite nature can be stated. There is reason to believe, however, that the famous British "coal king" has substantially matured the basis of a remarkable organization for setting alive the exploitation of great coal-yielding areas on modern lines and under processes of administration which are the outcome of his personal experiences. This aspect of the projects of D. A. Thomas will probably lead in the course of a year or two to a complete revolution in the world's coal industry.

Transport Enterprises

On the subject of his journey D. A. Thomas accorded a special interview today to a representative of the "Journal of Commerce." Concerning the Canadian side of the matter he said:

"With regard to railway and other projects in Canada, my associates and myself have completed several important and definite arrangements. We have secured a franchise charter for the Pacific, Peace River and Athabasca Ry., and also for the Peace River Tramway & Navigating Co. The former will be capitalized to the extent of £3,200,000, with bonding privileges of £10,000 per mile. The latter concern will be capitalized at £200,000, with bonding privileges of £7000 per mile. We have organized and equipped half a dozen parties of engineers and others, who are about to proceed on a reconnaissance and track surveying in order to locate the coal lands, minerals, etc. This work will occupy them three or four months. Adequate financial provision has been made for the necessary work during the coming 12 months. These projects will ultimately cost large sums. I expect to be able to proceed with the Peace River Tramway next year. I may say that this project also provides for the construction of several shallow draft river and lake steamers. The railway will traverse a country lavishly endowed both agriculturally and minerally—millions of acres of land growing the finest wheat in the world, with large areas of coal lands and minerals and indications of various kinds of natural gas and oil

The Navy and Oil

"As oil is going to be one of the chief requisites of the navy, the discovery of oil in Canada will be highly important. It is possible, if not probable, that these projects will develop thousands of square miles and stimulate immigration. The significance of this will be so well understood in view of the fact that the government contemplate purchasing interests in the Persian Oil Syndicate. Of course, I do not know what supply will eventually be available, but the scientific investigations which have already been made show that the oilfield that we are about to tap will be undoubtedly the richest in the dominions of this empire."

Revolutionizing the World's Coal Industry

Mr. Thomas declined courteously, but firmly, to discuss any details concerning his projects in the United States. There is every reason to believe, however, that he has been consulted by enormous holders of colliery interests in the States to formulate a scheme by which the vast coal-yielding resources of that continent may be worked on economic lines such as prevail within the organization of the Cambrian Trust.

Mr. Thomas did not confirm or repudiate this suggestion when it was put to him. Information from reliable sources goes to indicate that during his visit he has received amalgamated offers to organize a dominant section of the United States coal areas and to put into force his masterly knowledge of the working conditions, and of export avenues. In a few years there is reason to believe that the crowning work of his life may possibly be, with the coöperation of American colliery owners, the establishment of a great United States coal combine which will, through the aegis of the Panama Canal, supply the Far East with the bulk of its coal. It is obvious that such a stupendous undertaking will revolutionize the coal industry of the world.

Since President Wilson has advocated the antitrust act, the formation of such a combine would appear to be a difficult proposition, but the importance which the United States attaches to Mr. Thomas' scheme has raised the consideraion of the important point as to the meaning of a trust.

We have reason to believe that the comprehensive combine which Mr. Thomas is invited to control will have as its cardinal feature the reduction of prices, and will, therefore, be claimed to be outside the spirit of the antitrust laws.

Mr. Thomas was reluctant to discuss this question, but we have good authority for believing that the United States Government has under consideration legislation which will permit of Mr. Thomas carrving through a project which will place the United States next to Great Britain as a coal supplying center, and will almost guarantee for it the trade of the Far East.

The West Virginia Coal Mining Institute

Special Correspondence

SYNOPSIS—The Institute met at Cumberland, Md., and discussed more fully than usual papers of more than usual merit. The question box was a source of much animated discussion. Owing, however, to Cumberland being at the edge of the West Virginia-Maryland field and a hard place to reach from the southern coal regions, the attendance was not as large as usual. The next meeting will be held in Huntingdon, W. Va.

The West Virginia Coal Mining Institute met in the city hall of Cumberland, Md., on the morning of June 2. An address of welcome by Major Thomas W. Koon, mayor of Cumberland, was followed by another on behalf of the chamber of commerce, delivered by Thomas Footer, its president. Responses were made by J. B. Hanford, general superintendent of the Elkins Coal & Coke Co., of Morgantown, W. Va., and W. E. Fohl, consulting engineer of Pittsburgh. Neil Robinson, the president, then followed with an address, in which he urged the members to read the technical press with assiduity, so as



The Cumberland City Hall Where the West Virginia Coal Mining Institute Met

to prepare themselves to meet all the developments of the industry.

A paper entitled "The Historical Side of the Georges Creek Coal Field" was then read by R. A. Walter, chief engineer of the Maryland division of the Consolidation Coal Co. The paper was discussed by Herman V. Hesse, general manager of the same division and W. P. Young, superintendent of inspections for the Consolidation Coal Co., residing at Somerset, Penn. The paper of Clarence Hall on "Explosives Used in Coal Mining," which appeared on the program, was not submitted and Mr. Hall was not present.

Animated Question-Box Session

In the afternoon, P. J. Brennan, superintendent of the Davis Coal & Coke Co., Thomas, W. Va., read a paper entitled "The Necessary Training for Mine Officials," and then the question box was opened. It resulted in a most animated controversy, in which John G. Smythe, chief engineer of the Consolidation Coal Co., took a leading part. W. E. Fohl, E. N. Zern, W. P. Young, E. B. Wilson and P. J. Brennan also made interesting remarks. The three main questions were:

1. Which is the safer mine—one that is fiery, so recognized and guarded by the use of safety lamps, permissible explosives, compressed air as a motive power, paid shot firers, effective methods of treating dust, rigid discipline, etc.—or a mine where gas is found occasionally at any part of the mine, or continuously at certain sections of the mine, and operated as a mine of lesser risk, preventive measures being used in proportion to the believed danger?
2. Should ventilation be based on a stated number of cubic feet per man and animal underground, as at present required by the mining laws, or should it in addition be based on the quantity of methane and carbon dioxide shown by analyses of return-air currents?
3. Which is the proper method of setting a post—the small or the large end up?

In the evening the moving pictures made in the mines of the U. S. Coal & Coke Co., at Gary, W. Va., were run off for the entertainment of the members. The film is a replica of that which has been so generally exhibited throughout the country, and is owned by the University of West Virginia, Morgantown, W. Va.

On the second day, a visit was made to the station where the Cumberland & Pennsylvania R.R. discharges the Georges Creek coal into the barges of the Canal Towage Co., plying between Cumberland and Georgetown, on the Chesapeake & Ohio Canal. The boats carry an average of 17 tons and are each hauled by 4 to 5 mules, taking about 9 days for the return trip. The boats are loaded from a trestle, the front end being first filled about half full; the rear end is then loaded and the front end is then backed so that the trimming load can be placed.

Second Day's Session

After this inspection the institute met again at the city hall and heard a paper read by George E. Sylvester, chief mine inspector of the State of Tennessee, followed by one on "What Shall Be Considered Maximum Recovery with Modern Methods of Mining Bituminous Coal?" by E. W. Hesse, assistant chief engineer, Fairmount division, Consolidation Coal Co. In the discussion which followed, W. E. Fohl explained that one of the real reasons why Ohio had an incomplete recovery was because the union insisted on a room not less than 25 ft. wide with a road passing up the middle. Such a condition, especially with any refuse in the coal to be stowed made recovery of the pillars impossible.

F. C. Benner, special secretary of the Industrial Department of the International Young Men's Christian Association Committee, then made a plea for the coöperation of the mine owners in his work.

The paper on "Sanitation and Simple Ways of Making It Effective," by Dr. Robert Douglas Roller, Jr., surgeon for the New River Collieries Co., Eccles, W. Va., was eminently practical and not a series of abstruse platitudes about the importance of prophylaxis. Doctor Roller said in the discussion that he had only found two cases of

hookworm in Eccles, and these two were in country people who did not work in the mines. He did not believe that the hookworm could germinate in the coal mines of America as long as they continue to be as shallow as they are today. In any event, the development would not be menacing for the larvæ would be hindered in their growth.

The president gave an interesting account of the sanitation he is effecting as receiver for the La Follette Coal, Iron & Ry. Co. Some of the houses of that company he found had a most unfavorable record for tuberculosis and every precaution to render them safe by fumigation and whitewashing within and without had been attempted and he felt confident that success had been attained. Water analyses should not only be taken during low water, when the inflow might be wholly from springs, but during rainy weather when the stream or spring is swelled by surface water.

The Most Recent Work on Explosions

In the afternoon, George S. Rice, chief mining engineer of the Bureau of Mines, described "Recent Experiments on Coal Dusts," in which he showed that while the vacuum after an explosion caused a return draft, a still more violent reversal of direction of violence arose from the culmination of pressure in the explosion at a point remote from its origin. When this maximum pressure was created, it was so much greater than preceeding pressures, that the air and solid objects were driven forcibly backward into the areas of lower pressure in the rear.

He also made some remarks on the disagreement between the results of the American and British bureaus relative to the action of anthracite dust. Mr. Rice's statement was carefully guarded, but it was evident that he believed that the variance in results arose from the difference in the anthracites here and abroad rather than in a variation in the methods of experimentation. The British authorities have declared that while inflammation proper is dependent on the volatility of the hydrocarbons in the coal dust, detonation of a carbonaceous dust is possible regardless of the presence of volatile constituents provided the powder is sufficiently free from inert material.

Mr. Rice introduced several drawings of concentrated Taffanel barriers, which were boxes of stone dust arranged to trip and be discharged by the revolution of a vane, which in turn is to be actuated by the explosive waves. All the dust is not discharged at once, the full violence of the explosion alone being able to dislodge the dust which remains.

The Best Stone Dust to Use

Mr. Rice advocates the use of limestone because it emits, on being heated, carbon dioxide, which stifles the flame. It is, he admits, heavier than shale dust, which fact militates against its use, and experiments have not as yet shown for it any appreciable superiority. However, shale dust often contains a large percentage of vegetal matter, and so is not entirely inert. The fact that limestone dust is already on the market and shale dust at the present time is not, makes the former the more desirable.

R. D. Hall was of the opinion that the heat of dissociation of shale and limestone dusts into clay and moisture, and lime and carbon dioxide, respectively, were far more important considerations than what was the end product. Shale dust contains, so to speak, "tabloid moisture," which, being driven out of combination, absorbs much heat in that action.

E. B. Wilson then read a paper on "The Adaptability of West Virginia Coal for Byproduct Coking," and A. D. Macfarlane, chief engineer of the La Follette Coal, Iron & Ry. Co. described "An Endless Rope System for an Inclined plane." These two papers were not much discussed, though it was remarked that the system of haulage described in the latter paper involved the leaving of cars on the plane at all times, during operation or idle periods, and that the rope had to be stopped whenever a trip was to be attached.



Neil Robinson, President W. Va. Coal Mining Institute.



No. 12, or the Old Borden Shaft, Consolidation Coal Co.



E. N. Zern, Secretary-Treasurer

The After-Dinner Speechmaking

In the evening a banquet was held at the Y. M. C. A. of the Baltimore & Ohio R.R. W. E. Fohl was toastmaster. Neil Robinson gave one of those carefully polished addresses for which he is well known. He was followed by A. Taylor Smith, a lawyer of Cumberland, and C. R. Jones, dean of engineering at the Morgantown University.

The latter compared the past with the present; the scholars of the past were secretive and moreover believed that knowledge should not be debased to practical ends, the men of the present believed in making public all that scientists discovered and valued all such knowledge for its practical bearings. The end of science was now not secrecy nor self-advancement, but social service.

R. D. Hall, associate editor of Coal Age, then followed with a regret that business conditions were making it

natural and even imperative that the operator and his employee should not live in the same towns. Living together, as in times when the difficulties of transit permitted no other course, assured the betterment of both, and gave to each a clearer realization of one another's nature and needs. He urged a consideration of this estrangement, which tended to break up the solidarity which should exist between capital and labor. To prevent absenteeism from having its natural effect in alienating capital from labor, and labor from capital, welfare work must be pursued with energy equal to that with which it is naturally prosecuted when employer and employee live side by side and know each other's natures and needs.

W. P. Young, superintendent of inspection of the Consolidation Coal Co., Somerset, Penn., spoke of his trip to Argentine and Brazil to convince the South Americans that the coal of the United States would really burn, in which, of course, he was quite successful. As his speech was a travelogue rather than a description of the coal business in those countries, there is no need to discuss it further.

The addresses so far given had been interesting yet a little prosy. It remained for the director of the Y. M. C. A., William C. Montignani, to liven up the spirits of the auditors with some excellent jokes and lively singing. In a half hour Mr. Montignani completely removed the solemnity from the occasion with his clever entertainment. The supper furnished was most creditable to the ladies who supplied it.

Visits to Surrounding Points of Interest

On Thursday the institute started, at 7 a.m., by street car, for Frostburg. Some of the members visited No. 1 and some No. 12 mine of the Consolidation Coal Co. The latter is the old Borden shaft. Some of the timber in these workings has been in place about 34 years, during 29 years of which it has been under water. Wherever it rose and receded in the shaft, the timber had rotted entirely away.

The old hoist, built by G. W. Snyder, of Pottsville, Penn., in 1872, is still in effective service and lowered the visitors in the mine. They walked from No. 12 underground to No. 3 mine, and inspected the Pittsburgh and Lower Sewickley (Lower Tyson) seams and returned to the surface by the pump shaft.

The afternoon was spent in automobile riding and in visiting local plants near Cumberland. The first inspected was that of the West Virginia Rail Co., where large railroad rails are rolled down to sizes ranging from 8 to 40 lb. per lineal yard.

Kind of Rails Rerolled

The rails purchased by a coal corporation are probably never tested; on the other hand, rarely is rail purchased by a railroad without test. Consequently, the product of the West Virginia Rail Co. is a tested rail. Of course, there are flaws even in such rail and the use of the steel in actual railroad use brings out these defects. If a rail has slivered or cracked, the rerolling process of the rail company makes its condition worse instead of better, and consequently all such rails are thrown out and sent to mills where they can be melted. The heat used by the company at Cumberland is enough for rolling but not for welding a break.

It is claimed by the company that the continued pounding of the railroad track makes the steel dense, and that its condition is further improved by the rolling in the mill, where it is reduced in weight per lineal yard from 60 to nearly 90 per cent. The rails brought into the mill are some of them bessemer, and some openhearth and a load ready for heating which stood on the track were old John Brown rails from Sheffield, England which are known never to have flaws and which were made by an undiscovered process. The material being thus mixed some of the rails must be of steel far superior to that out of which ordinary mine rail is made.

Process of Rerolling

All the rail is knicked and broken to the required lengths. All rail which is slivered, cracked or piped is cast out. The length cut off is a little more than enough to form a longer rail of the lighter weight desired. The short sections of rail thus obtained are placed one by one in a furnace, where they are heated by natural gas. When a new rail is put in at one end of the furnace, a ram is actuated which pushes the rails toward the other end and discharges a heated rail ready for the rollers.

The rail is passed through the rolls about 7 times and then is sorted carefully into first, seconds and rejects. If the rail being rerolled is badly defective, it will open out and refuse to pass through the rolls. Seconds are rails having a roughness on their edges. Otherwise they have no defects.

On the automobile trip to the country a heavy storm drenched the visitors, and most appropriately their entertainers, the chamber of commerce, took them and their soiled garments to Footers' Dye Works, which the institute members examined with much interest.

About 100 members attended the meeting. It may be stated that the institute attendance would have been larger and more representative had it not ben held at Cumberland, Md., but rather in the heart of the West Virginia field. However, Cumberland well merited such a visit, as the members from Maryland are quite numerous in the West Virginia Coal Mining Institute.

Another reason for a somewhat smaller attendance than usual was the engrossing labor trouble in the Kanawha coal fields, causing 12,000 men to lay down their tools. This materially reduced the number of members from Charleston, W. Va., and the vicinity. On an invitation of the chamber of commerce and as the result of a vote on a recommendation from the institute to the executive board, the winter session will be held at Huntingdon, W. Va.

A Novel Shaft Lining

Marcel Gillieaux of Liege, in the 1914 number of the *Annales des Mines de Belgique,* describes an interesting method of lining shafts with molded blocks of reinforced concrete. After reviewing the systems of shaft linings in wood, brick, cut stone, cement and metal, the author states that his system was the result of an effort to overcome the well known objections to which all these are open; and he claims complete success in the practical operation of his plans.

Figs. 1 and 2 show a vertical and a horizontal cross-

section of a shaft lining, borne by a strong, annular block of reinforced concrete, set just below the shaft opening, as shown at 4, an iron ring 5, distributing the weight of the lining over a large bearing surface. This collar or block of concrete is laid as soon as the shaft has been sunk far enough to permit it; and the shaft lining then proceeds, following the sinking of the shaft as closely as is practically possible. The lining is constructed of sectional blocks which hook into each other, see Fig. 1. In Fig. 3 a vertical section of the block is shown exhibiting the reinforcement and the goosenecks by which adjacent blocks interlock. The dimensions of Fig. 3 are

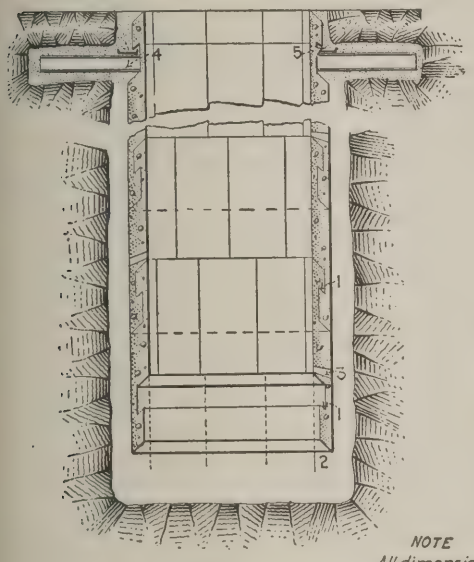


FIG. 1.



FIG. 2.

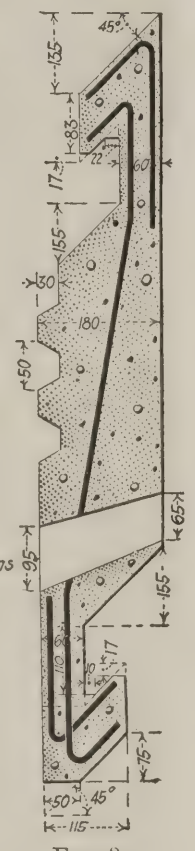


FIG. 3.

A SUSPENDED REINFORCED-CONCRETE SHAFT LINING

in millimeters, the millimeters representing, say, 0.04 of an inch. The opening at 3, Fig. 1, serves a double purpose; it allows the block, and consequently the lining, to be centered by iron bars passing through to the inner side of the shaft, and it serves as a channel to run cement between the shaft and the lining, when the lining has been extended to the required depth. In this way, the completed shaft has a solid lining of cement.

The other construction details, such as the form or mold for the blocks, special forms for locking or completing the cylindrical lining, cradle for handling the blocks, and so on, are treated at considerable length.

Gillieaux claims for his plan, that it can be constructed without the hazards to the workman which go with a lining built from the bottom upward; that it lessens the water in wet shafts; that the lining is homogeneous and equally strong at all points and that the shaft is completed and ready for operation with little loss of time, as the lining goes in while the shaft is being sunk.

The Reliability of Electric-Acoustic Signals in Mines

H. Kliver, of Bochum, Westphalia, Germany, writing in the Jan. 24 number of *Glückauf*, on the causes of failure of electric signals in the Dortmund, Westphalia, mining district, states that it has been noticed that, at times, the signaling system went wrong; either the signals were not received when sent, or the bells rang of themselves, without any action of the attendants. As such irregularities might lead to serious accidents, the management of the mines ordered an examination and report to be made, of every instance of failure within a certain period, with its cause, the means taken to remedy the trouble and the result. A frequent cause of trouble was found in water reaching the wires through defects in the insulation, leading to voltage loss, short circuits and weak currents.

In the summary for 1904, with few exceptions, all the troubles came from defects in the installation or the upkeep, such as defective cable joints, defects in the cable, bell not tight, poor cable insulation, loss of voltage and defective contacts. In a few instances, the signals were not transmitted correctly on account of being sent too hastily.

Defects Finally Restricted to Bell Mechanism

A comparison of this summary with that for 1913 shows that closer inspection had taken care of nearly all these troubles, which now seemed due to too rapid sending, almost exclusively. Nevertheless, the underlying cause for the bells not ringing was found to be in the striking mechanism not being sensitive enough to follow the magnetic action, even with a good contact. This led to the exclusive use of single-stroke (gong) bells.

Still the evil was not overcome entirely; occasionally the bells missed. Further study disclosed that, to insure perfect reliability, the hammers must be exactly equal in weight and length, and must hang in the same position, and the magnetic coils must be of equal strength. Moreover, it was observed that the mechanical and electrical resistances of the ringing mechanism changed, and that some bells rung more easily than others, after a little use, although both were equally sensitive in the beginning. This led to the adoption of a regulating device.

Mr. Kliver concludes that every reliable signal installation must meet these conditions:

(1) All the apparatus should be inclosed in water- and air-tight boxes; (2) the single-stroke bells (which, in Belgium, must consist of a solenoid attracting one end of the hammer lever, the other end striking the bell) should satisfy these requirements: (a) offer equal resistances mechanically and electrically; (b) be sensitive enough to strike at least four blows a minute; (c) be provided with adjusting devices to maintain a constant sensitiveness; (d) be so contrived that under no circumstances could the hammer strike without human assistance; (3) the transmitters should give a complete, perfect contact.

Panama Canal and the Coal Markets

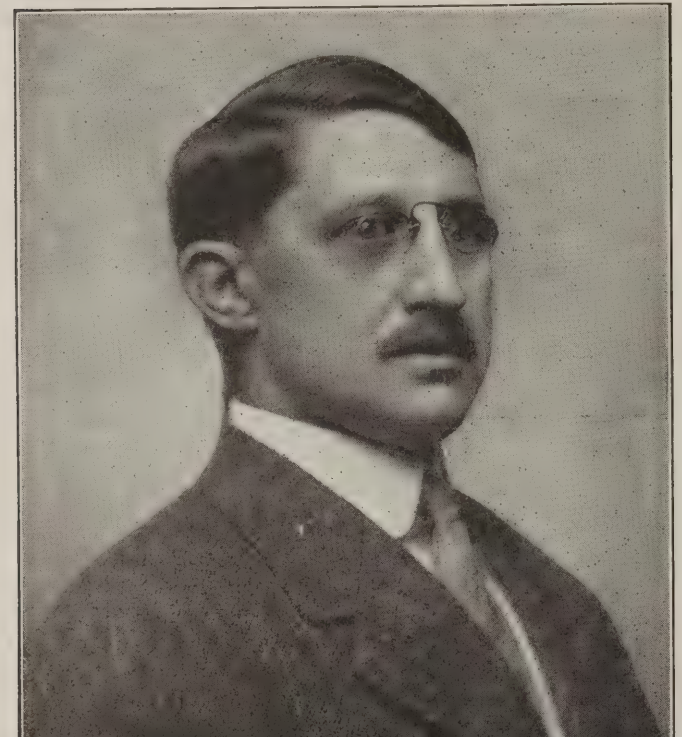
The second of Mr. Wadleigh's articles on "Effect of Panama Canal on World's Coal Markets" was crowded out of this issue, but will appear next week, June 20.

Who's Who in Coal Mining

Charles Enzian

Among the younger men in the coal industry who have advanced to a position of prominence through strict application to work in their chosen field, is Charles Enzian, mining engineer of the U. S. Bureau of Mines. He is in charge of mine accidents and mining methods investigations in the anthracite region.

Mr. Enzian was born at Weissport, Penn., in October, 1877. His early education was obtained in the public schools of Pennsylvania, which preliminary training was



Charles Enzian

followed by a four-year regular course in Lehigh University, where he was given the degree C. E. in 1901. The same institution honored Mr. Enzian with an M. S. degree in 1913.

Charles Enzian was particularly fortunate in obtaining considerable practical experience in engineering prior to his graduation from Lehigh. From April, 1894 to February, 1897, he was assistant to the county engineer of Carbon County, Penn. The work here consisted principally of surveying, municipal and county engineering.

During the summers of 1898 and 1899, he was construction engineer, working on plant extension for the Atlas Portland Cement Co., Northampton, Penn. During the summer of 1900, he was superintendent of construction, building a 2000-barrel cement plant for the Alpha Portland Cement Co., Alpha, N. J.

Immediately following his graduation from college in June, 1901, he accepted a position as engineer and superintendent for the Lehigh Coal & Navigation Co., and the Allen-Crane Water Co., at Catasauqua, Penn. Most of his time while serving in this position was taken up with explorations, water-storage supply and extension of distribution service lines.

In April, 1902, Mr. Enzian accepted a position as transitman and district engineer in charge of surveys at several collieries of the Lehigh Valley Coal Co., Wilkes-Barre, Penn. In this work, he also secured valuable experience in breaker construction, being employed for a time as resident engineer in charge of construction at one of the newer breakers of the "Valley" Co.

In November, 1905, Mr. Enzian was advanced to the position of division engineer, in charge of the Wyoming division of the Lehigh Valley Coal Co. In carrying on this work he had a corps of 25 assistants, and was responsible for surveys, maps, reports, developments, improvements, etc. While in this position, he also made a number of company examinations and valuations. He continued to serve the Lehigh Valley Coal Co. as engineer, in charge of its most important division, for five years, only deciding to leave them for the broader experience he hoped to obtain in the employ of the Mining Bureau.

Mr. Enzian has always been a diligent student of coal-mining problems and matters generally concerning his chosen profession. He is prominent in many mining and engineering societies, being a member of the American Society of Civil Engineers, the American Institute of Mining Enginers, The Engineers' Society of Northeastern Pennsylvania, National Geographic Society, Wyoming Historical & Geological Society, Wilkes-Barre, Nanticoke, Pittston, Scranton and Hazleton District Mining Institutes, Coal & Coke Committee, American Institute of Mining Engineers, Franklin Club, Wilkes-Barre, Penn., Hazleton Club, Hazleton, Penn., and Home Club, Washington, D. C. He is also secretary of the recently organized Anthracite Section of the American Institute of Mining Engineers.

In a literary way, Mr. Enzian has done creditable work. He is the author of the U. S. Bureau of Mines, Bulletin No. 60, Hydraulic Mine Filling in the Pennsylvania Anthracite Fields. He has contributed frequently to Coal Age and other technical journals and was collaborator on the Pennsylvania State Anthracite Mine Cave Commission Report of 1913. He is now serving as a member of the Pennsylvania State Anthracite Mine Cave Commission, which body was created to suggest a satisfactory solution of the serious problem of supporting the surface buildings over mines in the anthracite field.

But few of the younger men in the hard-coal regions are as well informed on the art of mining anthracite as Mr. Enzian, and the Bureau of Mines is fortunate in having availed themselves of his experience and service.

Editorials

The Kanawha Dispute

In the Kanawha district a peculiar situation exists. The operators have conceded everything the miners demanded except the check-off—everything in the union's program but the one illegal item. That demand most of the operators refuse to grant. Those who have submitted have been coerced by a boycott, as illegal as any of which the Standard Oil Co. has been guilty.

But this situation is not strange. What is peculiar is that the Department of Labor seriously is about to debate the difference between operators and miners, to decide in fact if the Sherman Anti-Trust law should or should not be obeyed, whether the companies should be, not only permitted, but almost compelled by one government bureau to violate the laws of the National Government and affront the Department of Justice.

We have never, be it understood, been violently opposed to the check-off. It was, we felt, a violation of the law, but we thought it was natural that the companies, hobbled by the union scales and conditions, should wish others to be similarly crippled and make the going equally hard for all. In short the illegality of the check-off appealed to our intellectual rather than our moral sense.

And so long as the check-off resulted only in agitation, in the laying off of the plants of the nonunion companies, no one objected strongly to its existence except those who suffered from the continued discontent the union fostered among their men.

Perhaps these outstanding opponents of unionism did not pay equal wages with other regions. Perhaps their coal was not more easy to dig or more readily loaded or less free from slate, and, therefore, should not be worked at a lower scale. Perhaps if conditions were exceptionally favorable, the differences in the labor involved had been excessively evaluated in writing the scales. These uncertainties furnished an excuse for collecting subsidies to upset the orderly working of neighboring mines.

So the agitation might be justified after all, if not by the letter of the law, at least by the spirit of equity. Beside the check-off never was an invention of the operator, nor did he ever favor it, despite all that has been recently said to that effect. It was forced upon him, but his resistance was never so strong as it would have been had he not recognized that it had a promise for him of a balancing of conditions between his own and other fields. Of course, the unionizing of his neighbor's collieries rarely helped him in the end as much as he expected, for the differentials existing at the time when the organization took charge were always recognized by the union and will be so acknowledged to the end of time.

But there is now a strong feeling against the check-off; now that it is realized that it is not a mere agitation but a war fund. It does not merely waste the money of the miners; it results in bloodshed. It is no longer a trifling with law, but an offense against morals: an unholy thing.

It is this subsidy to anarchy which the Kanawha operators are asked to provide, and the Department of Labor, by its board of conciliation, is to consider. We do not understand where there is room for consideration. Are the laws of this country to be submitted to a conciliation committee of three appointed by one man, the Secretary of Labor, who himself is appointed by the President? Where do we, the people, appear? Where are our legislative rights?

Strange things are happening, but stranger, indeed, will be the result if the board of conciliation demands that the operators collect from unwilling workmen a fund to promote warfare in Colorado and West Virginia, and a fund which tends to make the industry despicable from the Atlantic to the Pacific.

West Virginia Mine Outputs

Efficiency and conservation have received an immense amount of consideration recently, and West Virginia easily leads in the conservation of coal resources. It would be hard, however, to award any state the palm for efficiency.

We believe, however, that by concentrating efforts on these desirable factors in production, there has been a decline in the interest in large outputs in some parts of the country, and West Virginia is a conspicuous example of a state which produces large quantities of coal only by the undesirable method of operating a great number of small mines. In 1894 there was a single mine, Big Soldier, near Reynoldsville, Penn., which daily produced about 4000 tons. It is strange that today there are whole states which cannot show any such production passing over one tipple. Pennsylvania is perhaps the leading state in obtaining such results.

The trouble is largely psychological and not the fault of equipment or lack of knowledge. If the belief is present of the possibility of running a large tonnage, the hope of accomplishment spurs the managers on, and if the mine is properly equipped, the tonnage desired can usually be obtained. Let us quote the leading tonnages from West Virginia in 1912:

LEADING WEST VIRGINIA TONNAGES, 1912

Company	Mine	Tonnage
Virginia & Pittsburgh Coal & Coke Co.	Kingmont	590,252
United States Coal & Oil Co.	Island Creek No. 1	479,631
Jamison Coal & Coke Co.	Jamison No. 8	476,470
Federal Coal & Coke Co.	Federal No. 1	451,032
Houston Coal & Coke Co.	Houston Nos. 1-2	443,221
United States Coal & Coke Co.	United States No. 9	435,275
Gulf Smokeless Coal Co.	Tams Nos. 1-2-3	401,281

It will be noted that many of the largest coal companies are excluded from this list, not one of their mines reaching the required output of 400,000 tons per annum. Yet many of these companies mine coal by drift and could have a large tonnage if they were really so disposed. Conditions are quite favorable for large development and, in fact, when we look at some of the mines, we cannot avoid the conclusion that when they were constructed big tonnages were expected from them.

But in trapper boy and manager, the doubt in the possibility of achievement is implanted. They all feel it is hard to produce more than a few hundred tons per day. We trust that the figures we have obtained of the Pennsylvania and Illinois tonnages, which we are about to quote, will awaken in West Virginia a desire to make the present plants more efficient and to lay its dependence on the mines opened and not in adding new mines where none are needed.

In Pennsylvania about 2.44 times as much bituminous coal is mined as in West Virginia. Yet, whereas in the latter state there were seven plants mining over 400,000 tons per year in 1912, in the northern state there were in that same year 103 tipples having over that production. Vesta No. 4 alone produced 1,555,420 tons and Iselin tipple dumped from mines 1, 2, 3 and 4, 1,776,410 tons, and the whole state had 23 bituminous-coal tipples producing over 590,252 tons, the largest output of any tipple in West Virginia.

In Illinois, most of the mines are operated by shafts and consequently the tonnage is restricted by that fact. The state produced in 1912 about 10 per cent. less coal than West Virginia. Yet in that year 25 tipples in Illinois each produced over 400,000 tons. That is, there were over three times as many of these larger producers as in West Virginia. And in addition it may be said, that there were five plants each producing more coal than any single plant in that state.

Rambling Mines

In late years there has been a commendable tendency to reduce the area of coal workings opened and to endeavor to get a large tonnage from a small block of coal operated energetically. This does not involve the use of small pillars, because a larger tonnage in a given area can be obtained with large pillars completely extracted than from the same area with small pillars which have to be left undrawn. In fact, large pillars extracted by a retreating longwall system will give under proper management a maximum intensity of operation.

Such concentration of effort results in better supervision with consequent greater safety in operation, better coal product, more certain withdrawal of props, pipes and rail and more equal mining conditions throughout the mine relative to coal thickness. It saves the purchase of much pipe, rail and bonds, and decreases the amount of ventilating current needed. As few headings have to be maintained, steel cross-bars are not prohibitively expensive and if wood is used the spores generated in a labyrinth of old rooms do not impregnate the new timber.

Congestion of traffic has its difficulties also, but they can be met and as the area to be controlled is smaller, the needs of the situation can be better provided than in a mine with workings spread over a larger area. It does not pay to draw coal from a half dozen small distant sources to one common breaker or tipple. Better is it to concentrate on one particular section of the field, exhaust it and move on to another. By the time the first place is worked out, the breaker or tipple may be entirely out of date and the tearing down will be a source of profit.

It has been customary in the past whenever more tonnage was needed to put in a new opening, whereas intensification of activity in one established plant would be far more profitable. The desire to build a brand new tipple, to escape the mistakes of another superintendent, to do something spectacular is too strong among mining men. The effort and money spent in the new outfit would often have more effect if expended in giving support to the plant already in being.

The coal we have not worked, the facilities we have never tested urge us to new locations and entirely new projects. But the old mine, if it cannot be abandoned, may as well be rejuvenated as allowed to continue its existence as an unhappy second to a brand new plant.

Governor Cox Now Favors Ohio Operators

Governor James M. Cox arranged with operators and miners to leave the settlement of the Ohio strike to a committee, to be appointed following the adjournment of the joint convention in Columbus last Friday. The governor is now said to be out of harmony with the miners on the mine-run law. He has declared his allegiance to Ohio operators in their fight against the mine-run wage contract and advance asked by the miners, and assured the operators that he will support them in obtaining a contract as fair as the wage agreement in Pennsylvania.

Attorney-General Hogan has rendered an opinion that a contract calling for payment of miners on the basis of 99½c. for all coal passing over an inch and a quarter screen and 2c. a ton for the fine coal, is legal and within the meaning of the screen-coal law. Governor Cox has put it up to the miners to either accept this offer or shoulder the blame of prolonging a disastrous strike. He calls attention to the fact that they agreed to make the same contract with Ohio as that made with western Pennsylvania operators and that they would also enforce the mine-run provision on all if the law was passed in Ohio. The governor feels he has been tricked and is now out to repair the wrong that has been done to the Ohio operators.

A settlement is expected to be made within the next ten days and Ohio operators believe that work will be resumed by June 20 at the very latest.

Hazards of Coal Mining

Under this head the *Review of Reviews* says, "The coal miner's life at its best is a hazardous one; at its worst, conditions are so hard that men willingly take the chances of war, as they have done in Colorado, in the hope of bettering their lot."

To this, we might append a corollary equally well reasoned. The industry of farming in 1794 proved so dangerous to the Pennsylvania frontiersmen that they left the pursuit of agriculture to bask in the lap of Mars, accounting it safer to face the federal troops than to follow a plow, the point of which might at any time embed itself in a root and injure the husbandman. Agriculture, like mining, is only menacing at times, and the Whiskey Insurrection over, the brave farmers returned to the plow and its dangers.

The July 4 issue of COAL AGE will be devoted entirely to coke. All our readers are invited to contribute articles dealing with some phase of coke manufacture. Manuscripts should be in our hands by June 24, or sooner.

The Labor Situation

Progress has been made recently in the signing of several mine scales. On June 4, the representatives of the coal operators and those of the United Mine Workers of America agreed tentatively on a scale to be paid in the Pittsburgh district No. 5 for two years ending Mar. 31, 1916.

The only wage-scale changes have been advances to outside laborers. Dumpers will get $2.30 per day, rammen $2.48, pushers $2.08, trimmers $2.25 and car cleaners $2. The wages and conditions, under which blacksmiths, carpenters and drivermen work, are unchanged.

Firemen will hereafter only work eight hours a day, but at the same wages as now paid. Monthly men like teamsters, electricians, stable bosses and engineers are not considered as coming under the new scale.

ELECTRIC-LAMP SCHEDULE

Where lamps now in use are exchanged for the improved electric cap lamp, the miner will be debited 3c. per day. Where open lights are used and the electric lamp is substituted voluntarily, the same charge of 3c. per day is to be made. Safety lamps are to be furnished free of charge when required by the mining law.

This scale has to be presented to a special convention of miners which held its opening session on June 4. The operators' representatives were George Schluederberg, Jesse Sanford, John H. Jones, John Donaldson, William Henderson, William A. Luce and Samuel A. Taylor.

The miners were represented by Van Bittner, president of district No. 5; Robert Wood, a secretary of the central organization; James Flood, Oakdale, Penn.; James Charleton, Fairhaven, Penn.; William Hargest, Monongahela, Penn.; John O. O'Leary, Roscoe, Penn.; Sidney Davis, Amyville, Penn., and William Tears, Grove City, Penn.

THE KANAWHA STRIKE

The miners of the Charleston district of West Virginia known as No. 17 struck June 1 as soon as the contract with the operators expired. The next day a settlement was secured with some of the operators and 4000 men were enabled to go back to work. It is said that the concessions made were obtained by notifying these operators that their large collateral interest would be boycotted if they did not concede what the union demanded. Up to that time these particular companies had been determined not to concede the matter at issue.

The companies thus making concession were the Paint Creek Collieries Co. with six mines, Mucklow, Wacomah, Banner, Detroit, Greenbrier and Hickory Camp; the Imperial Colliery Co., with three mines at Burnwell, the Standard Splint & Gas Coal Co., with one mine named Standard, the Christian Coal Co. with a mine at Mahan and the National Bituminous Coal & Coke Co., with two mines at Eskdale on Cabin Creek. The Briar Creek and Coal River mines of the Paint Creek Collieries Co. are also included in the arrangement.

THE OPERATORS REFUSE THE CHECK-OFF

There is a possibility that now these important interests have made concession the others will be forced into it. As the contract involves the check-off, the operators forming the Kanawha Coal Operators Association, who will not make the concessions, have written to the President calling his attention to the provisions which are in their opinion a violation of the Sherman law.

In reply Thomas Haggerty, member of the International Board and Thomas Cairns, president of District No. 7 declared that the money collected would not be sent to international headquarters at Indianapolis, but would be used locally. These men declare that the operators in union districts are pleased to continue relations with the U. M. W. of A. or otherwise why do they do business with them year after year. The answer is very plain, the operators have been intimidated by the methods adopted in West Virginia, Colorado and elsewhere and have thought open war less desirable than submission. They are not pleased with the relations existing between the union and themselves. It is a striking piece of irony to ask the operator to admit that he enjoys the relations forced on him by the union.

THE CONCILIATION BOARD

Under Section 8 of the law creating the Department of Labor, Secretary Wilson has appointed a board of conciliation including Charles W. Mills, of Philadelphia, Patrick Gilday, president of United Mine Workers, district No. 2 of Morrisdale Mines, Penn., and O. L. Faulkner, of Cleveland, Ohio. The latter is an employee of the Department of Labor.

The Kanawha Coal Operators Association in a large advertisement in the Charleston "Gazette," June 2, says:

To our employees: Below you will find a copy of the last and final proposition made by the operators at the joint conference which adjourned sine die Thursday, May 28, the representatives of the unions refusing to accept it unless we agreed to the check-off which we declined to do.

A revision of the rules having been agreed to, we now propose in the interest of peace and harmony to agree to your demand for a renewal of the 1912-14 scale of wages for a term of three years. The only other point at issue between us, the check-off, we cannot agree to.

In short, the officers of the United Mine Workers of America propose to call a strike and throw about 12,000 miners out of employment, resulting in a loss of some $35,000 to $40,000 a day in wages, suffering and hardship for some 15,000 or 20,000 of their wives and children and paralyzing all business enterprises in Kanawha Valley, for the sole purpose, and no other, of forcing the coal operator to take from each of his employees 50c. or $1 a month or more and forward it to the officers of the organization at Indianapolis.

Coal Mining Institute of America

The summer session of this institute will be held in the Eagle Hall, at Monongahela, Penn., the town where the institute was organized in 1887. Two days will be taken, Tuesday and Wednesday, the 16th and 17th of June, respectively.

L. C. Isler, mayor of Monongahela, will deliver the address of welcome at 10 a.m., on Tuesday, and S. A. Taylor will then deliver his illustrated address on "The Advancement in Bituminous Coal Mining during the Last Forty Years." In the afternoon a discussion on mine timber will take place. William Lauder will discuss methods of timbering and quality of timber, William Seddon, Brownsville, Penn., the method of timbering with reference to overlying strata and geological formation, and H. I. Smith, who is assistant mining engineer of the U. S. Bureau of Mines, the possible substitutes for mine posts. The evening session is in the hands of the local committee, Henry Loutitt, Alexander McCanch, William Bird, H. T. Booker and W. A. Luce.

The second day session opens at 9 a.m., with a paper on "Accidents Caused by Machine Mining as against Pick Mining," by A. P. Cameron, of Irwin, Penn. This will be followed by the question box conducted by W. E. Fohl. In the afternoon "Practical Results from Efficiency Methods in Mining" will be discussed.

MORE TIME FOR DISCUSSION THAN FOR READING OF PAPERS

It will be seen that a meager program is provided. This is the result of a careful consideration of the best plan to be adopted. It has always been found that the Coal Mining Institute of America meetings have elicited most animated and interesting discussions, which are of as much value as set papers. It has usually been necessary to limit the discussion because of lack of time. It is possible that the shortness of the program will make possible a discussion of more than usual completeness and interest. It is impossible to make a meeting a success where one paper after another is read in a tedious succession and where an enforced *clôture* deadens the personal interest.

Kentucky Mine Owners

Following are the officers and board of directors of the Kentucky Mine Owners Association, whose term of office expires April 1, 1916.

Board of Directors: Frank D. Rash, Earlington; Percy D. Berry, Providence; C. W. Taylor, Greenville; F. M. Sackett, Louisville; K. U. Meguire, Louisville; White L. Moss, Pineville; H. Laviers, Paintsville; J. W. M. Stewart, Ashland; Hywel Davies, Lexington; all of Kentucky, and George T. Watson, Fairmount, W. Va.

Officers: Frank D. Rash, president; Geo. T. Watson and White L. Moss, vice-presidents and W. H. Cunningham, Ashland, Ky., secretary and treasurer.

Sociological Department

The Illinois Miners' and Mechanics' Institutes

By E. C. Lee*

For several years, mining men in Illinois have tried to induce the Department of Mining Engineering of the University of Illinois to establish schools in the mining centers, for the benefit of men who were unable to attend the regular classes of the University. Plans were discussed for some time, but funds were lacking for this form of university extension work. In 1911 the State Legislature passed a bill establishing the Illinois Miners' and Mechanics' Institutes, and in 1913 an appropriation of $15,000 per annum was made to carry out the work.

The purpose of these organizations as given in the Act is "to prevent accidents in mines and other industrial plants and to conserve the resources of the state," and any means may be employed "to promote the technical efficiency of all persons working in and about the mines and other industrial plants and to assist them to better overcome the increasing difficulties of mining and other industrial employments."

The Act of 1911 put the control of the Institutes in the trustees of the University, and they were by them placed under the general supervision of the Department of Mining Engineering of the University of Illinois, of which H. H. Stock is the head. The work is in charge of a director, and R. Y. Williams, late of the United States Bureau of Mines, was selected for this position, with headquarters at Urbana.

*Mining engineer and instructor, Illinois Miners' and Mechanics' Institutes.

Training Is for Positions Which Must Be Filled by Examination

Three courses have been adopted for carrying on the work: (1) A two-year course of systematic instruction at mining centers; (2) A short course at the University and (3) Unit courses in mining towns. The two-year course at the mining centers is so arranged that a man who can give two nights a week for two years can complete the entire course. The subjects he studies are designed to cover all practical details required in the examination by the State Mining Board, from whom a certificate must be received before a man can hold a position as state inspector of mines, mine manager, mine inspector or hoisting engineer.



Harrisburg School of the Illinois Miners' and Mechanics' Institute

Schools for this two-year course have been opened in Belleville and Collinsville, under W. L. Morgan, ex-state inspector of mines; and in Harrisburg and Herrin under E. C. Lee, mining engineer. The high schools in these cities are coöperating with the institutes, furnishing room, light, heat and janitor service. In addition to this a member of the high-school faculty acts as an assistant instructor, making any physical and chemical demonstrations necessary to illustrate the points brought out in the lecture by the instructor.

The physical and chemical laboratories of the high schools are at the service of the Institutes, and the apparatus in these laboratories is supplemented by apparatus kept in the office at Urbana, subject to the call of the instructors. Stereopticon work is used largely in addition to the physical and chemical demonstrations. In the study of safety lamps, for instance, not only is the lamp in question shown to the class, but assembled ready

for use and taken apart so as to show the different parts, and sectional views of the lamps are shown on the screen at the same time.

Subjects Taught and Time Devoted to Them

In the two-year course, the subjects are arranged in groups, 8 weeks or 16 nights being allowed for each group. The list of subjects and the time devoted to each are as follows:

PROSPECTUS OF STUDIES

Group	Course	Subject	Sessions
A	1	Methods of mining	10
	2	Timbering	5
B	3	Ventilation	8
	4	Mine gases and safety lamps.	5
	5	Special underground rooms..	2
C	6	Geology	5
	7	Surveying	10
D	8	Coal, a fuel	5
	9	Surface plant	5
	10	Steam	5
E	11	Hoisting	7
	12	Haulage	8
F	13	Fire protection	5
	14	Electricity	10
G	15	Drainage	6
	16	Explosives	9
		Review	7
		Total	112

Each subject is considered with reference to safety, efficiency, conservation and the state mining law; and in each subject the points covered are mining practices, mathematics, sciences and English, with sketches illustrating the apparatus used.

The courses are not necessarily studied in the order given in the schedule, the men being allowed to choose, by a majority vote, the next subject to be covered. The only restriction made is that each group must be taken up before the work in any one group is covered for the second time. Men may enroll for any course desired, receiving credit for the courses completed. A copy of the enrollment card is shown, the front to be filled in by the student, and the back for the records of the instructor.

ILLINOIS MINERS' & MECHANICS' INSTITUTES

School _____ Date _____

Name _____ Age _____ Married _____

Occupation _____ Company _____

Previous education _____

Certificates received _____ Desired _____

Remarks _____

FRONT OF CARD

Group Study	Attendance	Grade	Remarks
A			
B			
C			
D			
E			
F			
G			

BACK OF CARD

Will Try and Reach Foreigners

Recognizing the fact that many of the miners are of foreign birth, and unfamiliar with the English language, it is planned to establish classes for the men speaking a foreign language, to be taught by a man familiar with their own tongue. In these classes, if possible, a mining man will be selected as instructor, so that the work in English, mathematics and mining may go on at the same time.

The same work is covered in the short course at the University as is taken up in the two-year course in the field, 6 weeks' time being spent in the work. In this course, 4 hours each morning are spent in lectures and discussions conducted by the teaching staff of the University and of the institutes. During 3 hours each afternoon, courses are given in the mining and safety-lamp laboratories, in surveying on the campus, in drawing, and in rescue and first-aid work at the University mine-rescue station. The schedule for the short course for this spring is as follows, men being allowed to enter for any group of subjects or for the entire course:

THE SHORT COURSE AT THE UNIVERSITY OF ILLINOIS

Dates	Subjects for Discussion* Morning Sessions 8 a.m. to 12, Noon	Laboratory and Field Work Afternoon Sessions 2-5 p.m.
April 6-11	Geology Methods of mining Timbering	First aid training Drawing
April 13-18	Coal, a fuel Surface plant Steam	First aid training Drawing
April 20-25	Hoisting Haulage Fire protection	Mine rescue chamber Mining laboratory
April 27-May 2	Ventilation Surveying Special underground rooms	Mine rescue chamber Mining laboratory
May 4-9	Electricity Mine gases and safety lamps Surveying	Surveying on the campus Safety lamp laboratory
May 11-16	Electricity Explosives Drainage	Surveying on the campus Safety lamp laboratory

*For details of the topics covered under each subject, see schedule for the two-year course.

The Unit Course

A unit course is the term applied to one where a single subject is taught at a time, and where a considerable interval is allowed to lapse before another unit is taken up. In the conduct of these unit courses, an instructor is placed in a district where eight towns will arrange to furnish classes of fifteen or more men. Once in every three months the instructor will visit each town in the circuit and give a two-week unit course, which will consist of two hours' work on four evenings each week.

In the conduct of the different courses, the Institutes will coöperate with the State Mining Board and inspectors, the Illinois Mine Rescue Commission, Miners' Locals, the United States Bureau of Mines, the public schools, and with first-aid and other local organizations. It is planned later, when funds are available, to offer correspondence courses for men who cannot attend the regular classes, to print the lectures which are given in the two-year course, and make them the basis on which the correspondence course will be treated.

Firedamp Ignited by Sparks from an Electric Bell

In South Wales a fatal accident has been traced to an ignition of firedamp by sparks from an electric bell in use for signaling purposes. The electric bell was an ordinary one of the trembler pattern worked by an induction coil and a battery of eight Leclanche cells. Tested after the accident, the battery gave 11½ volts. It was proved experimentally that sparks from the bell, when supplied with current from the same battery, would ignite an explosive mixture of coal gas and air, and this latter was subsequently fired by sparks caused by rubbing a file across two wires connected to a pair of cells, giving only 4 volts pressure.

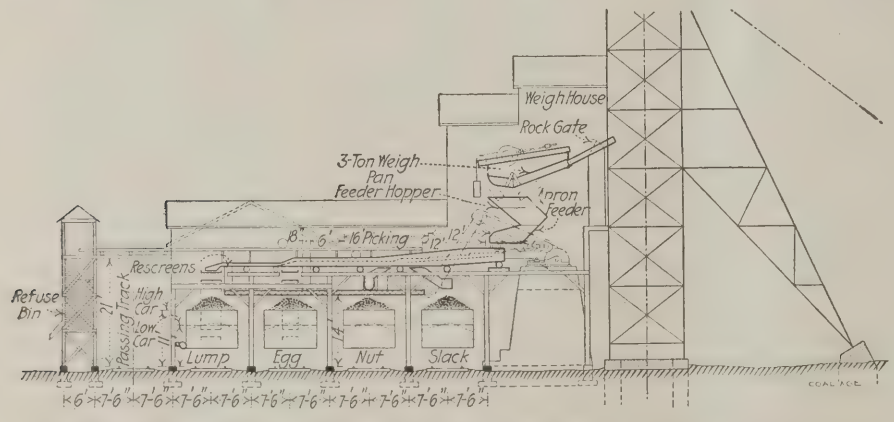
Discussion By Readers

Checking System for Miners' Coal

Letter No. 1—We were much interested in reading the excellent letter by Erskine Ramsay, of Birmingham, Ala., COAL AGE, May 23, p. 862, entitled "A Checking System for Coal Loaded by Miners," and since you have asked for views along this line, I send you herewith a sketch and description of a plan we have formulated for accomplishing very much the same purpose.

The accompanying illustration shows the conventional headframe and weigh-hopper, arranged for self-dumping cages. This design was adopted to meet the requirements stated by Mr. Ramsay, since it was necessary, for various reasons, to determine the exact amount of impurities that may be loaded by a miner, and the following description will explain the way in which we met this condition.

The self-dumping cage, with its weigh-hopper presents no new features. The weigh-hopper is designed to discharge into a feeder-hopper, made large enough to have twice the capacity of a pit car. This feeder-hopper is closed at the bottom by means of a device that feeds the coal out of the hopper in a steady stream and would entirely empty the hopper if permitted to do so. From this hopper the coal is discharged onto a Marcus patent picking-table screen.



PROPOSED ARRANGEMENT OF CHUTES, SCREENS, PICKING TABLES AND WEIGH-HOPPERS TO CHECK MINERS' COAL

The illustration shows the location and size of the screen; which affords 16 ft. of picking space. The 12-ft. screen marked "nut" is provided with 1½-in. round holes, and this perforated plate permits all the small sizes below 1½ in. to pass through to the lower decks so that the 16-ft. picking table, which is unperforated, has upon it only such coal as is above 1½ in. in size. The pickings are thrown into a rock carrier, marked "B," which is a chute attached to the Marcus screen, and shaking with it. By this carrier, all the pickings are carried forward to the refuse bin shown in the illustration.

The capacities of the feeder and of the screen are such that the coal can be dumped and screened at a rate equal to the full capacity of the mine, and yet permit of a small interval on the screen, between consecutive dumps. This interval, though small, is perceptible. Under the outer end of the refuse trough *B* is a small weigh-hopper, arranged with a gate at the bottom which may be opened or closed by men standing at the picking table. The weighman and check weighman, instead of being in the weigh-house, as customary, stand on the screen floor near the picking table.

The operation is as follows: The coal is dumped, weighed, screened and picked, the weighman recording the weight in the usual manner and the picker simply throwing the rock into the rock conveyor, which carries it forward and dumps it through the weigh-hopper at the outer end, which is ordinarily open. But, whenever a car of coal appears to contain an unusual amount of dirt, the man in charge of the picking floor closes the gate in the rock weigh-hopper and watches the dial attached to this scale until all of the pickings from this car are in the scale hopper. He then instantly reports this weight of rock to the weighman who records it opposite the weight of the coal in the same car. Should conditions justify it, the exact amount of pickings could be determined and recorded for every car of coal dumped.

We recognize, however, that there is one thing this device will not do. It will not determine the amount of dirt there may be in the fine coal below the 1½ in., but it *will* absolutely locate the man who is loading dirty coal.

It should be stated that the weight of rock obtained in the rock-weighing process may be indicated by means of a dial, at the weighman's desk, so that, with the miner's check in his hand, he can record the weight of material in the pit car, and immediately thereafter the weight of material picked out.

JOHN V. SCHAEFER, Vice-Pres.,
Chicago, Ill. Roberts & Schaefer Co.

Letter No. 2—I have read with interest Mr. Ramsay's letter on a Checking System for Coal Loaded by Miners, COAL AGE, May 23, p. 862.

A few months ago, I replaced a docking system in use at the mines of the LaFollette Coal, Iron & Ry. Co., with the following system, which has resulted in an improvement of 100 per cent. in the cleanliness of the coal.

A mine foreman should visit every working place in the mine, at least once each day the mine is running, but to do so, in our mines, would be a physical impossibility, owing to the extent of the area mined. To insure a personal visit to each working place, therefore, assistant mine foremen are employed. With this addition, the mine foreman or one of his assistants is able to see each miner at least once every day.

On the tipple, a coal inspector was placed, whose duty is to inspect every mine car as it comes from the mine, which he does without stopping the car. He carries a small two-pronged rake or hoe, with which he digs into the car at different points. He sometimes varies his method by following each car to the dump and watching the coal as it is dumped onto the screens. The cars come to the tipple in trips of 15, with the miner's check number on the outside of each car.

When the inspector finds a dirty car he makes a note of the number of the car in a book, which he carries for that purpose. At the end of the day a list of the numbers of miners loading dirty coal is handed to the mine foreman, who visits these men the next morning, and judges for himself if it is possible for the miner to load clean coal where he is working. If this is not possible, he may change the miner to a place where it is possible to load clean coal. If, however, in the foreman's opinion, the miner can load clean coal from his working place, a heart-to-heart talk takes place. If the miner shows a disposition to do better and not to repeat the offense, he is given another trial. If, however, his subsequent loading proves he is careless or don't care, he is given an order for his money. In the last three months, not more than six miners have been discharged for loading dirty coal.

About 50 per cent. of our coal is made into coke, the balance being disposed of as domestic coal. A much better coke has been the result, and little or no complaint is now being registered against the domestic grades.

A reduction in accidents has also been noted, as much better inspection is obtained. A gain in tonnage has also resulted with a resulting reduction in the cost of production.

G. M. Shoemaker, Manager of Operations,
La Follette Coal, Iron & Ry. Co.
La Follette, Tenn.

Calculation of Coal-Washing Efficiencies

In a recent article on this subject, Coal Age, May 2, p. 723, G. R. Delamater has attempted to express, by formula, the efficiency of any coal-washing machine or plant, hoping by this means to furnish a standard of comparison of the results produced in the use of different machines for washing coal.

As far as the formulas are concerned, they give valuable indications of the work each machine is doing when the several data involved are considered separately and with due regard to the required market conditions. The attempt, however, to combine the data relating to the percentage of washed coal produced and ash content, by taking the arithmetical means of two different efficiencies and calling this the washing efficiency, is not clear. It is not apparent why these formulas should be combined at all; or why they should be combined by taking the arithmetical mean, rather than by multiplying the results together or by any other method that could be applied. What these combined results represent, it is difficult to say; and it would be interesting to know whether Mr. Delamater has any logical reason for taking the arithmetical mean, instead of the product of the two efficiencies already determined.

As a matter of fact, it would seem that the attempt to combine, in this manner, the efficiencies of two machines working under different conditions, is an impossible task. On the other hand, if a method could be evolved that would express the commercial efficiency of a coal-washing machine under particular conditions, and that would enable a comparison of the work performed by that machine with that performed by another machine operated under the same or other specified conditions, there can be no doubt but that such method would have more value than this will-o-the-wisp, which Mr. Delamater has here presented.

Commercial efficiency, in coal washing, will depend very largely on the market conditions and requirements. Suppose, for example, we have a coal whose standard percentage for washed coal is rated at 95 per cent., with an allowable ash content of 5 per cent.; and suppose this coal, treated in two jigs of different type, gives the following results:

Jig 1, washed coal, 85 per cent.; ash content, 5 per cent.
Jig 2, washed coal, 80 per cent.; ash content, 3 per cent.

From these figures it is desired to ascertain which type of machine should be used to wash this coal. In both machines, the percentage of washed coal is below the standard, and, while the percentage of ash is standard in jig No. 1, it is below the standard in jig No. 2. Therefore, the efficiency of jig No. 1 must be calculated by formula D (p. 727), as the results obtained correspond to the third condition. The efficiency for jig No. 2, however, must be calculated by formula E, as the results here obtained correspond to the fourth condition given by Mr. Delamater on p. 726. The efficiencies as calculated by these formulas are as follows:

$$\text{Jig No. 1,} \quad \textit{effcy.} = \frac{1 + 85/95}{2} \times 100 = 94.74\%$$

$$\text{Jig No. 2,} \quad \textit{effcy.} = \frac{3/5 + 80/90}{2} \times 100 = 72.10\%$$

Regardless of these results, it is quite clear, from a commercial point of view, that, unless there is any pecuniary advantage in obtaining an ash content lower than the standard, 5 per cent., jig No. 1 is the machine to use, since this produces the largest per cent. of washed coal. But, to illustrate, suppose that the market price of the washed coal is x dollars per ton of coal; and that there is a bonus of a dollars per ton, for each per cent. that the ash falls below the standard 5 per cent. Then, the relative values of the products of these two jigs are as follows:

Jig No. 1, $^{85}/_{95}\,x + (5 - 5)\,a = 0.8947\,x$
Jig No. 2, $^{80}/_{95}\,x + (5 - 3)\,a = 0.8721\,x + 2\,a$

Aside from the relative first cost, cost of upkeep and depreciation, the relative commercial efficiencies of these two jigs is determined by equating the above values. Thus,

$$0.8947\,x = 0.8721\,x + 2\,a$$

$$a = \frac{(0.8947 - 0.8721)\,x}{2} = 0.0113\,x$$

From the above, it is evident that if there is no bonus or $a = 0$, No. 1 jig is the most efficient commercially.

But, when there is a bonus granted for each decrease of 1 per cent. in ash, No. 2 jig will be commercially more efficient when the bonus (a) is greater than $0.0113\,x$; or, assuming the market price of washed coal (x) is $5, if a is greater than $0.0113 \times 5 = \$0.065$, or 6½c. per ton. This method of comparing the commercial efficiencies of

different machines was evolved after a study of Mr. Delamater's article. It is possible that numerous faults and fallacies may be pointed out by other readers of COAL AGE, but if it stimulates further thought on the subject, as Mr. Delamater's article has already done, it will serve a useful purpose.

J. B. DE HART.

Coleman, Alta., Canada.

The Air Factor in Mine Explosions

John Verner has favored us again, COAL AGE, May 16, p. 818, with another letter in which he attempts to further explain his idea of the "reverse impulse" assisting the propagation of a mine explosion. I fail to see that he has made himself any clearer than at previous times. Being desirous of obtaining a clear conception of Mr. Verner's meaning, I would ask him to kindly illustrate his ideas, if possible, by a few hand sketches or diagrams; and state if what he calls the "reverse influence" is the same as what is generally spoken of as "back suction." It is quite commonly assumed that the expressions, "back suction, "vacuum stage" and "back lash," in reference to an explosion, are synonymous terms. These all relate to a reaction that sets in immediately after the explosive wave has passed. If, then, what Mr. Verner styles "reverse influence" refers to a similar reaction following the explosion, I would ask, how could that affect, in any way, the original explosion. Mr. Verner adds:

> It may be properly assumed that the vastly more powerful air blast, traveling in opposition to the explosion flame, must be an important, if not the controlling factor, in propagating explosive combustion.

As no one will probably deny this statement, it follows that what Mr. Verner designates as the "controlling factor" is the air current traveling in its original direction, assuming the explosive wave advances against the intake air. This condition was shown in Experiment No. 13 of the Altofts series, by a resulting 4-lb. vacuum. Mr. Verner also refers to Experiment No. 21 of the same series, where an explosion occurred within an explosion, as shown by the published photographs at the time. He refers to this double explosion as an evidence of the "reverse influence," but does not say where this reverse took place; nor does he make clear on what ground he bases such a conclusion.

JAMES ASHWORTH, Mining Engineer.

Vacouver, B. C., Canada.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

SYMBOLS AND FORMULAS

Most of the rules of mine ventilation are expressed by means of formulas, which show at a glance the relation of the several factors to each other, and make possible many transformations and developments.

Symbols—As far as practicable, the same symbols are used throughout to designate the same factors; and these are, for the most part, those symbols commonly employed in ventilation, as being the initial letter of the word for which they stand. For example, p = pressure; v = velocity; q = quantity, etc. The following table gives the more important symbols used:

TABLE OF COMMON SYMBOLS, MINE VENTILATION

A = area of regulator,	*sq.ft.*	Q = total circulation of air,	*cu.ft.per min.*
a = area of airway,	*sq.ft.*	q = single current,	*cu.ft. per min.*
B = height of barometer,	*in.*	R = resistance of mine or airway,	*lb.*
C = Centigrade reading,	*deg.*	r = any ratio,	....
c = constant,	....	s = rubbing surface of airway,	*sq.ft.*
D = depth of shaft,	*ft.*	T = absolute or higher temperature,	*deg.*
d = diam. or side of airway,	*ft.*	t = lower temperature,	*deg.*
F = Fahrenheit reading,	*deg.*	U = total power on air,	*ft.-lb. per min.*
g = gravity,	*ft. per sec.*	u = power, single current,	*ft.-lb. per min*
H = horsepower on air,	33,000 *ft. lb.*	v = velocity of air,	*ft. per min.*
h = height of air column,	*ft.*	V = volume of air or gas,	*cu.ft.*
K = Efficiency of fan,	per cent.	W = total weight of body,	*lb.*
k = coefficient of friction	0.00000002	w = unit weight,	*lb. per cu.ft.*
l = length of airway,	*ft.*	X = potential of mine or airway,	....
n = number of revolutions,	*r.p.m.*	x = the unknown quantity whose value is sought	....
o = perimeter of airway,	*ft.*		
P = total pressure,	*lb.*	*w.g.* = water gage reading,	in.
p = unit pressure,	*lb. per sq.ft.*	*Sp.gr.* = specific gravity,	....

Small subscript letters and figures are frequently written immediately after any symbol to show its reference to a particular kind or thing. For example, q_1, q_2, q_3, etc., indicate the quantities of air passing in three or more airways; q_a, q_b, q_c, etc., indicate the quantities passing in Splits A, B, C, etc. In like manner, the potential values of different airways and splits are indicated by X_1, X_2, X_3, etc.; or X_a, X_b, X_c, etc., as the case may be.

In some cases, two or more subscript letters or figures are used after a single symbol to indicate its reference; as for example, the pressure potential for Split A is written X_{pa}, or the power potential X_{ua}. The general potential, in a split circulation, is written X_o; or X_{po} and X_{uo} to indicate the general pressure and power potentials, respectively.

It is often necessary to indicate the summation of a number of items of the same kind, for which purpose the character Σ is written before the symbol indicating the kind. For example, ΣX_{abc} indicates the sum of the potential values for the splits A, B and C, instead of writing $X_a + X_b + X_c$.

In a complex circulation, consisting of a main airway and two or more splits, it is often necessary to indicate the general split potential by X_∞ and the mine potential by X_0.

The Coal Age Pocket Book

Use of Formulas—A few formulas comparatively form the basis from which practically all the other formulas of mine ventilation are derived. These few basal formulas also show the true relation, one to the other, of the several factors of ventilation, such as pressure, velocity, quantity, power, rubbing surface and the sectional area of mine airways.

The understanding of these formulas makes it unnecessary to learn and remember a large number of rules of ventilation. A formula is written as an algebraic equation in which each factor is expressed by its proper symbol. The equation shows the equality of certain factors grouped in the form of an expression. For example, the formula

$$p a = k s v^2$$

shows the equality of the total ventilating pressure **pa** and the resistance of the airway when the rubbing surface is **s** and the velocity of the air current **v**.

How Factors Vary—It is evident, from the inspection of a formula, that:

1. Any factor in one member of the equation varies **directly** as any factor in the other member, provided all the other factors remain constant and none of the quantities expressed in the formula are connected by the signs plus (+) or minus (—).

2. Any factor in either member varies **inversely** as any other factor in the same member, provided and except as stated (1) above.

For example, the above formula shows that:

The total ventilating pressure (pa) for airways varies as the resistance (ksv^2) of the airway.

For any given airway, **a**, **s** and **k** being constant, the unit pressure (p) varies directly as the square of the velocity (v^2) of the air current.

For the same total pressure (pa), in an airway, **k** being constant, the square of the velocity (v^2) varies inversely as the rubbing surface (s). Or, in other words, the velocity (v) of the air current varies inversely as the square root of the rubbing surface ($\sqrt{s}$).

For the same velocity (v) of air and the same rubbing surface (s) in an airway, **k** being constant, the unit pressure (p) always varies inversely as the sectional area (a) of the airway.

Transposing the above formula for total pressure, the formula for unit pressure producing a given velocity in a given airway or mine is

$$p = \frac{k s v^2}{a}$$

An inspection of this formula shows that:

3. The other factors remaining constant and none of the quantities being connected by the signs plus (+) or minus (—), any factor in the denominator of a fractional term forming either member of the equation varies **directly** as any factor in the numerator of that faction; and inversely as any factor in the other number.

Inquiries of General Interest

An Oil-Well Problem

I am writing COAL AGE for a little information, in order to settle an argument that has arisen over the sinking of an oil well in this community. The sinkers claim that there is oil in this hole, but that it will not rise to the top because there is too much water in the hole. The well is 8 in. in diameter and 1300 ft. deep.

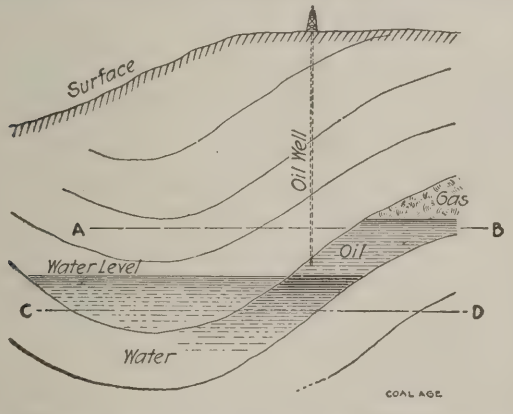
It is argued by some that if this hole was filled with water to the top and there was any oil in the hole, it would rise to the surface of the water. Others claim that the oil will not rise to the surface owing to the great pressure of the water in the hole, which they estimate as being 14 tons. Any information you can give that will throw light on the real condition existing in the hole will be greatly appreciated.

A SUBSCRIBER.

Gilmour, Ind.

It is a well known fact that oil will float on the surface of the water, because its density is less than that of water. This being a hole of large diameter, if there was oil in the hole, it would certainly rise to the surface of the water.

However, the presence of water standing in the hole points to the fact that the water level in these measures



IDEAL CROSS-SECTION OF OIL- AND WATER-BEARING MEASURES

has risen above the bottom of the hole. As shown in the accompanying sketch, suppose that the well has penetrated the productive measures at a point above the indicated water level. In this case, there is nothing to prevent the oil from entering and rising in the hole to a height only determined by the pressure in the measures.

This pressure is frequently so great that the oil is thrown out of the hole in a vertical stream that may reach a height of 50 ft. or more. Such wells are known as "spouting wells." In other cases, it is necessary to pump the oil from the hole into which it drains from the surrounding strata.

In time of a freshet or during a wet season, however, the water level may rise to the line *AB;* while, during a drought or dry season, it may fall to the line *CD.* As the water level rises, in this manner, the oil is forced to a higher level in the measures and is then unable to reach the hole. This produces the condition that is generally known in oil sections as "drowning out" the well. It is possible that this condition may exist, at the present time, in the hole mentioned.

Working Coal Seam with Heavy Parting

Kindly submit the following question to the readers of COAL AGE for discussion:

Would it be practicable or profitable to work a 5-ft. seam of coal that has a parting in the center varying from 6 to 18 in. in thickness? The material forming this parting is hard and shoots with the coal; it can, however, be easily drilled and mined with the pick. Both the roof and bottom of the seam are exceptionally good and a minimum amount of timbering is, therefore, required.

This deposit is located in the northwestern corner of Missouri, in close proximity to good markets, the quality of the coal being superior to that of 75 per cent. of the coal mined in Iowa. Following is a proximate analysis of the coal:

	Per Cent.
Moisture	4.86
Volatile combustible matter	39.48
Fixed carbon	51.12
Ash	4.54
Total	100.00

The coal contains 3.73 per cent. of sulphur, and its calorific value is 13,187 B.t.u.

The mining of this coal presents a proposition of two contiguous seams, each 2½ ft. in thickness, separated by a considerable parting of refuse material. The handling and disposition of this waste material will determine largely the cost of production. I shall much appreciate the suggestions of readers who have had experience in dealing with similar propositions.

FRED MORCK.

Warren, Penn.

This is an excellent question for discussion and should bring forth a number of practical suggestions in regard to the most economical method of mining to adopt. No doubt some will advise the longwall method of mining, as there is plenty of waste material for building the packs. Some, on the other hand, may prefer to drive wide openings and build the waste at the side of the roads, which has the advantage of avoiding the expense of yardage for entry driving, the same as in longwall.

It may be stated that the coal measures, in the section in which this mine is located, are generally favorable to longwall work; but this does not mean to imply necessarily that the longwall method of mining would prove the most economical method to adopt. The question of whether the mining should be done in the parting or in the floor is an important one. Let there be a free and practical discussion.

Examination Questions

Anthracite Mine Foremen's and Assistant Mine Foremen's Examination Held at Pottsville, Penn., May 25, 26, 1914

(*Continued from last issue*)

Ques. 8—Suppose a mine has two openings, one 60 ft. higher in elevation than the other, on the surface; the temperature of the air outside being 85 deg. and that inside of the mine 50 deg., would there be a current of air passing in the mine; and, if so, in what direction?

Ans.—In this case, much would depend on the depth of the two shafts and the inclination of the seam. The surface elevation at one shaft being 60 ft. above that at the other, suggests the possible formation of a cooler and therefore heavier air column in the shaft having the higher elevation at the surface, assuming that the shaft has a temperature equal to that of the mine (50 deg.), which would make this shaft the downcast. In case the shafts were not deep, this condition would probably prevail, to a greater or less extent, and create a permanent circulation of air in the mine.

In case the shafts were deep, however, or the seam had a considerable inclination, the warm outside air entering the downcast shaft would soon raise its temperature, with the result that there would be little or no perceptible current passing in the mine. What little air would circulate under these natural conditions would simply serve to equalize the temperature of the two air columns.

Ques. 9—When a fan is exhausting the air from a mine, how does it produce ventilation? State, also, how a forcing fan produces ventilation.

Ans.—The action of the fan is the same in either case, the system of ventilation depending simply upon the connection of the mine with the fan.

The action of a centrifugal fan is to create a depression at or near the center of the fan and a compression at the circumference. Under the pressure of the atmosphere, air enters the center of the fan and passes thence to the circumference, where it is discharged, owing to the centrifugal force created by the revolution of the air within the fan.

When the central opening of the fan is in connection with the fan drift, air is exhausted from the mine, and passing through the fan is discharged from its circumference into the chimney and thence into the atmosphere. When the fan is forcing air into the mine, the discharge from the circumference of the fan is conducted into the fan drift, the center of the fan being open to the entrance of the outside air.

In the exhaust system of ventilation, the atmospheric pressure acting on the downcast shaft or intake opening of the mine, forces the air through the mine against the depression in the fan drift due to the action of the fan. The mine airways, in this case, correspond to the suction pipe of a pump or a siphon.

Ques. 10—What are the provisions of the law regarding doors in mines?

Ans.—The anthracite mine law (Art. 10) requires (Sec. 9) all main doors to have an attendant to open and close the door for the passage of cars or men and prevent their standing open; (Sec. 11) all main doors to be so placed that one is always closed when the other is open, thereby preventing any break in the air current; and (Sec. 12) an emergency door provided at all main points and kept standing open so that it will not be destroyed by accident, but can be used at once in case the regular door is broken or destroyed by an accident. The framework of main doors (Sec. 13) must be substantially secured in stone or brick laid in mortar or cement, unless permission to the contrary is given by the inspector in writing.

Ques. 11—What material, in your judgment, should be kept on hand at fiery or gaseous mines, to meet emergencies that are likely to arise from explosions of firedamp?

Ans.—At such mines there should be provided a duplicate or emergency fan that could be at once placed in commission, in case the regular fan was disabled or in case a larger circulation of air should be required to clear the mine. There should always be kept on hand a plentiful stock of timbers of the required size, cap-pieces, brattice boards and canvas, nails and tools. There should be provided, also, a plentiful supply of approved safety lamps and these should be kept in condition ready for immediate use. There should also be a fully equipped rescue station, supplied with a reliable type of breathing apparatus, pulmotors, oxygen cylinders, etc., and a well trained rescue corps. The equipment of the rescue station should include either birds or mice that can be taken into the mine in small cages by the rescue party.

Ques. 12—What dangers are probable in a mine after an explosion of firedamp, and what precautions should be taken upon entering the mine?

Ans.—The chief danger is the presence of the afterdamp of the explosion. There may also exist dangerous quantities of explosive gas that may, at any moment, give rise to a second explosion of even greater violence than the first. There is danger, moreover, of heavy roof falls that renders the work of entering the mine extremely hazardous. Only experienced men should be allowed to undertake the work of rescue, and these must be equipped with the necessary breathing appliances to enable them to proceed with caution to examine, in turn, each section of the mine, in advance of restoring the full circulation of air in such sections. The purpose of this first investigation is to ascertain the condition of the air passages and workings, and to discover, if possible, any survivors of the explosion. In this work, only safety lamps or well protected electric lamps should be used. If fire is discovered in the workings, efforts should be made to extinguish it at once. The investigation should proceed in this manner, until every section of the mine has been explored. As the air current is restored in each section, other rescuers and workmen can enter to aid in the work.

Coal and Coke News

Washington, D. C.

In view of the early completion of the discussion on anti-trust legislation in the House of Representatives, that having been closed on Friday, June 5, a strong demand has arisen in the lower chamber for the adoption of a compulsory party programme designed for the adoption of the so called "Conservation bills" all of which have been before Congress in one form or another for a good while past. Included in this programme are the radium bill which provides for government monopolization and control of radium bearing ores, the Alaska coal land leasing bill, the general oil land leasing bill, and the water power and public land bill.

It is not yet certain how the effort to secure action on these bills at the current session will turn out, but up to date about 200 members have agreed to sign a petition to the Rules Committee asking for the preparation of a binding rule which shall insure the pressing forward of this general scheme of legislation.

Secretary Lane and Chairman Henry of the Rules Committee recently had a lengthy conference with President Wilson in regard to this whole matter and it is understood that the President expressed strong interest in the conservation measures although he did not undertake to commit himself to them as a necessary part of the administration scheme of legislation for the year. If the bills can be passed in the House before adjournment, it will be regarded by the advocates of the scheme as a decided victory in behalf of their ideas.

No Coal Freight Advance Is Expected

It is understood that the Interstate Commerce Commission is now definitely in position to hand down a decision in the 5 per cent. advance rate case within a comparatively short time and that in any event a decision may be expected before the end of June. Extreme secrecy has been observed by members with reference to the nature and scope of the report they intend to make. From inquiries that have been made, however, and from the general tone of affairs at the offices of the Commission, it is pretty generally understood that there is no intention of advancing the rate upon any class of coal.

Anthracite coal is already regarded as bearing altogether too high a freight rate while with reference to bituminous coal, it is felt that the operators have made out a case for their contention that if they were compelled to pay more for freight rates the mines in a good many of the fields could hardly continue doing business if they were to pay expenses.

Another factor which contributes strongly to the belief that the Commission will not saction any advance in freight rates is the circumstance that according to general opinion Mr. Brandeis, the Commission's counsel, has not succeeded in restraining the members from determining to make some advances. This practically implies as a corollary that concessions will be made to Mr. Brandeis along other lines and that some of the items in which he has been most earnest to prevent advances will be dealt with as he desired. One of the things in which he has been most interested is bituminous coal.

On June 8 representatives of Ohio bituminous coal operators filed application in the United States Supreme Court for an injunction against the enforcement of the Ohio State Anti-Screen law until its legality can be tested. The matter was presented by A. C. Dustin, who appeared as counsel for the operators of Cleveland. The matter was taken under advisement.

Appropriations for the Bureau of Mines

The Sundry Civil Appropriation Bill which has just passed the House of Representatives contains important appropriations for the Bureau of Mines, which are expected to be retained substantially unchanged by the Senate as follows:

For general expenses, including pay of the director and necessary assistants, clerks, and other employees in the office at Washington, D. C., and in the field, and every other expense requisite for and incident to the general work of the bureau in Washington, and in the field, to be expended under the direction of the Secretary of the Interior, $70,000.

For investigation as to the causes of mine explosions, methods of mining, especially in relation to the safety of miners, the appliances best adapted to prevent accidents, the possible improvement of conditions under which mining operations are carried on, the use of explosives and electricity, the prevention of accidents, and other inquiries and technologic investigations pertinent to the mining industry, $347,000;

For purchase of mine-rescue, first-aid and fire-fighting equipment and supplies for use in the operation of mine-rescue cars and stations, $30,000;

For purchase of steam and electric equipment for supplying light and power to the testing plant of the Bureau of Mines at Pittsburgh, Penn., $10,000.

For investigation of mineral fuels and unfinished mineral products belonging to or for the use of the United States, with a view to their most efficient mining, preparation, treatment and use, including personal services in the bureau at Washington, D. C., not in excess of the number and total compensation of those so employed during the fiscal year 1913, $135,000;

For inquiries and scientific and technologic investigations concerning the mining, preparation, treatment, and utilization of ores and other mineral substances, with a view to improving health conditions and increasing safety, efficiency, economic development, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; to inquire into the economic conditions affecting these industries: Provided, that no part thereof may be used for investigation in behalf of any private party, nor shall any part thereof be used for work authorized or required by law to be done by any other branch of the public service, $100,000.

For inquiries and investigations concerning the "mining," preparation, treatment, and utilization of petroleum and natural gas, with a view to economic development, and conserving resources through the prevention of waste; to inquire into the economic conditions affecting the industry, $25,000;

For one mine inspector for duty in Alaska, $3000;

For per diem, subject to such rules and regulations as the Secretary of the Interior may prescribe, in lieu of subsistence at a rate not exceeding $5 per day when absent on official business from his designated headquarters, and for actual necessary traveling expenses of said inspector, $2500;

For technical and scientific books and publications and books of reference, including payment in advance for subscriptions to publications, $1500;

For purchase or lease of the necessary land, where and under such conditions as the Secretary of the Interior may direct, for the headquarters of five mine rescue cars and for the construction of the necessary railway sidings on the same, $1000: Provided, that the Secretary of the Interior is authorized to accept any suitable land or lands that may be donated for said purpose;

In all, for the Bureau of Mines, $725,000.

Persons employed during the fiscal year 1915 in field work, outside of the District of Columbia, under the Bureau of Mines, may be detailed temporarily for service at Washington, D. C., for purposes only of consultation or in connection with the preparation of results of their field work; all persons so detailed shall be paid in addition to their regular compensation only their actual traveling expenses in going to and returning therefrom; and all details made hereunder, and the purposes of each, during the fiscal year shall be reported, in the annual estimates of appropriations, to the Sixty-fourth Congress at its first regular session.

HARRISBURG, PENN.

The final arguments in the Government suit against the Reading Co., the Philadelphia & Reading Coal & Iron Co., the Philadelphia & Reading Railway Co., endeavoring to dissolve the so called anthracite coal trust which is alleged by the Government to exist as the result of an illegal combination between these companies, were begun on June 3, in the United States District Court of Pennsylvania.

G. Carrol Todd, special assistant United States District Attorney, made the opening plea for the Government, contending that the Reading Co. is a combination in restraint of trade, due to the fact that it owns stock in both the Reading railway company and the Philadelphia & Reading Coal & Iron Co. The Government also contends that this stock is juggled regardlessly and that large sums of money are lent from one company to the other without interest.

Mr. Todd first gave a general outline of the history of the case and cited the former suit against the same defendants which resulted in the court order to dissolve the Temple Iron Co. In explaining the relationship between the Reading Co. and its affiliated companies he declared that the Reading Co., with the Central R.R. of New Jersey, the Lehigh & Wilkes-Barre Coal Co., and the Lehigh Coal & Navigation Co., controlled 63 per cent. of the unmined coal in the Schuylkill region and furnished 29 per cent. of the entire hard-coal output.

In speaking of the alleged combination he explained that such a method was not the natural and normal way for a

railroad to grow. "The natural and normal way for it to grow," said he, "is by acquiring connecting lines and not those in competition. In every state in the Union it is unlawful for a railroad to acquire competing lines. These combinations, however, cannot be effectually dissolved by a distribution of stock."

While discussing the financial relations existing between the old Reading R.R. and the present Reading Ry. with the Reading Coal & Iron Co., Mr. Todd said that the railroad had lent immense sums to the coal company. He said that at the time of reorganization the total indebtedness of the coal company to the old railroad was $68,000,000.

Immediately after the reorganization we have the preposterously absurd situation of the company transferring a debt of itself, to itself, through the Reading Co. Since the reorganization the Reading railway company has made additional advances to the coal company of $12,000,000. These loans are supposed to be secured by general mortgages, but the Reading Co. pays the interest on the bonds and the coal company has never made a payment on them. Thus, we have a total unsecured debt of about $80,000,000 carried on the books as an open account. A sum approximating $12,000,000 in interest has been remitted to the coal company by the railroad company. In view of these facts, is it any wonder that the Reading Co. owns most of the coal business in the Schuylkill region? It is apparent that they could if they so desired.

Jackson E. Reynolds, counsel for the Reading, said in opening his argument, that the so called trust had not charged monopolistic prices. He declared that no product is marketed at so low a profit as anthracite coal and added that in the past 25 years the coal companies have not made more than 25c. a ton profit on their output. It had been testified by the independent operators themselves, he said, that the alleged trust sells the independents coal at a fair price. The coal companies, he asserted, sell to anyone, anywhere, at the same price.

Charges of exhorbitant freight rates by the railroads had been made but these had been so completely refuted that he considered the issue dead. Statistics presented by Mr. Reynolds tending to show the amount of anthracite coal still unmined were greatly at variance with those offered by the Government. He declared that his figures were obtained from the assessors in the anthracite region while those of the Government were taken from a report made by a geologist to a New York financial institution 20 years ago. Mr. Reynolds' figures showed that the amount of unmined coal at the present time to be nearly 1,250,000,000 tons, while, he said, according to the Government, it amounted to less than 700,000,000 tons.

Continuing his argument on June 4, from the day before, Mr. Reynolds denied that the coal-carrying roads were operated in restraint of trade and interstate commerce. Pointing out the circumstances under which the defendants leased their coal lands to independent concerns, Mr. Reynolds endeavored to show that the Reading had done everything in its power to encourage competition in the anthracite mining district of the state.

John G. Johnson, senior counsel for the defendant railroads, took up the principal allegations of the Government. In giving his views of the suit, Mr. Johnson said:

It must be borne in mind that the Philadelphia & Reading Ry. is not the only railway serving the Schuylkill region. The Pennsylvania R.R. ramifies the Schuylkill field, and it is in evidence that in the year ending June 30, 1911, it transported from that region over 4,000,000 tons of coal and in the following year about the same amount. During the corresponding years the Lehigh Valley R.R. transported 2,800,000 tons and 2,230,000 tons, respectively. In this connection it will be recalled that the evidence shows that the Pennsylvania reaches every point of any traffic importance served by the Philadelphia & Reading R.R., both in Pennsylvania and New Jersey, and reaches New York Harbor and Philadelphia in the immediate vicinity of the terminals of the Reading system.

During the course of his argument, Mr. Johnson told the court that it was the very tribunal that authorized the Reading holding company to acquire control of the stock of the Philadelphia & Reading Coal & Iron Co. and the Philadelphia & Reading Railway Co.

It was also asserted that it was impossible to gain a monopoly over the production, transportation and sale of anthracite coal in the Schuylkill region as there were already 32 independent operators in that territory.

PENNSYLVANIA

Anthracite

Mahanoy City—While timbering in a tunnel of the Ridge colliery on June 4, one miner was killed and another fatally burned by an explosion of gas. The men fired the gas with their naked lamps. The fire was quickly extinguished.

Georgetown—Fire of an unknown origin broke out in the blacksmith shop at the Red Ash colliery, on June 3, and for the lack of efficient fire-fighting apparatus several buildings were destroyed, and much damage resulted. The building was burned with a large amount of tools. The timekeeper's office was also burned and valuable books and papers were destroyed. The car shops, located in a frame building near-by, ignited and were badly damaged.

Pringle—Settling of the ground has been noticed near Washington St., the result of weak support of the roof in the mines of the Kingston Coal Co. As yet no serious damage has been done to adjacent property.

Shamokin—The Hickory Ridge Colliery of the Susquehanna Coal Co. suspended operations, June 4, when all union employees went on a strike to force a number of men to become members of the United Mine Workers of America. Between 600 and 800 men and boys quit work. About 500 employees of the Scott shaft, operated by the same company, also went on strike.

Wilkes-Barre—Litigation which has been long pending and which involved the royalties on a considerable area of coal land was brought to a close, June 4, when the Lehigh Valley Coal Co., filed an agreement with the recorder of deeds to pay $155,000. The trustees of the proprietors of Kingston Township are the plaintiffs and the money derived from the settlement will apply to the school districts of numerous towns that have been formed from the original area of the township.

Bituminous

Connellsville—The Connellsville coke trade is steadily dwindling. Of the 37,935 ovens in the upper and lower Connellsville region, 21,020 are in operation, but their output represents only slightly over 80 per cent. of their capacity. A majority of the merchant ovens in operation are running six days per week, but the greater portion of the furnace ovens, on the other hand, are operating but four days.

Butler—As the result of legal proceedings to determine the ownership of the property of the Erie Coal & Coke Co., at Ferris, Fred Roe, a stockholder and five mine guards were recently arrested charged with trespassing. The Roe faction refused to give possession to Levi Deal, who was recently elected president and general manager. Deal's election is held to be legal.

Mount Pleasant—A class in mining has been started in the public schools by a number of young men of this district, and meetings will be held each Tuesday and Friday evening at 7 o'clock. James Wardlow, of Scottdale, has been engaged as an instructor. It is the intention of the students to continue the class as long as there is any information to be gained which will be of benefit to those attending. It is also intended to have instruction in first-aid work once a month.

WEST VIRGINIA

Charleston—Charles W. Mills, A. L. Faulkner and Patrick Gilday, commissioners of conciliation in the Kanawha Coal miners' strike in West Virginia, on June 8 held a conference with Secretary D. T. Evans and others of the operators' association, and Thomas Haggerty and Thomas Cairns, officers of the United Mine Workers, hoping to find a common basis of agreement.

Bluefield—In the first-aid contest held in Bluefield, on May 13, George E. Wysor, C. C. Bailey and T. J. Burwell tied for first honors in the one-man event. This tie was settled in a second contest held on May 30, when George E. Wysor secured first place with a score of 96.4 per cent. It should be added that Mr. Wysor served 10 years in the hospital corps of the United States Army in the Philippines.

KENTUCKY

Winchester—The Fidelity & Columbia Trust Co., of Louisville, was on June 3 appointed as receiver of the Day Lumber & Coal Co. with full power and authority to operate and manage the business of the company whose plants are situated at Clay City, Jackson and Beattyville.

Hellier—The Alleghany Coal Co. will make an increase of from 50 to 75 cars per day in output, effective June 15. Some 200 extra men will also be given work.

Whitesburg—Another big coal-developing company, a subsidiary of the Elkhorn Mining Corporation, is being organized in Baltimore, according to information received here. It is said that the capital of the new organization will be several million dollars. Its organization follows closely on the heels of the recent visit to this section of a party of Eastern capitalists. The new corporation, it is declared, will acquire about 20,000 acres of the Elkhorn Mining Corporation's property in the Boone's fork and Beaver Creek sections and develop them.

Slemp—A 100-acre boundary has been purchased and will be developed by the Leatherwood Coal Co., recently organized. The company has a capital stock of $40,000 and R. C. and M. Cornett are among the incorporators.

OHIO

Columbus—Coal operators and striking miners of Ohio failed to reach an agreement on June 5 on a wage scale, and the joint conference was adjourned. After the adjournment of the joint conference, the miners and operators went into separate executive sessions.

Columbus—The Essex Coal Co., of Columbus, Ohio, has about completed equipping its two new mines in the Pomeroy Bend field which will be ready for operation when the Ohio mining scale is signed. The spur from the mine of the Kanawha & Michigan R.R., which is about three miles in length, has been constructed. One of the mines will have a capacity of 1000 tons daily and the other 1500 tons. Both will have modern electrical equipment and be arranged to conform to the anti-screen law.

INDIANA

Brazil—The tract of land just west of Carbon, recently purchased by the firm of Brown & Owens, has been leased to a company of Brazil business men, who will shortly drill for coal. It is said in case the coal is found at a shallow depth, steam shovels will be employed, and the coal stripped. If it is lower, however, and of a sufficient thickness, a mine will possibly be sunk upon this land.

Sullivan—The Booster Club has raised a bonus of $2500 to obtain the shops and general offices of the Consolidated Indiana Mining Co., which proposes to spend $7000 in building a plant.

The Shirley Hill Coal Co. recently paid the administrator of the estate of Frank Miller, killed in the mine, $9104.

The Jericho mine and coal washer has reopened, after a shutdown since Apr. 1. A string of 800 empty cars was on the sidings.

Clinton—Miami mine No. 8 has resumed, the damages to machinery following a fire having been repaired. It is the largest employer of labor in the Clinton field, and holds the record of the 20 mines for the largest hoist in one day.

ILLINOIS

Springfield—Thirty pupils of the Bunn School have received certificates as first-aid students, as the result of a course given in this subject by the principal of the school and Thomas English, of the Illinois Mine Rescue Station.

Herrin—The engine room and boiler house, together with the generators, and the wash house at Mine B of the Chicago & Carterville Coal Co. was destroyed by fire recently, entailing a loss of several thousand dollars, which was covered by insurance. It will take about two months to repair and put the mine in shape for operation.

Sparta—The Illinois Fuel Co. has just finished the installation of a new crusher at its mine at this place. This company will be the first in southern Illinois to install a crushing plant at its mine to crush mine-run coal for large steam contracts, in order that the screenings may take a lower rate of anywhere from 10 to 20c. per ton under what the mine-run would take, were the mine-run to be shipped in that form and crushed at destination. Several Illinois roads have a lower rate on screenings than on the other sizes, and this mining company has devised a scheme that looks quite attractive to several large consumers.

Benton—The Middle Fork Mining Co., which is sinking a mine two miles southeast of this place, has secured 1700 acres and will make it a 4000-ton per day mine. It will be operated entirely by electricity, and the work is in charge of J. M. Seymour, who has had charge of sinking every mine in the vicinity of Benton.

Belleville—The influence of a certain element of a mining-town population is much in evidence here at the present time. An attempt has been made by the better element of citizens to eliminate the sale of intoxicants and the drunken scenes that have attended the annual picnic of the public schools of this city. Belleville is one of the few mining towns in Illinois that has failed to show any progress in municipal affairs or in a general moral way in the past 25 or 30 years.

The engine room at the Muren mine, operated by the Southern Coal, Coke & Mining Co., of St. Louis, just east of here, on the L. & N., was destroyed by fire recently, with a loss of $10,000.

ARKANSAS

Fort Smith—Fifty men were sworn in as deputy United States marshals at Fort Smith on June 3, and taken to Prairie Creek to guard the mine of the Mammoth Vein Coal Co., operated by the Bache-Denman Co., Despite the fact that the company secured a federal injunction against strikers, clashes have been frequent. The mine recently was put into operation again.

WYOMING

Sunrise—A crew wearing oxygen helmets recently prevented a disastrous fire in the big mine of the Colorado Fuel & Iron Co. at this place. The fire was discovered in the bottom level, and would doubtless have spread had not the use of helmets made it possible for the fire-fighters to work in the smoke and gases.

FOREIGN NEWS

Sabinas, Mexico—It is reported that the French ambassador at Washington has requested the State Department to investigate the confiscation by constitutionalists of coal mines at Sabinas, owned by French interests. Managers of the mines are prepared to forward estimates of their damage to the State Department.

St. Petersburg, Russia—The latest result of the new anti-Jewish law is the closing of 50 collieries in the province of Ekaterinoslav, which are owned or leased by Jews. This action was taken by order of the assistant-governor of the province, and rendered 6000 miners idle. The Jewish proprietors are forwarding a petition to the Minister of Trades.

PERSONALS

J. D. Parker, chief engineer of the American Coal Corporation, resigned from that company on June 1 to engage in other business in Birmingham, Ala.

B. P. Manley, late of Denver and Salt Lake City, has assumed the position of general manager of the American Fuel Co., of Utah, and subsidiary interests.

V. P. Leyson, a native of Wales, has been appointed chief engineer of the Montevallo Coal Co., with mines at Montevallo, Ala., and assumed his duties June 1.

John Wynn, manager of the Edgefield Coal Co., near Canton, Ohio, sailed from New York June 10 on the "Aquitania" for Liverpool. He expects to spend several weeks in the British Isles visiting relatives.

Tom Sneddon, superintendent of the Diamondville, Wyoming coal properties of the Anaconda Copper Mining Co., sailed for Scotland, June 10, on the "Aquitania," on one of his periodical visits. He will be away about three months.

M. H. McCorkle, secretary of the Sterling Coal & Coke Co., has resigned and has been succeeded by Yale H. McManus, formerly secretary of the Winona Coal & Coke Co. H. G. Oaks has been made store manager by the former company.

Mrs. John C. C. Mayo, widow of the democratic national committeeman from Kentucky, it is reported will be elected a member of the board of directors of the Consolidated Coal Co., of Baltimore, and other important corporations in which her husband was interested.

Graene Turnbull has resigned from the Consolidation Coal Co. to take a place as secretary and treasurer of the Empire Coal Co., of Montreal, Can. Mr. Turnbull, for a number of years, was confidential man of President Jere H. Wheelwight, of the Consolidation Coal Co.

W. A. Thomas, for several years past commercial engineer in charge of all sales of mining apparatus for the Westinghouse Electric & Mfg. Co., resigned his position with that company on June 1, and has taken up the practice of consulting engineering in Pittsburgh with offices in the Second National Bank Building. His training in practical mining, coupled with his work with the large electrical companies and extensive experience with mining firms, should peculiarly fit Mr. Thomas for the new work which he has chosen. He will specialize on mining.

CONSTRUCTION NEWS

Hellier, Ky.—The Elkhorn Consolidated Coal & Coke Co. is planning the opening of two new mines and extensions and increases in its plant, employing several hundred additional men.

Greenville, Ky.—The W. G. Duncan Coal Co. has awarded contracts to the Roberts & Schaefer Co. for the building of

two Marcus patent coal tipples for installation at Greenville and Luzerne, Ky.

Pottsville, Penn.—The East Bear Ridge Coal Co. has taken possession of the Girard tunnel at Mahanoy Plain, and is shortly to advertise for the erection of a breaker, plans of which are in course of preparation.

Kewanee, Ky.—The Kewanee Coal Co. will build 50 additional miners' houses and open two additional mines, with a large increase in coal shipments within the next 60 days. Vast improvements will be made in the plant.

Mossy Bottom, Ky.—The Keyser Coal Co. is preparing for an extensive coal-mining operation here and will build a short line branch railroad from the Chesapeake & Ohio to reach it. It will ship from 60 to 75 tons per day from the start, while rapid increases are to be made.

Penny, Ky.—The Elkhorn & Shelby Creek Coal Co., which has its principal office at Jenkins, Ky., is now constructing a tipple and will operate two mines near here, with an initial capacity of 600 tons daily. According to W. J. Christopher, the manager, it may build a small power plant.

Cabin Creek Junction, W. Va.—The steam power plant of the Virginian Power Co., was formally opened June 6, a number of invited guests being present. This plant, which cost $1,250,000, is believed to be the largest that has been constructed as an auxiliary plant supplying current solely to coal operations.

Birmingham, Ala.—The Maryland Coal Co. will increase its output at its Sipsey mines in Walker County. Several additional drift openings will be made at once, the object being to get the output up to 2000 tons per day. Although this mine is only about one year old, approximately 900 tons per day is now being mined. The improvements will cost in the neighborhood of $100,000. The initial steps were taken recently in the actual development of the Panama Coal Co. property six miles east of Sipsey. The engineering force of the Frisco has started the survey for a spur to the mine. This property will be developed at once at a cost of approximately $1,000,000.

Chicago, Ill.—S. M. Felton, president of the Chicago Great Western Ry. Co., has awarded a contract to the Roberts & Schaefer Co., for the building of three 100-ton capacity, reinforced,concrete, counterbalanced-bucket (Holmen type) locomotive coaling plants for installation at St. Joseph, Mo., Carroll, Iowa, and Kenyon, Minn. Also a 50-ton capacity frame coaling station at Red Wing, Minn. In addition, as receiver for the Pere Marquette Ry. Co., he has awarded this firm contracts for the building of two 100-ton concrete stations from the same design for installation at Blenheim, Ont., and Port Huron, Mich. The plants are alike and equipped with 100-ton weighing features.

Riola, Ill.—The Allen & Garcia Co., engineers, McCormick Bldg., Chicago, Ill., have completed the design and specifications for the new tipple to be erected for the Bunsen Coal Co., near Riola, Ill., and is asking for bids. This tipple will be of the well known A. & G. patented design and will probably be one of the largest and strongest steel tipples ever constructed in Illinois. One of the innovations in its construction will be the wide docking table 30 ft. long placed immediately ahead of the weigh pan to enable the dock boss to examine the coal for rock and refuse before it goes onto the screen. A counterbalanced gate is placed at the head of the screen so that a car of dirty coal instead of passing from the docking table over the screens and into the cars can be readily diverted by means of this gate into a railroad car on the 4th track where the coal can be cleaned without interrupting hoisting.

NEW INCORPORATIONS

Dennison, Ohio—The capital stock of the United Coal & Fire Clay Co. has been raised from $10,000 to $100,000.

South Bend, Ind.—The United Mining Co. has been incorporated here, with $25,000 capital stock, to deal in oil, coal and gas lands. The directors are S. M. McDonald, W. R. Roberts and O. S. Womine.

Glen Roy, Ohio—The H. & W. Coal Co. has been organized for the purpose of mining, with a capitalization of $5000. The incorporators are G. W. Welch, Irene Welch, C. M. Reese, Carrie Reese and William Ware.

Fort Smith, Ark.—The Edwards & Edwards Coal Co. has been organized with a capital stock of $20,000. The officers are W. F. Edwards, president; Jesse Edwards, vice-president; Helena Edwards, secretary, and Katie E. Edwards, treasurer.

Cleveland, Ohio—The West Virginia and Ohio Coal & Coke Co., has been organized for the purpose of mining with a capitalization of $15,000. The incorporators are G. L. Cassingham, J. W. Canavan, C. L. Ayers, Ralph Iago, and Almieda Cassingham.

Providence, Ky.—Notices of dissolution of the Luton Coal Co., a Kentucky corporation, have been published. The company recently disposed of its holdings and serves notice that its business will be wound up on June 15. S. K. Luton was president of the company.

Owensboro, Ky.—The Bon Harbor Coal Co. has been incorporated here with a capital of $2000. The company will engage in a general coal business, the mines being situated west of Owensboro. Louis Hoback is president and principal stockholder and S. Weikel, secretary and treasurer.

INDUSTRIAL NEWS

Lookout, Ky.—The Big Branch Coal Co. plans the opening of new mines on an additional coal tract near Lookout, with increases in its old operation of from 75 to 100 cars per day. This to become effective July 1.

Venice, Ill.—The Chicago & Alton R.R. has purchased a large acreage between this place and Brooklyn, adjoining its present right-of-way and near the roundhouse, to be used for an extension of coal-storage tracks.

Knoxville, Tenn.—In a petition in voluntary bankruptcy by the Consolidated Coal & Coke Co., of Knoxville, the liabilities are scheduled at $6,794.86, and the assets at $6,239.46 of which sum $5,369.46 are represented by accounts due.

Columbus, Ohio—According to the financial report of the Hocking Valley Ry. Co. for the month of April there was a falling off of 46 per cent. in the freight revenue of the road as compared with April of last year. This decrease is due monstly to the suspension of mining.

Washington, D. C.—The Supreme Court on June 8 upheld the constitutionality of the Virginia law requiring companies mining coal or manufacturing iron or steel to pay employees at least monthly in money, and making it unlawful to issue scrip unless redeemable in cash at its face value.

Kansas City, Mo.—Coal men of Kansas City have received notice from the Northwestern Mutual Life Insurance Co. that in future it will not accept for insurance common mine workers, mine bosses and others whose principal work is inside the mines. This class has heretofore been accepted at an extra premium.

Pittsburgh, Penn.—Messrs. George H. Deike and J. P. Ryan, late of the U. S. Bureau of Mines, have organized the Mine Safety Appliances Co., with offices and stock rooms in the Curry Building, 451 Fourth Ave., Pittsburgh. This firm will handle the Koehler safety mine lamp, and the Seibe-Gorman & Co., Proto rescue apparatus.

Wilkes-Barre, Penn.—All the larger producing anthracite coal companies report that the production of coal for May will be slightly larger than that for the corresponding month of 1913, when 5,995,742 tons were shipped to market. It is believed that the output for May, 1914, will be somewhat above six million tons.

Washington, D. C.—The New York Central and other railroads were on June 3 refused permission by the Interstate Commerce Commission to cancel the proportional rate of $2.10 per net ton from the Ohio coalfields to the upper Mississippi River crossings applicable on bituminous coal destined to points west thereof. The roads were directed to maintain the above named rate in effect for a period of two years.

St. Louis, Mo.—Advice from Washington, D. C., is to the effect that Col. Joseph F. Wolfner and Alexander A. Bryden, of this city, representing the Southern Illinois Coal Operators' Association, are meeting with considerable success in an attempt to induce the Secretary of the Navy to try out Illinois coal. It is claimed that Illinois mine-run coal can be delivered at various points on the seaboard at a price equal to that of West Virginia coal and at Gulf points for a lower price.

Punxsutawney, Penn.—The majority of the mines in this section are working two and three days per week, and even with this curtailed output, sidings everywhere are being filled with coal cars. Railroad tonnage is cut almost in half, and as a result many brakemen and firemen have been laid off. A number of conductors were also started flagging, and many engineers were put to firing. In Du Bois, more than 400 employees of the B. R. & P. railway have been laid off.

Coal Trade Reviews

General Review

Anthracite storage bins glutted with steam sizes and the initial curtailment in operations inaugurated. Further shrinkage in bituminous demand and the trade continues under heavy stress. Improvement in Lake shipping creates a more hopeful undertone.

Curtailment of operations in the anthracite regions is finally at hand, a few isolated collieries having reduced operation to five days during the current week. The market is glutted with steam grades, while so much has been stocked that storage capacity is about exhausted. With the possible exception of the New England market, the trade is settling down into a pronounced lethargy with the individuals aggressively raking the market for orders and offering large concessions on most sizes. The general stoppage has been further accentuated by an exceptionally light movement up the Lakes, shipments for the season to the first of the current month amounting to only half those for the same period last year.

In bituminous there is a growing tendency on the part of the operators to relax from their determined stand for a higher price-level than last year. What contract business remains open will be closed on the same basis as expiring ones. The demand is even less and indications point to a still further shrinkage, while consumption remains at a very low level with no immediate indication of any improvement. But even under the heavy stress the large distributing centers continue remarkably free of demurrage coal. While a moderate improvement may be expected beginning after mid-summer, there is so much excess coal that it will take some time to wipe this out.

A heavier Lake movement supplemented by the long continued shut-down in Ohio has given the first impetus to Pittsburgh district operations which have increased sharply to fully 75% capacity. However, the local trade is spotty, current requirements being light with negotiations on new contracts conducted at unsatisfactory figures. Stocks are generally much reduced, although there is still sufficient to adversely affect the market. The labor conference in Ohio, about which the market there has been hinging for some time resulted in a complete deadlock temporarily, and there is little change in the situation. In the meantime buyers are holding off, only taking sufficient West Virginia coal to meet current requirements pending the return of the Ohio operators into the market.

The May dumpings at Hampton Roads showed a substantial increase, aggregating more than a million tons. The movement at the moment is fairly good, although rather slow to New England, and circular prices are maintained except on small lots, which are subject to some cutting. Lump coal in the Southern market is steady under the impetus of a light summer's stocking movement, and prices are generally firm with only occasional shading to move demurrage coal.

No significant activity is noted in the Middle Western situation. Some dealers find that buyers are showing more interest as stocks are exhausted, and it is reported that a number of railroads will be in the market shortly, but the trade generally is looking forward to a period of unusual quiet.

EASTERN MARKET

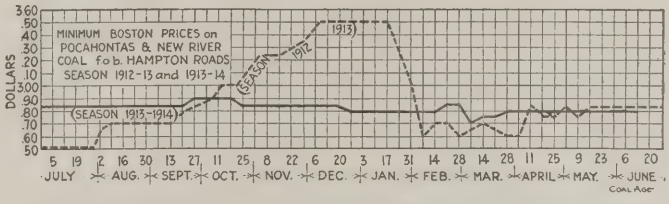
BOSTON

Pocahontas and New River prices still weak for inland delivery. No improvement in sight and even lower figures expected. Pennsylvania operators make prices to take tonnages previously held, but Georges Creek remains firm. Marine freights dull. Anthracite still in steady request.

Bituminous—There is substantially no change in the situation reported a week ago. Prices on cars at the various distributing points continue weak, and cargoes of Pocahontas and New River are still being forced on the market. On the few contracts that still remain to be closed there is a strong feeling on the part of shippers who had them last year to meet any price that may be made and the chances are therefore that some new low records may be established before June is over.

Some of the agencies who have cargoes waiting in what are regarded as restricted markets are deadlocked for orders and the trade is looking to see the coal finally moved at ruinous prices. Meanwhile, there is no pronounced offering of Hampton Roads coals at less than $2.85, f.o.b., and while the volume of coal at the piers is not materially reduced yet the various interests seem reconciled to heavy tonnages on cars and manage to worry along with what orders happen to come.

In some industries here there are signs of picking up, but while the more hopeful believe the trend is that way there is nothing like a general improvement as yet. When it does come stocks are so large it will be some time before it creates any extra demand for coal. Certain of the Pennsylvania operators have been scalding down prices lately in the effort to hold business they had last year and several sales have been made at 15@20c. off what had been considered the season basis. Such tonnages, however, are only a normal movement and were taken to keep the mines running. Georges Creek is steady in price but with the output considerably curtailed.



Water Freights are very dull; 65@75c. are the prevailing rates from Hampton Roads to Boston, depending upon the size of the carrier. Several of the large sailing vessels are tied up on account of the slack business.

Anthracite—June is turning out a heavier month for deliveries than was expected. The companies are still well supplied with orders and new business is subject to a fortnight delay in most quarters. The Eastern dealers are taking on supplies up to the limit of storage, although the movement to the consumer is generally light. The cool weather is helping out somewhat.

Current qotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.90@1.50	$1.20@1.65	$1.67@1.77	
Philadelphia*	2.15@2.75	2.45@2.90	2.92@3.02	
New York*	2.45@3.05	2.75@3.20	3.22@3.32	
Baltimore*	.....	.....	2.85@2.95	
Hampton Roads*	.....	.....	.....	$2.80@2.85
Boston†	.....	.....	.....	3.35@3.63
Providence†	.....	.....	.....	3.40@3.68

* F.o.b. †On cars.

NEW YORK

Bituminous operations further curtailed. Less coal on demurrage but prompt demand entirely gone. Anthracite storage bins congested with steam grades and curtailed operations are going into effect.

Bituminous—The soft-coal market is characterized by a total absence of any new developments. Consumption continues at an abnormally low level, with the possible exception of in the textile lines, and production for the current week will run from 40 to 45% capacity as compared with 50% for last week. If anything, the demand is still less and shows every indication of further shrinkage.

Demurrage coal is rarely heard of only one important instance being noted recently, this involving 1000 tons of a good grade Pennsylvania product, which was offered at $2, but later advanced to $2.25. The comparative absence of consignment coal, in the face of the depressed conditions, indicates an excellent undertone in the market.

What few contracts are still hanging fire will be closed shortly, but the agencies are generally receding from their determined efforts in the early part of the season to obtain higher figures than last year, and the balance of this business will be closed on about the same basis. While there is an almost total absence of prompt demand, the nominal market is not quotably changed and continues as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—All of the prepared sizes of hard coal are now easy, with the possible exception of stove coal, while the steam grades are being put back into storage in such large quantities that bin capacity is being exhausted. Curtailed operations in the mining regions have already been put in effect at one or two collieries, and a general restriction is now definitely in sight. The market is glutted with the steam grades to such an extent that restricted operations are inevitable. The better grades of egg coal can be moved at the circular only when accompanied by a proportion of stove, and the off qualities are selling down to 10 to 20c. less than regular prices. Chestnut is the flatest of the domestic sizes, the off qualities being offered down to as much as 50c. off the circular and the better grades, 25c. less. Pea coal is about equally as bad, with plenty offered at concessions of 25 cents.

In the steam sizes, the low-grade buckwheats are selling down to $2, while the better qualities are holding up to 15 and 20c. less than circular. There is an over-abundance of No. 2 buckwheat on demurrage which can be bought at $1.60, f.o.b., while the better qualities are difficult to move at concessions of 10 and 15c. per ton. The collieries have been restricting the production of barley coal for the past two or three weeks, but there is such an excess supply, that the low grades are selling at $1.25, and sales are even being negotiated at 5c. at the mines in order to permit a continuance of operations. The better grade of barley is selling at 15c. off the circular by the individuals, while the large companies are putting it into storage. The New York market on anthracite is now quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.80	$4.55@4.70	$4.75	$4.50@4.65
Egg	5.05	4.80@4.95	5.00	4.75@4.90
Stove	5.05	4.95	5.00	4.90
Chestnut	5.30	5.00@5.20	5.25	4.70@5.15
Pea	3.55@3.60	3.30@3.60	3.45@3.50	3.10@3.45
Buckwheat	2.80	2.60@2.80	2.50@2.75	2.00@2.75
Rice	2.30	2.25@2.30	2.00@2.25	1.60@2.25
Barley	1.80	1.60@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Market for anthracite dwindling. Partial suspension of mining indicated. Orders comparatively few. No change in bituminous situation. Restricted operations fail to stiffen prices and market still continues heavy.

Anthracite—The past week has indicated that partial suspension of mining will be necessary to avoid flooding the market with surplus coal. While it is true that there is a demand for certain sizes, the mines cannot be worked full time to take care of these. It is understood that the storage facilities of some of the companies are well stocked with the small sizes, and as the demand for steam coals has been inactive for some time, the surplus has been going into stock. Of the domestic sizes, chestnut seems to be only one inclined to drag. Broken, egg and stove are all moving well, but the absence of storage facilities in the West, due to the large amount of coal carried over from last year, finds this outlet cut off.

This is doubtless the inception of short time work at the mines during the summer. Every effort is being made to instill some enthusiasm into the market, but the results are far from successful, and it does not seem possible to stimulate any business. Outside of the New England market, which continues about normal, there is really no activity whatever. Individual operators are offering large concessions from the so called circular prices, and making circumstances fit the case. It is understood as much as 35@40c. has been conceded on chestnut coal, in order to effect a quick disposition.

Bituminous—Continued curtailment of mining, coupled with low prices, still fails to create anything like activity in the bituminous situation. The industrial depression still has its effect in the call on contract coal, which in many cases have been reduced fifty per cent. and the demand for spot coal is comparatively nil. Of course, there is considerable tonnage moving, taken in the aggregate, but the comparison is so marked when lined up alongside of last year's business, that it makes a situation far from satisfactory.

BALTIMORE

General dullness characterizes both the bituminous and anthracite trade. A little better tone in New England and toward the West. Exporting continues the feature of the local market.

In a dull listless market, such as characterizes affairs here, there is little to be said. The hard-coal men say that they are doing some business, but orders for storage coal are only fair at best. Quite a few dealers will grant the full spring discount up to the last of June.

Bituminous conditions remain flat, although it is reported that more coal is being taken on contract for the New England market. Westward too, there is an awakening demand for West Virginia and western Pennsylvania fuels. This inquiry is at present the most encouraging feature of the trade. Meanwhile prices for spot coals remain about the same as last week. Slack is the weakest feature in West Virginia, selling at the mines at from 50 to 55c. Three-quarter gas is worth from 80 to 90c. Little or no change is reported in Pennsylvania line coals.

The export business remains a feature of the trade here and has aided incidentally in preventing any surplus at tide. Necessity for quick loading several times has wiped out some demurrage coal. A wide range is noted in the charter announcements of the past week.

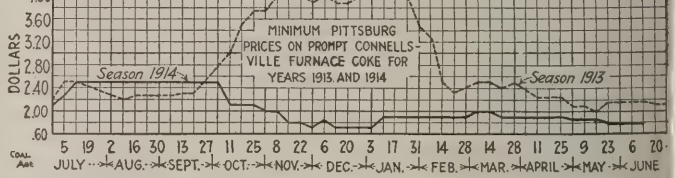
CENTRAL STATES

PITTSBURGH

Mining operations considerably increased in Pittsburgh district, mines operating at about 75% of capacity, chiefly on Lake business. Prices continue irregular, and slack sold at deep cuts. Coke stagnant, prices showing some undertone of strength and production and shipments decreased.

Bituminous—There has been a sharp increase in mining operations in the Pittsburgh district, and the district as a whole is operating at about 75% of capacity, the mines on some lines being in full operation. The increase is due almost wholly to shipments in the Lake trade, which are now fairly good. The Pittsburgh district, of course, is benefited by the partial or complete idleness, of other districts which cater to the Lake trade. There is hardly any domestic trade. The railroads are taking from 60 to 75% of their normal tonnages, and the chief reason that they are not taking full tonnages is that their freight business is light. They have consumed nearly all their stocks laid in some time ago. With manufacturing consumers the case is different, as their stocks are still largely in evidence, because they are operating at from one-half to two-thirds of normal, and stocks which were laid in for 60 days are stringing out to 90 days.

An effort is being made to secure list prices on mine-run and screened coal, though with no great measure of success, and some contracts have lately been taken at rather deep cuts. In the case of slack there is no effort to secure the regular list figure of 90c., and prompt lots have sold down to 55c. in extreme instances. Operators are averse to making contracts for slack except for the full twelve-month, but on such contracts the price is sometimes shaded to 80c. We quote list prices, subject to more or less shading, unchanged as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.



Connellsville Coke—The market continues practically stagnant, but with a moderate undertone of strength, as some of the operators are strongly of the opinion that the second-half of the year will prove much better in the iron and steel industry than would be expected from present inactive conditions. One of the four large producers of foundry coke has reduced its price from $2.65 to $2.50, prices usually quoted being to consumers, which means 15c. less to dealers. The other operators are undecided whether to meet the reduced price. Contracting for foundry coke is slow. We quote: Prompt furnace, $1.75@1.85; contract furnace, $1.25@2; prompt foundry, $2.35@2.65; contract foundry, $2.35@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connelsville region in the week ending May 30 at 244,028 tons, a decrease of 12,602 tons, and shipments at 252,437 tons, a decrease of 23,635 tons. Shipments exceeded production by 8409 tons.

BUFFALO

Indications of a possible stir in bituminous before long. Some consumers exhausting stocks. Strikes elsewhere also having their effect. No improvement in coke. Anthracite dull, but steady.

Bituminous—There is an occasional bituminous jobber who reports better business. Others report similar conditions when they say that the trade is spotty. One jobber says his May trade was 15 per cent. better than April and he is going to make June show an equal increase if he can. But it is a fact that some of the smaller consumers are running out of a supply. The railroads are asking for very little more than they did a month ago, but it is felt that they must reach the end of their supply before long. It all depends now on the consumption.

The strikes in Ohio and West Virginia are reducing the amount of coal coming on the market. It is also said that the agreements with the miners in the Pittsburgh district are not as secure and satisfactory as in the Allegheny Valley. All mines are still run on short time, as it is a certain loss to allow coal to leave the mine unsold. Salesmen are urging coal upon consumers at reduced prices. There is less complaint of coal on track at junction and terminal points, but there is still sufficient to do some harm. If there were none the seller would be able to get a profit, but such is hardly the case now. It is generally agreed that the price of bituminous is at the bottom, yet the more active dealers and shippers stand by the circular, which gives Pittsburgh lump at $2.80, three-quarter at $2.70, mine-run at $2.55, and slack at $2.15, with Allegheny Valley sizes about 25c. lower.

Coke—The market is without new feature of any sort, buyers ordering very sparingly. They are aware that the lowest level has been reached, but this is not a time for accumulation of stock of any sort unless it can be had at sacrifice prices. Coke furnaces are firm at $4.50 for best 72-hr. Connellsville foundry.

Anthracite—The movement is light, but the general tone is good except that jobbers are already dreading the clamor that must come next fall on account of the failure of the consumers to stock up at the low prices. Most shippers by Lake are doing little, although one dock is alone active enough to run the week's total up to 124,000 tons, which is a fair summer average. Lake shipments for the season to June were 603,445 tons, according to custom-house figures, as against 1,143,860 tons to the same time last season. This difference bids fair to widen further as the surplus stocks at Upper-Lake docks is great enough to forbid anything like a heavy movement.

TORONTO

Yards well stocked and trade quiet, but prices steady.

Trade is quiet as compared with previous years at this season. Manufacturers in most lines are restricting their output, and not buying in excess of immediate requirements. The yards are well stocked and few conignments are now coming forward. Prices generally are steady at the following quotations, with occasional shading in steam coal by jobbers who are overstocked: Retail anthracite, egg, stove and nut, $7.50; grate, $7.25; pea, $6.25; bituminous steam, $5.25; screenings, $4.35; domestic lump, $6; cannel, $7.50. Wholesale f.o.b. cars three-quarter lump, $3.75; screenings, $2.75.

TOLEDO

Buyers still holding off. West Virginia mines filling current requirements. Active Lake trade anticipated later in the season.

Pocahontas coal here is very scarce and is bringing prices considerably above the list when it can be secured at all. Domestic Southern coal seems to be in much better demand and there is an improvement in the call for steam fuels. Railroads are not as yet buying to any extent as they seem to be well stocked up. The Lake Shore is said to have purchased heavily of West Virginia coal so that it will be in no danger of a fuel shortage during the busy fall season.

Buyers are holding off and investing in but little of the West Virginia product as it is generally expected that the Ohio operators will be in the field again within a short time. Inquiries are beginning to come in from steam consumers rather freely, indicating that there will be buying from these quarters within a short time. The Lake shipping continues fairly active and there is no weakening of prices. Toledo dealers are hopeful and look forward to a good season's business later on.

COLUMBUS

Nothing accomplished at the labor conference which adjourned "sine die" but with arrangements for again convening later. Operators procrastinating until constitutionality of anti-screen law is finally determined.

With the labor conference a failure, the situation in Ohio shows little change. Mines are still idle and little will be done in negotiating a wage scale until after the constitutionality of the anti-screen law is finally passed on by the United States Supreme Court. The conference found both sides strong in their demands. The miners' delegates stood strongly for a wage scale of 49.65c. for machine-mined coal on the mine-run basis, while operators as strongly opposed giving such a rate, saying that they would be unable to meet competition in other states if such a rate was paid. Governor Cox took a hand in the matter by asking the miners' officials to continue the scale committee and be ready to renew the meetings.

At the conferences, John M. Roan, of the mining department, represented the Governor. The adjournment was made "sine die," but both sides appear hopeful and there is a tendency among the rank and file of the miners to make a compromise.

The demand for steam grades, which is becoming better now since surplus stocks are being exhausted, is being looked after by shipments of West Virginia and Kentucky coal. Mine-run, West Virginia coal is being sold between 70 and 85c. and other grades are correspondingly low. Domestic trade is also showing increased activity. Dealers in Ohio are selling quite a good tonnage, as many householders are inclined to stock up for the coming winter. Pocahontas and West Virginia splints are the popular grades for domestic demand. Little is doing in the Lake trade and comparatively few cargoes are leaving Ohio ports for the Northwest. The ore business continues bad, which has an influence on the coal trade.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50@$1.40		$1.50@$1.40	$1.50@$1.40
¾-inch	1.35@ 1.30	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.30@ 1.25		1.25@ 1.20	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.05
Nut, pea and slack	0.85@ 0.80		0.85@ 0.80	0.80@ 0.75
Coarse slack	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.65

CLEVELAND

Consumers beginning to show an interest in contracts for Ohio coals. Operations will be under way shortly. Price basis same as last year. Improving tone in the Lake trade.

Inquiry for Ohio coal is beginning to be general. No large contracts have been made, but the large consumers of No. 8 are showing more interest than at any time since the coal year opened. The inquiry is largely from lake customers who have only seven and one-half months in which to take in their coal. They at least want to know the price.

Locally the trade is buying from hand to mouth and enjoying prices which cannot last. There is a tendency to sell at very low prices merely because it seems better to move the coal than to store it. In the Youghiogheny field, stocking of slack is going on, but more than enough is coming in to meet the immediate needs of the local market. Withal there is an upward tendency on the part of the operators.

Youghiogheny slack has been selling at 50c. at the mines in competition with Fairmount gas. Toward the last of the week some operators would not meet the low price and from 5 to 10c. more was asked. The spot market was on the basis of $1.60 to $1.65 the last of the week. The low price of Pennsylvania coal has tended to drive Fairmount grades out of the field to a certain extent. Fairmount operators are holding to 50c. at the mines for slack which means $1.65 here to the jobber and this is the high point of the market.

Ohio coal operators will do well to get the same prices as last year, when they start contracting. Pennsylvania has sold coal on contract at 5c. under 1913 prices and some of the larger shippers bought West Virginia fuels on about the same reduction.

The Lake Trade is not improving though a heavier movement is looked for this month. On June 1 two of the largest shippers to Lake Michigan were 50% behind last year on the same date. The Sault Ste. Marie Canals report soft-coal shipments for May to Lake Superior at approximately 475,000 tons less than in 1913 and anthracite shipments were about half. Anthracite movement will be heavier the rest of the season, and Ohio mines will undoubtedly begin shipping Lake coal by June 20.

Vessels of all sizes are plentiful. Boats are being held three to four days for coal. Toledo, Sandusky and Lorain docks, over which West Virginia coals are moved, had heavy line ups last Saturday, many of the boats not getting away for several days. Iron ore shipments are a little heavier than they were and the talk of tieing up more boats is not so pronounced as it was.

For shipments the following prices, f.o.b. Cleveland, are being asked:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.25		
Lump, 1¼-in.		$2.35	
Lump, ¾-in.		2.25	$2.05
Mine run	2.60	2.20	1.95
Egg	3.25		
Nut		2.20	
Slack	2.25	1.55	1.65

CINCINNATI

A freer Lake movement is the only favorable change in the market. Business still slow generally with buying in all departments limited. Restricted production on account of labor troubles apparently having no effect.

In spite of the strike in West Virginia, the market has not improved to any appreciable extent during the past week. Reports indicating that there are more boats at the Lake ports ready for coal is the only news of a cheering nature received for some time; with prospects for a Lake movement of normal volume there will be one outlet for the superabundant supplies, at least. With a large proportion of the West Virginia mines closed down, it would seem questionable to refer to the supplies as abundant, but that is exactly the situation. Dealers are showing a marked reluctance to buy; the steam business is about as slow as it possibly could be, and there is no present indication of improvement.

Inability to dispose of screenings is one of the worst features of the market, and is seriously handicapping smokeless operators, who have their domestic grades sold up. This sluggish steam trade is undoubtedly due to the slow condition of business in general. While the domestic business may regain a normal volume within the month, and the Lake movement also reach its usual proportions, no real recovery of the trade can be expected until general situation improves.

DETROIT

Domestic business showing some increase, but railroad consumption at the lowest point in a long time. Ohio suspension has little effect on the market.

Bituminous—The general trade is still slow, no special inconvenience having been experienced as a result of the long suspension in the Ohio fields. Railroad requirements are down to the lowest point in years, and stocks laid in for 30 to 60 days are proving sufficient to last twice that long. Domestic business is showing some slight activity. Pocahontas egg and lump for June delivery is quoted at $1.75, with July at $2. The circular on splints is $1.50 for June, and $1.75 for July, on egg and lump. Adequate supplies of Hocking lump and three-quarter still seem to be available. The suspension seems to have little effect on the local market, and there is scarcely enough demand to absorb the current arrivals.

HAMPTON ROADS

Movement for the week fairly good. Demand still light with circular prices being maintained. Dumpings for month of May over one million tons.

Dumpings over the piers of the three railroads at Hampton Roads have been fairly heavy with a plentiful supply of coal left on the yards to take care of any vessels which may arrive during the next few days. Foreign shipments have been to St. Lucia, Coronel, Canal Zone, Naples, Ceara, Puerto Madryn, Venice, Port of Spain and Havana. There has been a fair supply of bunker steamers calling here during the week and while shipments to New England have not, perhaps, been as heavy as hoped for at the same time a number of large cargoes have moved to that market.

Circular prices appear to be maintained although there may have been some small parcels sold at a cut. So far as can be ascertained, however, no cutting is being done to any great extent.

During the month of May over one million tons of coal were dumped over the Hampton Roads piers. The Norfolk & Western Ry. is considerably in the lead with 528,270 tons; the Chesakeake & Ohio Ry. dumped 306,290 tons and the Virginian Ry. 263,151 tons. This is an increase of more than 35,000 tons over the figures for the month of May 1913. This increase is divided between the Chesapeake & Ohio and Norfolk & Western, the Virginian Ry. having fallen down to the extent of about 15,000 tons as compared with May last year.

The new steel pier of the C. & O. Ry. at Newport News having been completed and put into operation they are abandoning several of the old wooden piers which will later be taken down.

LOUISVILLE

A decidedly increased domestic demand. Steam grades weak but improvement anticipated shortly. Prices increasing at the usual summer schedule.

There has been a decided improvement in the domestic demand and mines are working on full time generally, with the output of most of them sold ahead up to the first of September. While this is making business good in that respect it is also causing a further glutting of the steam-coal market. Industrial requirements are small, numbers of the large users having reduced orders to half of the normal amount. Some relief is anticipated in the Middleboro section from the announcement of the Southern Railway that it will restore the maximum tonnage at once. Since December this company has been operating on the minimum basis but is now planning to store the surplus for winter and spring use. The situation in the western Kentucky field is not as good as in the east. Many mines are working only one day a week while large numbers have closed down altogether until winter. The railroads which are the large consumers in the summer have been using only small amounts.

Prices on the domestic coals in both parts of the state saw a 10c. increase in June and there will be another in July and August, orders taken now for delivery in those months being at the advance price. Eastern Kentucky block coal ranges from $1.40 to $1.65, while August delivery prices range from $1.60 to $2. Nut and slack are at from 40 to 50c. for the poorer grades and from 65 to 75c. for the better qualities. All prices are f.o.b. mines.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Market shows slight improvement over last week. Furnace and foundry coke quiet. Blacksmith coal falling off slightly in tonnage.

The lump-coal market shows some improvement over last week, as the retail yards are beginning to stock up for their fall and winter trade. Prices are remaining firm with no evidence that any reduction will be made from the regular circular. While steam coal is rather quiet, the fact that several of the large railroads have asked for bids on their annual tonnage has had a tendency to make the operators more confident, as the tonnage called for is quite large.

Spot shipments are weak, but prices are remaining about the same, with only an occasional reduction to move track coal. As is usually the case during the summer months, the tonnage on blacksmith coal is falling off slightly, but this cannot be considered as evidence that the market is weakening. Heavy sales of pig iron were made the past week at about $10.50 per ton 2 Foundry, f.o.b. Birmingham. Furnace and foundry coke are still quiet, with no immediate improvement looked for.

INDIANAPOLIS

Conditions are back to normal for June. Mines are making better than half-time and prices are at the usual summer level. Industrial conditions steady.

Reserve stocks, accumulated in February and March, are exhausted and many buyers are again in the market. Contracts are being cleaned up, the larger operators reporting about 80% of them closed. Indiana mines are in operation about four days a week, which is up to the average for this season. Prices are also at about the same level as usually prevails this month, although slack is stronger than at this time a year ago; it is in good demand at 85 to 90c. Operators report industrial conditions in fairly satisfactory shape. The harvest in this state is less than a month away and the marketing of the big wheat crop is expected to mark the beginning of better times, whether the railroads get increased rates or not.

The retailers continue to put the Eastern coals into consumers' bins. There is enough uncertainty yet about mining conditions to induce those that have the money, to get their next winter's coal in hand. Indianapolis dealers are still selling at summer prices though not guaranteeing these later than July 1. The anthracite trade in this city is not lively because of a more general use of coke, which is the principal product of the local gas company. On account of the unsettled mining conditions in Ohio, no coal from that state is coming to this market. Pocahontas and other Virginia fuels find a good market here and dealers so far have been able to fill all orders.

CHICAGO

Little activity in Chicago market. Railroad contracts continue the principal feature in the trade. Not much demand for either steam or domestic coal. No change seen in the dull coke market.

There is nothing of material interest in the Chicago market. With practically no activity in any branch of the trade dealers are looking for a period of unusual quiet. If there is any relieving factor at all, it is a small number of contracts being closed by railroads and a number of large factories, who must use some coal. There is hardly any demand whatsoever for anthracite, while smokeless coal is about the same as for several weeks. Some dealers thought

the introduction of a lower grade of coal, with some of the attributies of smokeless, would effect the high-grade smokeless market, but no change in the latter is seen.

It is generally believed that the money stringency has played a large part in making the present dull situation. There are some, however, who believe that this will soon be relieved and better conditions prevail. The coke market is about on a par with general conditions and there is little, if any, demand.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.05@2.10	$2.30@2.40	$2.10	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.65
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.77	1.96	1.67	

Coke—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.45; gas house, $4.25.

ST. LOUIS

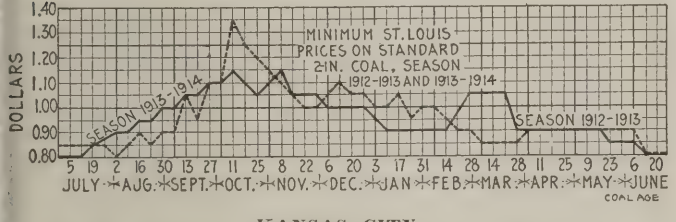
Situation generally discouraging but consumers showing a tendency to buy. Car shortage next fall being already anticipated. Surpluses seem well depleted.

There is a little contracting going on, either for steam or domestic, but the consumer is inclined to buy on the open market. Shippers feel that there will be a shortage of cars next fall which is making some of them a trifle cautious. The same unsatisfactory conditions as for several weeks past still continue in the different mining districts in Illinois and the mines in Williamson and Franklin Counties are gradually resuming operations, with practically no market for their output. The large supplies accumulated by the railroads previous to April are about exhausted now and most of the roads are again in the market. This is relieving the condition in the 5th and 9th Districts to considerable extent. Anthracite is moving in slow, and smokeless is picking up a trifle. Inquiries are coming in this month for domestic coke, but on the whole there is very little coal moving.

The market is now quotable as follows:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump			$1.20	$0.80@0.90	$1.15
3-in. lump			1.15		
6-in. lump	$1.20@1.35		1.25	1.00@1.15	1.35
Lump and egg	1.85@2.15	$2.00			1.15
No. 1 nut	1.20@1.35				
Screenings	0.85@0.95		0.80@0.85	0.70@0.80	0.75@0.80
Mine-run	1.00@1.15			0.75@0.80	
No. 1 washed nut	1.40@1.50	2.25	1.50		
No. 2 washed nut	1.25@1.35		1.35		
No. 3 washed nut	1.25@1.30				
No. 4 washed nut	1.25@1.30				
No. 5 washed nut	0.80@0.85				

Coke—Gashouse, $4; byproduct, $4.75, both f.o.b. St. Louis.



KANSAS CITY

Business showing improvement. Coal moving to wheat fields. Lump in better demand from harvesters. Market steady.

Coal is being shipped in quantities to the scene of the wheat harvest in Kansas, Oklahoma and Missouri and business is much improved as a result. Lump is in better demand, about one-third of the threshermen buying lump, and the remaining two-thirds using nut. Nut is to be utilized exclusively in the South, while Northern agriculturists are showing a preference for lump. The market is steady and stiff, with no concessions offered by operators.

PORTLAND, ORE.

Effort being made here to introduce Chinese anthracite on Pacific Coast. Local demand dull and will probably continue so for some time. Some fear expressed that Colorado strike may spread to Utah and Wyoming this fall. Wellington coal enters market.

Shippers at Seattle have corresponded with coal dealers here relative to possibilities of introducing Chinese anthracite on this coast. It is said the coal could possibly be retailed here for not to exceed $12 per ton. Several steamship companies are operating regular service between the orient and this port and it is certain that more satisfactory freight rates could be maintained on this coal than from Australia.

Although it has been reported here that the Panama Canal would undoubtedly be opened to traffic in a few weeks, coal dealers here have received information from the anthracite people in Pennsylvania indicating that there is no probability of any coal ships passing through the Canal before the first of 1915. This would make it too late in the season to admit of any large shipments for the coming season.

It has been intimated that there is a possibility of the Colorado strike situation extending into Utah and Wyoming next fall. This in addition to a car shortage may prove a hardship on consumers as well as dealers the coming fall.

Wellington coal has again entered the Pacific Coast market, and while little has as yet found its way into Portland, it is being shipped to San Francisco in considerable quantities. The condition of the market here has not justified much importation.

PRODUCTION AND TRANSPORTATION STATISTICS

VIRGINIAN RAILWAY

Total shipments of coal over this road for April of the current year amounted to 342,843 tons as compared with 345,039 tons for the same month last year.

ANTHRACITE SHIPMENTS

Anthracite shipments for May and the first five months of the current year as compared with last year were as follows:

	May		5 Months	
	1914	1913	1914	1913
Phila. & Reading	1,202,679	1,123,869	5,086,832	5,703,277
Lehigh Valley	1,249,218	1,191,632	4,829,093	5,408,310
Cent. R.R. N.J.	782,889	745,347	3,549,573	3,724,219
Del. Lack. & West	901,596	882,651	3,656,638	3,961,646
Del. & Hudson	663,648	591,499	2,754,627	2,936,187
Pennsylvania	579,869	574,468	2,746,436	2,656,765
Erie	702,892	671,972	3,251,852	3,417,900
Ont. & Western	198,762	214,304	940,552	1,073,503
Total	6,281,553	5,995,742	26,815,603	28,881,807

FOREIGN MARKETS

GREAT BRITAIN

May 29—With the Whitsun holidays so near, business is quiet. Quotations are approximately as follows:

Best Welsh steam	$4.68@4.80	Best Monmouthshires	$4.11
Best seconds	4.56	Seconds	3.87
Seconds	4.29	Best Cardiff smalls	2.67
Best dry coals	4.32	Seconds	2.46

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, $6.24; good foundry, $4.80@5.52; furnace, $4.08@4.56.

COAL FREIGHT DECISIONS

I. C. C. Nos. 5607 and 5601 Sub. No. 1—J. E. Stone & Son vs. Southern Ry. Co. (No. 5001) and Griffin-Hallman Fuel Co. vs. Southern Ry. Co. (No. 5001 Sub. No. 1).

Rate of $2.05 per ton on coal from Newcomb, Tenn., to Greenville, S. C., found to have been unreasonable insofar as it exceeded a rate of $1.95. Reparation awarded.

Suspension Docket No. 280—Coal rates from Indiana and Illinois mines to stations in Iowa.

Proposed increased rates on coal from grouped mines in southern Indiana and Illinois to points on the Mason City & Clear Lake and Inter-Urban railways in Iowa held to be justified and order suspending their operation canceled.

Suspension Docket No. 338—Coal rates to Dewey, Okla.

Proposed increased rates on slack and run-of-mine coal from West Mineral and Fleming, Kan., to Dewey and Bartlesville, Okla., not found to be justified and directed to be canceled.

Suspension Docket No. 281—Proportional rates on coal from Ohio coal fields to Mississippi River crossings.

The cancellation of the proportional rate of $2.10 per net ton from Ohio coal fields to the upper Mississippi River crossings, applicable on bituminous coal destined to points west thereof, not justified.

Financial Department

Delaware, Lackawanna & Western

President Truesdale, of this company, reports, in part, for the year ended Dec. 31, 1913, as follows:

Results—The earnings, both gross and net, for 1913 were large, and reflected the business conditions of the country generally during that period.

The unusually large crops of all kinds produced in 1912 stimulated business activities in every direction, and as a consequence the railroads of the country during the greater part of the year handled an exceptionally large tonnage, in which this company participated to an extent not equaled in any preceding year. Our mining operations, which were suspended for about two months in 1912, were prosecuted without important interruption throughout the year and the transportation earnings on coal were, in consequence, $1,138,203 more than in 1912.

Taxes—The increase in taxes was $208,020, or 11.74%. This illustrates the current trend of affairs, national, state and municipal.

Coal-Mining Department—Our mining operations resulted in a larger production of coal than in any previous year. The net earnings from this source, however, were $841,876 less than in 1912. This was due to various causes, but chiefly to higher mining cost. As explained last year, many of our mines have reached a point where the larger part of the coal produced is being mined from the thinnest workable veins of coal in the anthracite region, and in mining it large quantities of rock have to be taken out, which in some cases costs more to blast and remove than the coal itself. The miner has to use almost double the quantity of powder in taking out the rock that he uses to secure the coal, and his pay is increased accordingly. Much of the coal from these mines is also mined from the old abandoned workings and is secured only at a high cost per ton. The cost of mining has been further increased appreciably as a result of labor troubles.

The state of Pennsylvania has also undertaken to collect a tonnage tax on the anthracite coal produced on the basis of 2½% on the amount realized by sale of coal at the mines. This tax cost us about $250,000. The increase in taxes levied by the counties and municipalities in the anthracite region cost us the additional sum of $106,804.

The tonnage produced from our collieries and washeries was 8,844,063 gross tons, or 677,273 tons more than in 1912. The development of the new operations, i.e., the Loomis and the Laurel Run, has been pushed vigorously and should by Dec. 31, 1914, be producing a considerable tonnage.

Extraordinary expenses, aggregating $959,511, were made for improved equipment and on the new developments. The outlook for the coming year, as respects the anthracite-coal industry, seems fairly encouraging.

Financial—During the year an increase of $12,000,000 in capital stock was subscribed for by the stockholders; 50% of the subscriptions was called early in the year and the proceeds largely utilized in paying for the work done during the year on the new Clarks Summit-Hallstead line. The balance due on the new stock was payable Jan. 5, 1914. At the present writing these payments have all been made and certificates of stock issued therefor, thus making the present issue of stock outstanding $42,277,000.

General Remarks—During the last two months of 1913 the business activity of the country at large slowed down very rapidly, and at present writing the volume of business being done is from a fourth to a third less all around than at the same time a year ago. This was in part due, no doubt, to the shortage of the corn crop of 1913, but to a greater extent, however, to a widespread feeling of doubt and uncertainty as to the effects of the tariff and currency legislation pending and under consideration by Congress and finally enacted into laws. The railways immediately felt this slowing-down process and have been forced to retrench.

The present outlook for 1914 appears to be somewhat uncertain, not to say discouraging, to the railway interests and those more or less dependent on them for their prosperity. Of course, if later in the year the prospects for abundant crops appear to be good, conditions may change very much from what the present outlook promises.

Gross Revenues

	1913	1912	1911	1910
Coal	$14,418,507	$13,280,304	$14,096,725	$14,067,778
Mdse., fght.	15,089,067	13,999,359	12,462,679	12,443,473
Passenger	8,549,346	7,722,953	7,696,800	7,290,943
Mail, exp., etc.	2,727,235	2,561,894	2,330,359	2,250,738
Total rev.	40,784,148	37,564,511	36,586,563	36,052,932

Operating Expenses

Mt. w. and st.	5,148,035	4,646,175	4,144,940	3,804,932
Mt. equip.	6,189,093	6,128,762	5,762,903	5,034,605
Traffic exp.	887,576	822,835	779,489	716,347
Transp. exp.	12,533,966	11,778,982	10,864,107	10,379,455
Gen'l exp.	815,173	769,668	767,213	688,110
Total exp.	25,573,842	24,146,423	22,318,652	20,623,448

The principal traffic statistics compare as follows:

Coal Traffic

	1913	1912	1911	1910
Tons (gross) transport	9,087,660	8,483,899	8,864,419	8,921,033
Tons 1 mile	*1,738,170	*1,491,246	*1,687,831	*1,681,100
Rate per ton-mile	0.830c.	0.835c.	0.835c.	0.837c.
Merchandise traffic:				
Tons net tr.	14,544,493	13,394,359	11,804,105	11,758,953
Tons 1 mile	*2,321,374	*2,139,002	*1,842,778	*1,788,021
Rate per ton per mile	0.650c.	0.654c.	0.676c.	0.696c.
All freight traffic:				
Earn per fgt. train mile	$4.56	$4.19	$4.15	$4.09
Av. trainload net tons	659.58	602.38	583.82	566.72
Passenger:				
Earn p. pass. serv. to mi.	$1.71	$1.63	$1.61	$1.55
Pass car'd.	25,509,047	25,462,301	26,512,689	26,246,479
Pass. 1 mile	*546,309	*505,585	*510,845	*501,580
Rate per pass. per mile	1.565c.	1.528c.	1.507c.	1.454c.

*000 omitted.

Note—For the previous annual report of this company, see "Coal Age," Vol. 3, p. 708.

Lehigh Coal & Navigation Co.

Railroads—The coal tonnage of the Lehigh & Susquehanna R.R. and branches aggregated 9,328,493 tons, an increase over 1912 of 338,790 tons, and a decrease from 1911 of 217,409 tons. The gross receipts were $9,962,036, showing a net increase of $41,850 over 1912. The Panther Creek R.R. has been merged with the Lehigh & Northeastern R.R.

The net revenue received from railroads for the year was $2,495,081, a decrease of $76,124.

Lehigh Navigation Electric Co.—The power plant of this subsidiary at Hauto has been practically completed, and is now in partial operation. Full operation will be inaugurated as soon as connections are made with prospective customers, with whom contracts have been made for the sale of a substantial amount of the power to be produced. It is hoped that negotiations will soon be completed which will provide a satisfactory market for the entire estimated production of the present installation.

During the year electric companies have been chartered to operate in additional townships which may be reached by the Lehigh Navigation Electric Co.'s transmission lines.

RESULTS FOR CALENDAR YEAR 1913

	Coal	Canals	Railroads	Miscellaneous	Total 1913	Total 1912
	$	$	$	$	$	$
Revenue	14,279,914	213,490	2,901,595	899,688	15,294,687	13,808,650
Expenses	9,808,108	253,135	406,514	20,823	10,488,581	9,573,351
Depreciation	*704,090	18,000	.....	39,927	a762,017	400,000
Taxes	302,970	.....	.....	5,292	308,261	199,572
Net operating revenue	464,746	57,645	2,495,081	833,646	3,735,828	3,655,727
General administrative expenses					136,656	165,183
General taxes					232,459	250,995
Interest on funded debt					953,034	923,264
Other interest					41,168	8,029
Dividends paid (8%)					1,124,636	2,124,636
Balance, surplus					247,875	3,163,620

*Includes $476,777 for depreciation and reserves and $227,313 for depletion of coal lands. a Includes $534,705 for depreciation and reserves and $227,313 for depletion of coal lands.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 25
Issued Every Saturday
Hill Publishing Company

NEW YORK, JUNE 20, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Ask the Mines That Use—

Wico Safety Electric Lamps

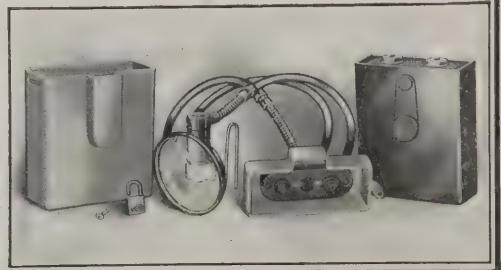
WHETHER the electric safety lamp has reached the stage where it can be considered a practical equipment and they will answer **yes,** most emphatically. They will tell you that you can purchase the Wico lamp now without trial and be assured of economical, efficient service. As compared with other cap lamps, it is much stronger, has more hours of light when first put in service and after months of daily use will burn far beyond the shift requirements when other lamps are out of commission or so short of battery capacity as to be unreliable in the extreme. The vital point of the electric lamp is the battery. The Wico battery is practically indestructible and guaranteed to give twe ve hours of light daily for a year from date of purchase.

Approved by United States Bureau of Mines

So that you can take for granted the safety of the Wico Lamp in gaseous atmospheres. The other big questions, daily cost and efficiency, have been answered **in** practical service. You can have the answers for the asking.

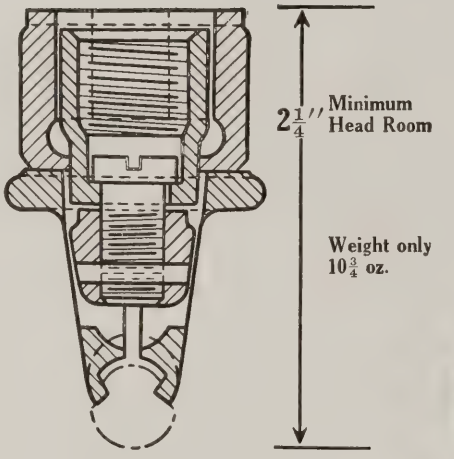
Write today.

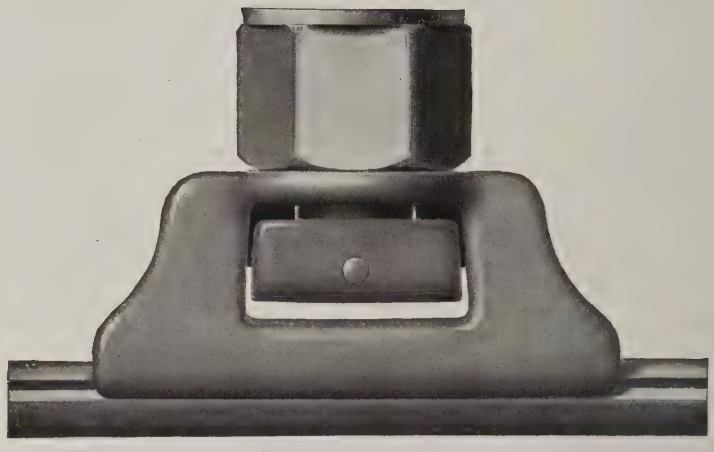
Witherbee Igniter Company
Springfield, Massachusetts



It's to your advantage to use

Westinghouse Type RE Trolley Wire Clamps





Consider these points:

1. Ultimate side strain required to pull 4/0 grooved trolley wire from jaws, 1350 lbs.

2. Ultimate vertical strain required to pull 4/0 grooved trolley wire from jaws, 1950 lbs. Should the wire be pulled from the jaws it can be immediately re-inserted and tightly clamped. It is not necessary to straighten the jaws which may have been distorted.

3. The clamp is tight against the suspension body at the same time wire is clamped.

4. When the wire has been inserted in jaws it is held automatically until the clamp is firmly tightened.

Westinghouse Electric & Manufacturing Co.

Sales Offices in
45 American Cities

East Pittsburgh
Pennsylvania

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JUNE 20, 1914 NUMBER 25

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 993

Much depends upon the accuracy of the small scale on a coal tipple, which is used for weighing the loaded mine cars. Errors in weights are a frequent cause of petty strikes.

*AN EPITAPH: *Page* 994

Poem by Berton Braley.

HISTORICAL SKETCH OF THE GEORGES CREEK COAL REGION: *Pages* 995-1000

A history of the Georges Creek field from its earliest settlement. Coal was probably found by the Indians, and it is said Braddock's army burned it on their march West. But not until the railroads and the canal were built did the tonnage increase to 2000 tons per year. The methods of the primitive miners are described, as are also the steps by which transportation and operation were placed on a stable footing. R. A. Walter. COAL AGE, Vol. 5.

ELECTRICITY IN COAL MINING—V: *Pages* 1000-1002

The selection of prime movers, reciprocating engines, steam turbines and waterwheels, is taken up in relation with the first cost and operating expenses of the plant. David R. Shearer. COAL AGE, Vol. 5.

EFFECT OF PANAMA CANAL ON WORLD'S COAL MARKETS—II: *Pages* 1003-1005

This installment is confined essentially to a discussion of the merits of our different foreign competitors. Great Britain is the power to be reckoned with in the world's coal trade, but there are other countries forging ahead rapidly which cannot be ignored. The use of fuel oil threatens to be a powerful factor in the situation, particularly in the Pacific Coast markets. F. R. Wadleigh. COAL AGE, Vol. 5.

*THE LIGNITE BRIQUETTING PLANT AT MINOT, N. D.: *Pages* 1006-1009

With greater supplies of lignite than all other varieties of coal combined, the time is fast approaching when these low-grade fuels will be briquetted and used. In certain instances, including the one here described, this has already proved a commercial success. G. J. Mashek. COAL AGE, Vol. 5.

THE LABOR SITUATION: *Page* 1010

Colorado is quiet, except for rumors of drastic action by the President. Many firearms have been surrendered in the northern part of the state. Mother Jones has been denied admission into Canada by the immigration authorities. Serious trouble was feared in West Virginia, but affairs there are now pacific. COAL AGE, Vol. 5.

MINE INSPECTORS' INSTITUTE: *Pages* 1011-1012

Principal features of the seventh annual meeting of the Institute, held at Pittsburgh, Penn., June 8-12, 1914. Description of the demonstration given by the Federal Bureau of Mines for the entertainment and instruction of the visiting members at their testing station in Pittsburgh and at the experimental mine at Bruceton. J. T. Beard. COAL AGE, Vol. 5.

NEW ANTHRACITE DISCOVERY: *Page* 1013

*A SIMPLE SLATE PICKER: *Page* 1013

TONNAGES OF BITUMINOUS COAL PLANTS: *Page* 1014

*MILWAUKEE'S COALING PLANTS: *Page* 1015

WHO'S WHO IN COAL MINING: *Page* 1016

Brief sketch of the life of Alfred W. Calloway, president of the Davis Coal & Coke Co.

EDITORIALS: *Pages* 1017-1018

Coal and Other Barons—Occupational Fatigue—Concentration of Surface Operations—Clayton Bill.

EXTRACTS FROM A SUPERINTENDENT'S DIARY: *Page* 1019

ANOTHER AMERICAN MINE SAFETY ASSOCIATION SECTION: *Page* 1019

RECENT LEGAL DECISIONS: *Page* 1019

CARTOON: *Page* 1020

DISCUSSION BY READERS: *Pages* 1021-1023

A Longwall Proposition. Letters Nos. 1, 2 and 3—The "Safety First" Call. Letter No. 1.

STUDY COURSE IN COAL MINING: *Page* 1023

INQUIRIES OF GENERAL INTEREST: *Page* 1024

Cubic Contents of a Bushel of Coal—Cleaning Safety-Lamp Gauzes—Two Questions of Safety—Engineer of Mines.

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 1025

COAL AND COKE NEWS: *Pages* 1026-1029

COAL TRADE REVIEWS: *Pages* 1030-1034

ADVERTISING INDEX: *Page* 32

NUMBER OF COPIES PRINTED THIS ISSUE 10,250

None sent free regularly, no returns from news companies, no back numbers.

The Other Man's Opinion

It's always interesting to compare notes on the paper you read—to ask your friends what they think of it and to get other men's opinions. Out of our regular correspondence we have taken some opinions on Coal Age—you will like to look them over:—

"I have seen enough of your publication to appreciate its value, and I take pleasure in renewing my subscription."
J. F. Welborn, Pres.,
Colo. Fuel and Iron Co.,
Denver, Colo.

"We subscribed for Coal Age with its first issue, and think highly of your paper."
F. L. Schoew, Pres.,
Howard Colliery Co.,
Chattaroy, W. Va.

"I am taking four of the trade papers and without a doubt I get more from Coal Age than from any other journal I have ever seen. You are indeed due to be congratulated upon the success your paper has attained. No coalman can afford to be without it, and in this connection you can count me as a subscriber as long as it is published."
H. E. Bissell,
Asst. Secretary, Black Diamond Coal Mining Co.,
Birmingham, Ala.

"Coal Age is the best paper of all the mining papers."
H. N. Starnes, Pur. Agt.,
Alabama Coal & Coke Co.
816-818 Brown Marx Bldg.,
Birmingham, Ala.

"I am a reader of COAL AGE with much interest, as I consider it the best journal published for mining men as a whole. I have been a subscriber from the beginning and I wish you much success in the future for your paper."
F. G. Morris,
General Superintendent Coal Mines.
Republic Iron & Steel Co.,
Sayreton, Ala.

"Thanking you for the book for this year, which I find very valuable in our business, I am respectfully,"
L. A. Vreeland, Mgr.,
The Canon Coal & Dev. Co.,
Pueblo, Colo.

"The Randolph Coal Co., of which I am Secretary, is a subscriber to your paper. I am so well pleased with it that you may rest assured that as soon as our subscription runs out, we will subscribe again."
L. D. Powell,
Randolph Co. Coal Co.,
Coulterville, Ill.

"I congratulate you on the success of your aims in making Coal Age a necessary publication for mining men."
J. W. Starks,
State Mine Inspector, 5th Dist.,
Georgetown, Ill.

"I know it is the best paper published for mining men in general."
M. D. Daniel,
State Mine Inspector,
Ashland, Ky.

"Coal Age deserves much credit for their general circulation. Your admirable Journal is doing good work and is really supplying a want. You have the best wishes of the fraternity for your continued success."
Very truly yours,
A. C. Finley,
General Manager Penn. Erie Coal Co.,
Rayland, Ohio.

"The writer would not be without his copy of Coal Age."
D. D. Dunkin, Supt.,
McAlister Coal & Coke Co.,
Buck, via Carbon, Okla.

"Find enclosed $3 subscription to your *really* valuable paper. It is a veritable live wire, a boon and a money maker for operator, mine official and miner."
Charlton Dixon, Supt.,
Oliver Coal Company,
104-6th St., Pittsburgh, Pa.

"You are putting out the best coal paper published."
Geo. E. Boyd.,
Boyd Brothers Coal Co.,
Tarentum, Pa.

"Coal Age is necessary to every coal mining man. I couldn't well afford to do without it.
John McClane, Supt.,
Ft. Ligonier Coal Co.,
Ligonier, Pa.

"I must say that you have the best mining paper published today."
J. A. Morgan,
Inside Foreman, Scranton Coal Co.,
325 Garfield Ave.,
Scranton, Pa.

"I wish to say here that I am thoroughly in accord with the sentiment of the Coal Age, and believe its influence for good throughout our coal mining field."
Geo. E. Sylvester.,
Chief Mine Inspector.

"I like Coal Age—in fact it can't be beat. The reading is of the best and when I am needing supplies of any kind, always look at Coal Age ads first."
Gus M. Hodges, Ass't. Gen. Mgr.,
Malakoff Lignite Co.,
Alba, Texas.

"Coal Age is entirely satisfactory, as a matter of fact I am a subscriber of three different mining journals, but consider Coal Age to be the best and am always pleased to see it come."
Emil Ostlund, Mine Supt.,
Utah Fuel Co.,
Utah Mine, Utah.

"I am well pleased with Coal Age and feel that I could not well do without it. It's all right."
R. J. Humphries, Manager,
Buckhannon River Coal Co.,
Adrian, W.Va.

"I can heartily recommend COAL AGE to any one wanting a good clean mining journal."
J. M. Swick,
M. F. & Supt., Humphries Colliery Co.,
Philippi, West Va.

"Coal Age is already in "First Place" and still advancing."
G. W. Coyle, Mgr.,
Hartford Coal & Mining Co., Inc.,
Hartford, W.Va.

"I find that your paper is a great help to me, and I would not be without it at all now."
R. B. Barlow, Superintendent,
Logan Coal Co.,
Ethel, W.Va.

"I assure you my support in every way as I have taken it up with our Mine Superintendents and Foremen and every one else at our mines that I think it would interest in the operation of coal mines. I have tried to impress upon them the fact that they should have this paper, and will continue to do so."
C. J. Ryan, Gen'l Sup't.,
Hutchinson Coal Co.,
Fairmont, W.Va.

"I enjoy every issue and consider some of the articles fit to be incorporated in textbooks on mining."
C. O. Messenger, Mining Engineer,
Wilsonburg, West Va.

"I think Coal Age is one of the greatest mining journals printed, and a help to all mining men. Every mining man would be better by reading it."
Thos. Griffiths, Gen. Supt.,
Belmont C. Co.,
Acosta, Pa.

"The reading material contained in your paper has not only been interesting to me, but also instructive; in fact I consider it the only source from which I may get the latest information on coal mining."
S. Ken Huang,
Tayeh Iron Mines,
Han-yeh-ping Iron & Coal Co., Ltd.,
Tayeh, China.

COAL AGE

Vol. 5 NEW YORK, JUNE 20, 1914 No. 25

Have you ever stopped to consider how much depends upon the accuracy of the small scale on your tipple, which is used for weighing all of the mine cars?

In most cases, no accurate check can be obtained against the mine weights, because the coal before reaching the railroad scales has to be picked and washed, or possibly be subjected to both treatments, and in this separation process, various errors creep in. However, in spite of this fact, many coal companies have no systematic method of testing the accuracy of their tipple scales, nor the tare weight which is credited to the empty cars.

Every now and then, you will hear of a local union calling its men out on strike, as a protest against errors in weights, and the history of such disagreements is generally about as follows:

An auditor, in checking over mine weights according to pay-rolls, against receipts from coal sales over a period of several months, finds a noticeable discrepancy. The manager is notified and immediately takes the question up with the local superintendent. The superintendent warns the company weighman that unless he watches his weights more closely, someone will be minus a job. The company weighman and the miners' check weighman (if there happens to be such an individual around) test out the scale with test weights and find them a little out of balance. They agree to adjust them and, as a sort of compromise to the company for the shortage of the previous two months, decide to lean the company's way for a time.

Here's the result:

Miners notice a difference in their weights, question the check weighman and become suspicious of his manner, elect a new check weighman, demand a new test to be made for determining the tare weights of all of the cars, demand a few other things, such as stopping the cars on the scale for a longer time and finally end up by declaring a strike,

Ponder a minute if you please, as to what might have occurred over a period of several months, to have affected the weights. Here are a few possible happenings:

1.—The weighman might have been dishonest and credited coal to a dummy.

2.—The *railroad* scales might have been out of adjustment for a time and then readjusted without the mine official's knowledge.

3.—The average tare weight of the cars might have been affected by repairs to a number of old cars, or by changes in the type of wheels in use.

4.—The weighman might simply have been careless.

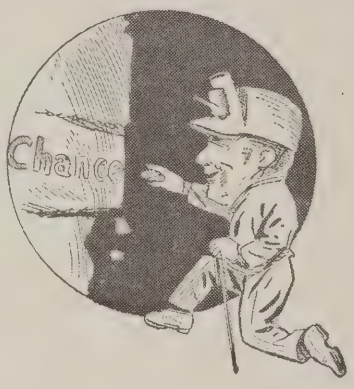
5.—A considerable amount of coal might have been stolen off the loaded railroad cars, between the time they were loaded and the time of weighing on the railroad scales. (This often happens during the winter months, at camps where no check is made on the domestic coal sales.)

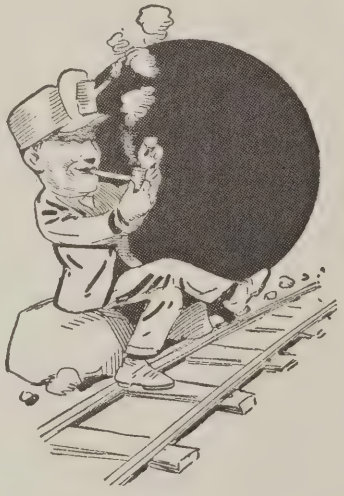
Moral—Don't let errors accumulate until they become so large as to excite you unduly and upset your better judgment.

An Epitaph

By Berton Braley

Written expressly for Coal Age







Here Lies
ANTONIO HOROWITZ
Or What is Left of Him,
He Was a Man
of
Splendid Build
of
Vigor and of Vim.

He Never Feared to
TAKE A CHANCE
Wherever He Might Be,
He'd
TAKE A CHANCE
The Roof Was Safe
He Would Not Look
To See.

He'd Use a Drill
To
Tamp a Charge
And
TAKE A CHANCE
on
That,
He'd Smoke in Any Gassy Place
He
Happened to be At.

And
When He Rode Upon The Cage
He Would Not
Grasp
The Bar,
He Never Looked Upon
The Board
Where
RULES OF SAFETY
Are.

But, Being Full of Health and Strength
And Quite Devoid of Fear
He Played at Hide and Seek
With
DEATH
And Now He's Lying
Here.

He TOOK A CHANCE
With Dynamite
He
TOOK A CHANCE
With Damp,
And in the Very PRIME OF LIFE
Fate Snuffed His
Miner's Lamp;

He's Done With
TAKING CHANCES
Now
He's Done with Mines and Such,
And What is Left of Him
Lies Here—
HE TOOK ONE CHANCE TOO MUCH.

Historical Sketch of the Georges Creek Coal Region

By R. A. Walter*

SYNOPSIS—A history of the Georges Creek field from its earliest settlement. Coal was probably found by the Indians and it is said Braddock's army burned it on their march West. But not until the railroads and the canal were built did the tonnage increase to 2000 tons per year. The methods of the primitive miners are described as also the steps by which transportation and operation were placed on a stable footing.

The Georges Creek Coal basin lies almost wholly in the western part of Allegany County, Maryland, in the valley between Dan's and the Savage Mountains. The synclinal axis of this canoe-shaped basin extends from a point four miles north of the Pennsylvania State line, south 27 deg. west, 25 miles to Westernport, the basin maintaining an average width of six miles. The upper Potomac basin, southwest of Westernport, is geologically a continuation of the Georges Creek basin, but has always been commercially considered as distinct and separate from the Georges Creek field.

Frostburg, the largest town in the region, is located on the synclinal axis of the basin, 11 miles west of Cumberland, 5 miles south of the Pennsylvania State line and 10 miles south of the northern end of the basin. It is situated on the divide between Jennings Run, which drains the north end of the basin, and Georges Creek, which drains its south end. From the latter creek, the field derives its name.

Eckhart, Loartown and Vale Summit are located near the eastern edge of the basin on the headwaters of Braddocks Run, which flows through Short Gap, a break in the coal-bearing measures, about three miles east of Frostburg, thence eastwardly to Wills Creek a short distance above Cumberland. Mount Savage and Barrelville lie northeast of Frostburg, near the northern limits of the basin, Midland, Lonaconing, Barton and Westernport being located southwest.

Space does not permit a history of the field in detail, but only such events are noted as were of importance to the general development of the region. The early history of the field, the struggles of the mine owners, the introduction of railroads and canals, the formation and growth of the coal companies and the mining methods of different periods will be briefly dwelt upon.

*Chief engineer, Maryland division, the Consolidation Coal Co., Frostburg, Md.

Cumberland Settled in 1750

Allegany County, Maryland, is especially rich in general historical details, very complete authentic history dating back to 1749 being readily obtainable. In that year a patent was granted to what was known as the Ohio Co., for 500,000 acres south of the Ohio, between the Monongahela and Kanawha Rivers and west of the Alleghenies. This company immediately began an exploration of the country and in 1750 built a trading post at Wills Creek—now Cumberland.

In 1751 a trail, from this trading post, west across the Georges Creek Valley, thence north to the present site of Pittsburgh, was marked by Colonel Thomas Cresap accompanied by Nemacolin, an Indian guide. This trail was used by George Washington, on his expedition against the French in 1753, and improved by him to such an extent that after his return over the same route in the following year, it had become a fairly passable road. It was again used after the completion of Fort Cumberland in 1755 by General Braddock on his ill-fated attempt to capture Fort Duquesne, and has since been known as the Braddock Road.



A canal paralleling the Potomac and largely used for conveying Georges Creek coal to Georgetown



Loading dock at Cumberland, Md., on the Cumberland & Pennsylvania R.R. and the canal

The Chesapeake & Ohio Canal

Notwithstanding Washington's protest, Braddock halted to "level every mole-hill and bridge every brook." As everyone familiar with early American history knows, these delays were primarily responsible for his defeat by the French and Indians. His road-building operations, however, were of great benefit to the Georges Creek and other regions lying west of Fort Cumberland by opening to settlers this hitherto inaccessible country.

Georges Creek Settled before Revolutionary War

It is believed that the first settlement in the Georges Creek Region was made near Loartown, shortly after Braddock's retreat. However, very few settlers moved west of Fort Cumberland until after 1768, as the French-Indian allies were terrorizing the whole frontier by their

massacres. About 1768, the Indians were subdued and a stream of settlers began pouring westward to the fertile lowlands along the Ohio. Quite a few of these stopped along the way, the pioneer settlers of the Georges Creek region being recruited from their ranks. After 1788, the awarding of over 4000 military lots west of Fort Cumberland, to soldiers of the Revolution, was the greatest factor in populating this region until the development of the coal industry began.

Braddock's Road, from incessant use, eventually became almost impassable. No provision was made, nor were funds available, for its repair, and its condition after 50 years' use can readily be imagined. The need for a good road was realized by such men as Washington, Clay and others, who earnestly advocated and supported the project. In 1806, the National Government authorized the building of a turnpike from Cumberland to Wheeling. This road reached the Georges Creek region in 1814 and gave the flow of emigration renewed impetus.

Discovery of Coal Deposits

Little is known about the discovery or early development of the coal deposits in the Georges Creek region. Tradition states that the Indians, in their early intercourse with the white settlers, sometimes referred to a black stone found here which burned like wood. From the same source we also hear that the soldiers of Braddock's army in passing through this region on their ill-fated march in 1755 to Fort Duquesne, discovered coal and burned some in their camp fires. Captain Orme, who kept a fairly comprehensive record of the happenings on this expedition, makes no mention of the presence of coal, but it is certain that the excavations made for the Braddock Road on the steep hill-sides directly on the outcrop of large seams, exposed the fuel to view. Whether it was recognized as coal must remain an unsettled question.

For a Long Time after Discovery It Was Not Mined Systematically

The first authentic record of the discovery of coal in the Georges Creek region is noted on a map made by M. Bonne bearing date 1782. As this map was made in France from information previously acquired in America and as the map shows a coal mine at the mouth of Georges Creek, the existence of coal in this vicinity must have been known sometime prior to that date.

During the next 28 years, mention is made but once of the occurrence of coal in this region. However, the country was rapidly being cleared and settled and it is likely that during this period the outcrops of the coal seams were exposed at a number of places and the coal mined for local use. It is reported that in 1810 there was an exceptionally violent freshet, which washed the earth off a considerable area of a large coal seam—probably the Pittsburgh or Big Vein—near Barton. The exposure of this coal is supposed to have caused great excitement and people came for miles to see it. Some of the more enterprising dug it up and hauled it by wagon as far east as Romney and even Winchester, where it was used for smithing purposes. Later it was hauled to Westernport only, and there loaded in flatboats and rafts and floated to Washington.

Early Industrial and Other Uses

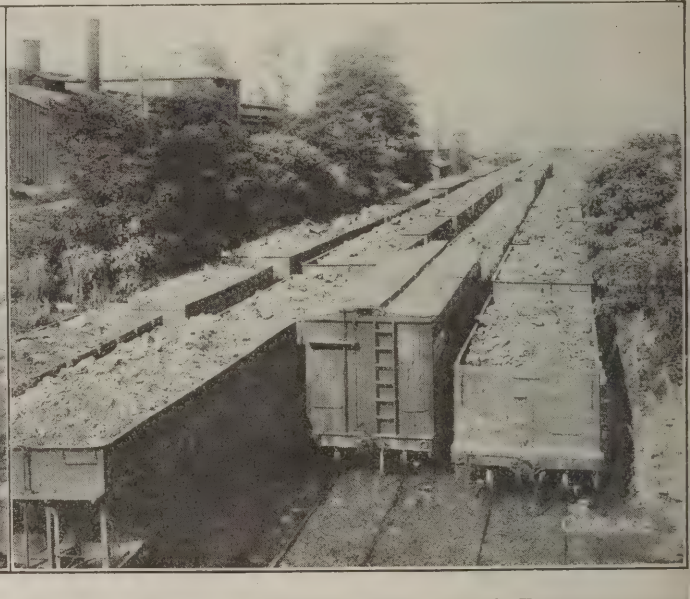
In the report of the United States Geological Survey the statement is made that coal was first discovered near Frostburg in 1804. According to Scharf's "History of Western Maryland," the first coal mined in the region was taken from the Sheetz Farm, 1½ miles east of Frostburg—date not given—and hauled to Cumberland. Both of these references probably are to the same mine. It is certain that the mine on the Sheetz Farm was operating in 1816, for at that date the coal from this working was used in Cumberland in the manufacture of glass.

Again, we have the record that during the construction of the National Turnpike in 1814 coal was found at Eckhart, which must have been in the same general vicinity as the mine just mentioned, and wagoned to Cumberland and other points as far east as Baltimore.

The small amount of coal which thus reached the markets was of excellent quality and gave such satisfaction that a demand was created for all that the mine owners



Consolidation No. 10—A Typical Small Seam Mine in Georges Creek Valley



Freight Yards of the Cumberland & Pennsylvania R.R. at Mt. Savage, Maryland

could deliver. To transport coal by wagon without having any return freight was uneconomical, hence it was carried in this way only when the teamster desired to bring back with him a load of supplies.

Boating Coal on the Unimproved Potomac

This, of course, did not satisfy the demand and, as railroads were then unknown and no other means of transportation available, the mine owners began shipping the coal in boats. These boats were flat-bottomed, with square raking ends, and were about 80 ft. long, 13 ft. wide and 3 ft. deep, and held from 50 to 60 tons. They were poorly constructed and clumsy. The combined efforts of the entire crew of four men were required to steer them.

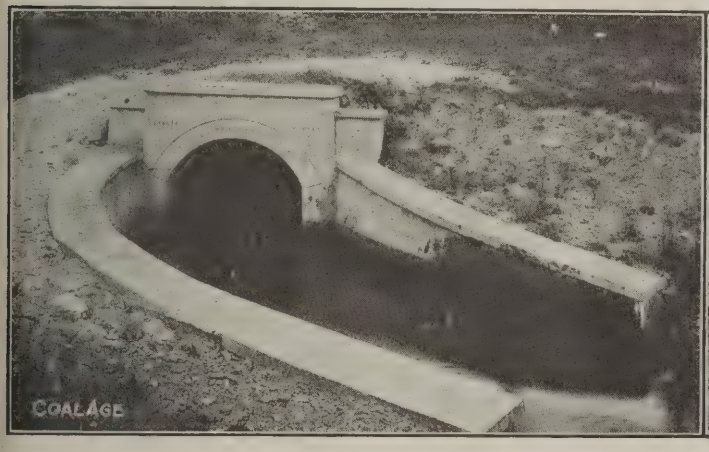
A practical means of transportation having now been discovered, more mines were opened and operated intermittently throughout the year, the coal being hauled by wagon to Cumberland where it was unloaded near the present municipal pumping station on Green Street, and stored in large piles on the river bank awaiting a freshet of sufficient height to float the boats with safety. These were generally built on the banks of Wills Creek of the finest white pine which abounded along this stream, and, at the first signs of a sustained rise, were floated to the stock pile of coal. The coal was loaded as rapidly as possible, the men working day and night. The crew then took charge of the boat, floated it to its destination—anywhere between Cumberland and Georgetown or Washington—and sold the boat and contents, returning to their homes on foot.

The Construction of the Chesapeake and Ohio Canal

By 1820, this traffic had assumed commercial importance and gradually increased until the completion of the Baltimore & Ohio R.R. to Cumberland in 1842, from which date it rapidly dropped off until after the completion of the Chesapeake and Ohio Canal to Cumberland in 1850; when it was abandoned altogether. While at its height as many as 40 boats have been known to leave in one day. Not only mine owners, but farmers, merchants, mechanics and men of every occupation participated in these boating ventures as a quick way of obtaining cash, which was then, as in all frontier communities, scarce.

This method of transportation, however, was at its best uncertain and it could be readily perceived that no systematic and profitable development of the coal seams could be expected unless the carrying facilities were improved. The need for some cheap method of transporting freight had been realized many years before, and well organized efforts had been made to secure it. Washington can be considered as the originator of these movements. On his several journeys through the region between Cumberland and the Ohio Rivers, he had been impressed with its wonderful natural resources and it was owing to his personal efforts that the Potomac Co., the predecessor of the Chesapeake and Ohio Canal Co., was organized in 1785. The object of this company was to so improve the channel of the Potomac River as to render it navigable as far as Cumberland.

Under the direction of Washington, who was its first president and who remained with it in that capacity until he resigned to accept the Presidency of the United States, the Potomac Co. started work at once and pursued it intermittently until 1820, by which time the public was thoroughly convinced that the Potomac River could not be made navigable by the expenditure of the limited amount of money then available.



East Portal Hoffman Drainage Tunnel



The Consolidation Coal Co.'s No. 7 Mine

The charter was then withdrawn from this company and granted to the Chesapeake & Ohio Canal Co., organized in 1828 to build a canal from Georgetown to Cumberland and thence to the Ohio River, with an auxiliary canal to Baltimore. The latter was never built but in 1850 the main canal, after great financial difficulties, was completed to Cumberland at a total cost of over $11,000,000.

The Building of the Baltimore & Ohio R.R.

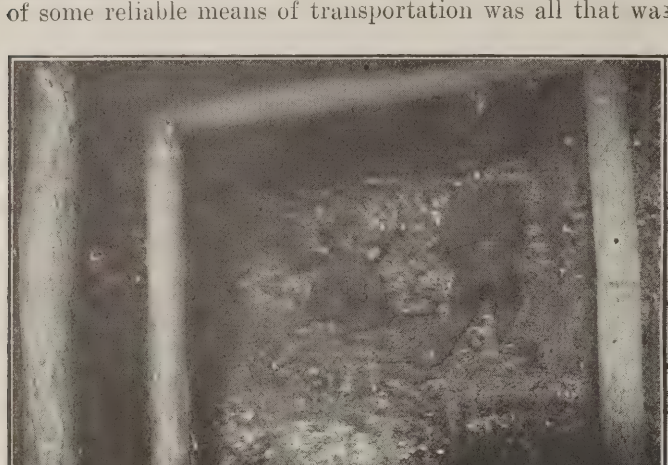
Just prior to the transfer of the charter of the old Potomac Co. to the Chesapeake & Ohio Canal Co., great interest was aroused by the experiments of Stephenson in England and Cooper in America with the steam railroad locomotive. Philip E. Thomas and George Brown, two citizens of Baltimore, were firm believers in the practicability of the railroad and called a meeting of the leading men of the city to discuss the advisability of building a railroad, instead of a canal, from Baltimore to Cumberland and Wheeling.

A plan for the organization of this road was drawn up and presented to the General Assembly of Maryland in February 1827 and an act of incorporation passed a few days later. The Baltimore and Ohio R.R. Co. was or-

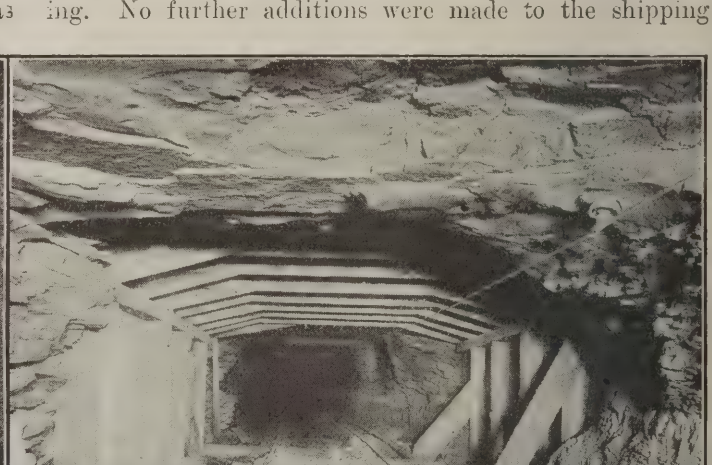
ganized the same year and in July, 1828, work was commenced. The practicability of using the steam locomotive for haulage purposes was firmly established in 1831 and in Nov. 5, 1842, the road was completed to Cumberland and in operation.

The First Coal Company Incorporated in 1828

It is a significant fact in connection with the organization of these two great transportation companies, that the first regularly incorporated coal company of the Georges Creek Field was organized in 1828, the same year that ground was broken for the construction of both canal and railroad. The excellence of Georges Creek coal was appreciated at this early date and the assurance of some reliable means of transportation was all that was required to interest Eastern capital in the development of these coal deposits.



Mining the Georges Creek "Big Vein" Coal. There Are No Cleat and Butt Fractures



Concrete Overcast in Consolidation No. 11, before Removal of Forms

The first incorporated company was the Maryland Mining Co., operating at Eckhart. This was followed 10 years later by the Maryland and New York Mining Co., operating between Frostburg and Mount Savage. These companies were the pioneers in exploring and systematically examining the field but sad to say they were organized too far in advance of the arrival of adequate transportation facilities. They eked out a rather precarious existence up to the arrival of the Baltimore & Ohio R.R. in 1842, but finally failed and their property was acquired by others.

Both companies started to build a railroad to Cumberland, down the valleys of Jennings Run and Braddocks Run, respectively. The latter was started in 1845 and completed in 1846 by the Maryland Mining Co. The other road was not completed by the original corporation, but by the Mt. Savage Iron Co., its successor. Before the completion of these roads, all the coal was shipped over the Baltimore & Ohio R.R. after having been hauled by wagon to Cumberland.

The Origins of the Cumberland & Pennsylvania R.R.

The Georges Creek Coal & Iron Co., organized in 1835, built a tramroad from Lonaconing and connected with the Maryland Mining Co.'s railroad at Clarysville in 1847, and in 1853 built a railroad from Lonaconing to Piedmont to connect with the Baltimore & Ohio R.R. at that point. This railroad was purchased in 1864 by the Cumberland & Pennsylvania R.R. Co., which had meanwhile acquired possession of the Mt. Savage Iron Co.'s road and extended it through Frostburg to Lonaconing. This was the first through railroad and remains to date the only railroad traversing the entire region.

In 1872, the Pennsylvania R.R. interests constructed a railroad to the Pennsylvania-Maryland state line at Ellerslie, and the Cumberland and Pennsylvania built a connecting link between this road and its line at Kreigbaum. Eight years later, the Georges Creek & Cumberland R.R., connecting with the Pennsylvania at Cumberland, was constructed from Cumberland to Lonaconing. No further additions were made to the shipping facilities until 1912, when the Western Maryland R.R. acquired control of the Georges Creek and Cumberland R.R. and extended their trunk line across the northern end of the field.

Thus we have a record of the transportation facilities for over a century, from primitive wagon and flatboat until at present there are two competitive railroads with outlets over three competitive trunk lines and over the Chesapeake and Ohio Canal. These splendid shipping facilities, its proximity to tide water and its high grade of coal have given this region decided advantages over other coal fields for shipments into the world's fuel markets.

The Gradual Consolidation of the Georges Creek Mines

In addition to the coal companies already enumerated there were incorporated before 1850, the Frostburg Coal Co., the Allegany Mining Co., the Washington Coal Co., and the Borden Mining Co. Of these, only the latter is now in existence. A detailed record could be given of the other companies incorporated since that time, but with few exceptions, the financial history of one is the history of all. Many were organized prematurely, others were continually on the verge of financial ruin, almost all were merely existing.

No better illustration can be given of conditions than that shown to exist by the following circular issued in 1869 by a committee of the five principal mining com-

panies of the region, including the Consolidation Coal Co., which had been incorporated in 1860 and was at this time operating the properties originally owned by the Ocean Steam Coal Co., Frostburg Mining Co., Mount Savage Iron Co. and the Cumberland and Pennsylvania R.R.

To the stockholders of the companies mining Cumberland coal in Allegany County, Maryland.

An experience of 25 years has convinced many of the most practical and sagacious persons, whose interests have been identified with the development of the Cumberland coal mines, that those interests can be made reasonably remunerative only by a complete change in the system of management. The total product of 1708 tons in 1842 has been increased, by the legitimate demands of the trade, to 1,330,443 tons in 1868, with a prospect of 1,500,000 tons in 1869, and yet, of the immense capital which has been invested in Allegany County, in coal property, how large a proportion has been swept away, and of that now representing the mining interests how insignificant is the portion which, even ocasionally, makes any return to the proprietors. Three reasons may be given to explain these unsatisfactory results. First, remoteness from our principal markets, with insufficiency and high cost of transportation thereto; Second, heavy expenses of multiplied administration, and Third, ruinous and, under existing circumstances, uncontrollable competition.

The first of these obstacles would inevitably subside, if not disappear under a systematic and unified apportionment of production to demand; the second and third would obviously vanish by the substitution of a single management, in the common interest, for the twenty-one separate organizations which, with their complicated and expensive machinery, now absorb the modicum of profit which is left to the owners of the mines.

Five of the largest companies having, with others, tried for years, but in vain, to remedy the evils above adverted to, by harmony of action, have at length determined to find, if practicable, a solution of the problem by uniting their properties under one organization, permanent and homogeneous. A suitable agent has been selected to investigate the relative areas and values of their respective coal lands, preliminary, it is hoped, to the adoption of an equitable basis of incorporation. These five companies are now moving in perfect accord toward that object, and have established a joint committee on consolidation. Within a month it is hoped that they will be prepared to proceed to the consideration of such a basis. To this end it is earnestly desired that as many companies now operating in the Cumberland coal region of Allegany County should unite in having their lands surveyed and appraised; or, if not that, that they will, at least, appoint a representative, or more than one and not more than three, to meet with the joint committee, and discuss with them the bearings of this scheme on their various interests. Stockholders are earnestly requested to press this important subject upon the consideration of their directors.

The five companies issuing this circular were the American Coal Co., the Borden Mining Co., the Consolidation Coal Co., the Cumberland Coal & Iron Co. and the Hampshire & Baltimore Coal Co.

The First Attempt at Consolidation Failed

An agent was selected to report on the acreage and values of the various companies, and after six months' labor submitted a thorough report showing that there remained unworked in the region about 15,000 acres of the "Big Vein" seam alone. The report was unsatisfactory, however, to a number of the operators and the plan failed in attracting into the consolidation any other company than the Cumberland Coal & Iron Co.

The acquisition of the property of this company by the Consolidation Coal Co. gave the latter more than half the coal lands of the region and all the railroad facilities. These holdings were still further increased a few years later by the purchase of the property of the Allegany Coal Co. by the Consolidation Coal Co.

Although this proposed consolidation of all companies in the region failed, its effect on the Cumberland coal market was invaluable. The enlarged company introduced better methods of mining and selling and fixed a high standard of excellence for its product, which has always been maintained. Being on a sound financial footing, it was in position to undertake improvements impossible of execution by any of its smaller component companies. It was the pioneer company of the region to install steam-driven fans for ventilation, and to use mine-haulage locomotives.

It has always been in advance of other companies in the region in conservation of its property and has been making strong efforts toward the ultimate extraction of every available ton of coal. It is the only company in the region that has solved the problem of satisfactorily and economically draining those mines below water level, thus increasing the ultimate recovery from the region and lengthening its life and prosperity. It has, since its inception, paid regular dividends to its stockholders, something unheard of before in this region, and is a fair representative of that class of consolidations which are beneficial alike to competitors, employees and the consumer.

Numerous companies have been incorporated since the organization of the Consolidation Coal Co. Those which were organized along conservative lines with good financial backing and good management were successful, while others, over-capitalized and mismanaged, have had a rather checkered career.

Double-Entry System Introduced about 1850

The early development was almost exclusively in the Pittsburgh or Georges Creek "Big Vein" Seam and the mining methods followed at first were of the crudest. An opening was made into the coal on the outcrop, driven wide and poorly timbered for a hundred feet or so, by which time it generally caved in, then another opening was made and the performance repeated.

This method was gradually modified until about 1840, at which date the general mode of procedure seemed to be to drive a single heading as far as possible without any artificial ventilation. Rudimentary rooms, seldom over 50 ft. long but about 20 ft. wide, were then driven to the right and left with but very little coal remaining between them. This operation was continued as near the outcrop as the condition of the seam and roof would permit and the opening then allowed to fall in.

Mines developed in 1850 show that recognition was being given to the need of better ventilation; in some few instances double entries were driven with furnaces as the ventilating appliance. There was no regularity, however, in regard to crosscuts or break throughs, or to the spacing of rooms. Rooms were driven of irregular width, crooked and running into each other at all sorts of angles, with no provision for the ultimate extraction of all the coal.

William Cullen Bryant, Stygian Rivulets, Etc.

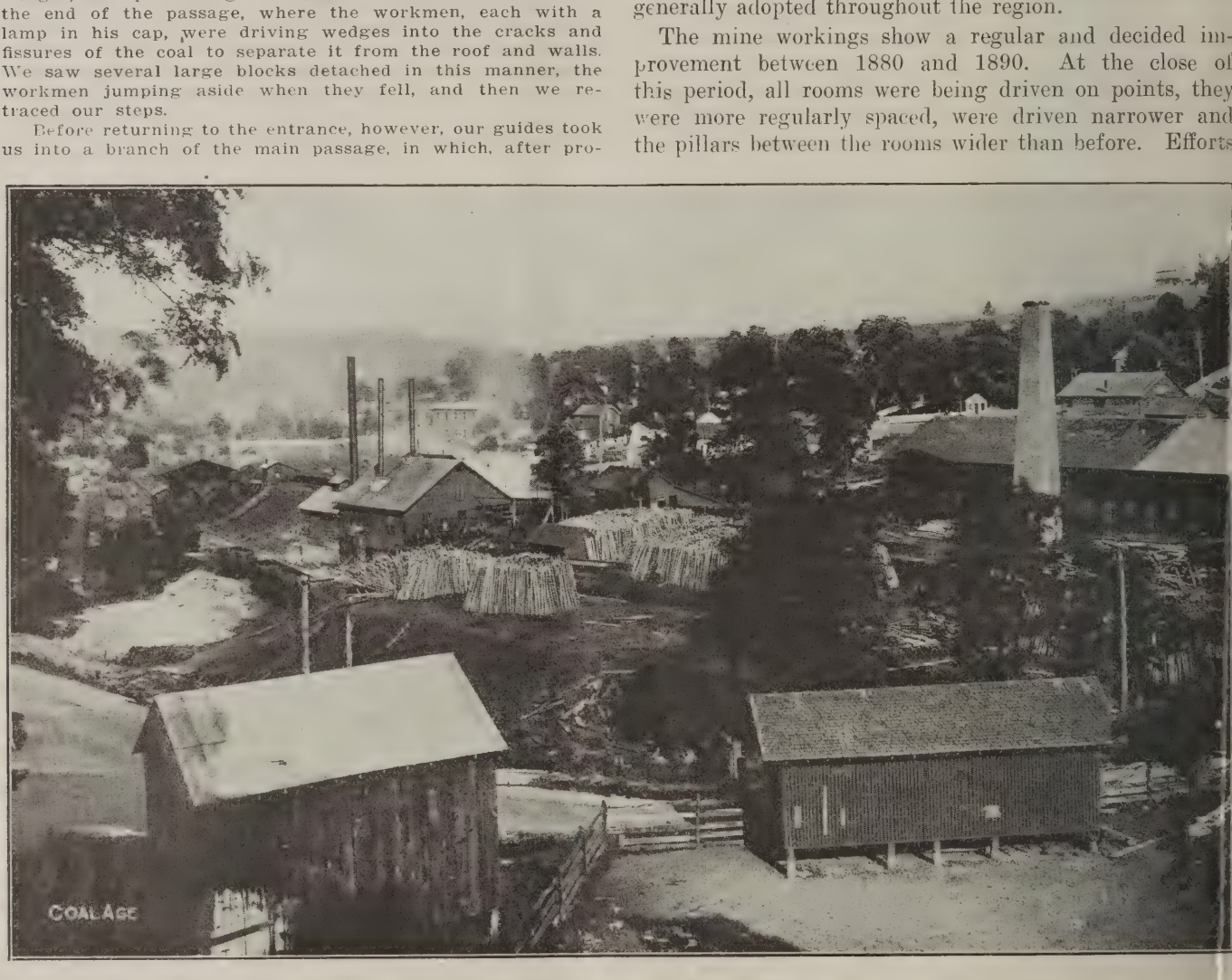
The following description of a trip through a Georges Creek mine, in 1860, by William Cullen Bryant, the famous poet, will no doubt be interesting, and will give some idea of the mining methods of that period:

Our party made a visit to a coal mine some three miles distant from Mt. Savage. From one of the black entrances flowed a lively little stream with yellow waters, into which I dipped my finger to ascertain their flavor. They were acidulous and astringent, holding in solution both alum and copperas. Leaving the Stygian rivulet we came to another entrance, out of which a train of loaded trucks was passing, every one of which was attended by a miner blackened from

head to foot with the dust of his task, and wearing in the front a small crooked lamp to light his way. As they emerged from the darkness they looked like sooty demons of the mine with flaming horns coming from the womb of the mountain.

We now entered, each carrying a lantern, attended by a guide. The vein of coal is from 8 to 10 ft. thick, and the passage is of that height, with a roof of glistening slate, propped in some places by wooden posts. Here and there, on each side of the passage, yawned chambers cut in the veins of coal, and extending beyond the reach of the eye in the faint light of our lanterns. At length we heard the sound of sledges, and proceeding for some distance farther came to the end of the passage, where the workmen, each with a lamp in his cap, were driving wedges into the cracks and fissures of the coal to separate it from the roof and walls. We saw several large blocks detached in this manner, the workmen jumping aside when they fell, and then we retraced our steps.

Before returning to the entrance, however, our guides took us into a branch of the main passage, in which, after proceeding a little way, we heard a roar as of flames, and then saw a fierce light before us. A furnace appeared, in which a fierce fire was blazing; the blackened workmen were stirring and feeding it, and a strong current of air rushing by us went with the flames up the shaft, which reached above to the surface of the ground. This, we are told, was a contrivance to ventilate the mine. All the foul air and all the firedamp and other noxious gases are drawn up and carried off from the passages and chambers by this method. On our way back to the entrance we perceived that the veins lay at just such an inclination as allowed the workmen to roll the loaded trucks by hand along an easy descent to the mouth, as I hear is the case with all the mines.



The Oldest Mine in Operation in the Georges Creek Region. It Was Opened in 1842.

Even in 1870 Alignment Sights Were Set

Workings of 1870 show in some places, rooms regularly spaced and driven on points. Some portions of workings were still, however, driven on the old method and those rooms that were spaced at regular intervals were too wide and the pillars too narrow. The need of ventilation was now more fully realized and almost all headings were paralleled by air courses. No mechanical devices had as yet been installed for ventilating purposes. The furnace was, however, coming into more extensive use.

Slope-haulage engines had been in use since 1845, but this decade—1870 to 1880—witnessed the installation of steam locomotives for mine haulage and also the first power-driven fan for mine ventilation. This was an exceptionally important step forward and one that was soon generally adopted throughout the region.

The mine workings show a regular and decided improvement between 1880 and 1890. At the close of this period, all rooms were being driven on points, they were more regularly spaced, were driven narrower and the pillars between the rooms wider than before. Efforts were now being made to secure all the coal by pillaring. The results were not as gratifying as at present, but were far better than anything attempted before.

The next decade marked the installation of mining machines, compressed-air motors for inside haulage and also the first successful development of the smaller seams of coal. Previous to 1890, mining had been confined almost exclusively to the Pittsburgh or "Big Vein" seam, but since that date the high quality of the coals of the smaller seams has been realized and at present there are more mines working in these beds than in the "Big Vein."

In 1900, about 75 per cent. of the coal was being recovered, but this, by careful management and a more thorough knowledge of the action of the overlying strata has been increased until at present a record of 95, 96 or even 97 per cent. ultimate recovery in some of the mines is by no means uncommon.

Electricity in Coal Mining

By David R. Shearer*

SYNOPSIS—This is the fifth article in the series on this subject. The selection of prime movers—reciprocating engines, steam turbines and waterwheels—is taken up in relation with the first cost and operating expenses of the plant.

Perhaps the most important part of any plant used for mine operation is the prime mover or source of power by which the electric generating equipment is driven. The chief reason for this is the fact that this part of the equipment varies more widely in first cost, operating expense and upkeep than any other part of the entire plant. In considering the generating equipment, we find that the efficiencies of all standard machines are high, ranging from 85 to 90 per cent. of the power expended on the generator shaft. Moreover, if properly installed, a generator is not liable to rapid depreciation or inherent accidents, nor does the efficiency diminish with the age of the machine.

If we examine the steam engine, in the light of generator operating characteristics, we note that it is a very inefficient machine and that this inefficiency increases rapidly with the age of the engine. We cannot, however, consider the engine alone from a practical standpoint in determining the prime-mover efficiency of a steam power plant for the very evident reason that the boiler or boilers play an important part in regard to the operation of the engine.

Engines are classified into several distinct types, each of which may have some favorable points, offsetting which are certain inimical features applicable to each type of machine. The simple slide-valve engine is perhaps the most common, it being cheaper in first cost but far more inefficient than later and more costly types.

Even the slide-valve engine is found in two varieties, the high-speed or automatic-cutoff engine, which is perhaps the more modern type, and the slow-speed or throttling engine. This latter form is almost obsolete, owing to its lack of regulation and its large consumption of steam. For small installations, say 100 hp., the high-speed automatic is very satisfactory, but when it becomes necessary to install a larger unit, it is usually advisable to use a more efficient type of engine.

In the larger types we have the corliss, condensing and compound. The chief value of the corliss engine lies in the type of valve-gear used. In this type the valves for inlet and exhaust may be adjusted separately and individually so that the point of admission and release may be set at the most economical operating points for a given set of conditions, while in the slide-valve engine the same valve unit is used for both inlet and exhaust and therefore is not subject to adjustments.

Within recent years, engines of the four-valve type have been brought out, differing to some extent from the corliss system. High economy is claimed for some of these machines, which are usually of the non-releasing type. Although some simple corliss engines are in use, it is usual to find them run condensing, as by so doing we secure some 10 or 12 lb. more working pressure on the piston heads.

A step further in this direction leads us to the compound condensing corliss engine, in which type there are two cylinders. The steam is admitted first to the high-pressure cylinder and the exhaust from this cylinder used in the large low-pressure cylinder, after which it is discharged to the condenser.

With an engine of this last named type we may secure an efficiency approximately three times as great as with the simple slide-valve throttling engine. Another point in favor of the compound condensing unit is that the efficiency of this type of machine holds up well throughout the life of the plant.

The Steam Turbine

Another type of prime mover which has come into prominence within the last 10 years is the steam turbine, either used alone or in conjunction with a corliss engine. The turbine is noted for its high speed and for its ability to utilize steam containing a high degree of superheat, the use of which cuts down condensation losses and adds to the overall efficiency. Owing to the high speed, it is usual to find the turbine used to drive an alternating-current generator, the direct-current generator not being well adapted to such high speed on account of commutator troubles. The efficiency of the ordinary steam turbine, when used alone, is perhaps not quite so high as that of the compound corliss condensing engine, but when designed for low pressure and used on the exhaust from a corliss machine, a marked increase in economy is possible, considering both engine and turbine as a single unit.

So many factors enter into the proper selection and installation of steam engines and their accessories that each individual case must be worked out separately after all the factors governing the plant operation have been determined. The probable life of the plant must be assumed from past experience with similar installations and the cost of several different types of equipment must be estimated.

After this the economy and cost of operation of the differing types must be determined. With this data clearly expressed, a balance must be worked out between the efficiency desired and the initial cost. No detail should be left out that would go toward adding to the overall efficiency. Such, for instance, as properly covering the steam pipes, the use of superheaters and economizers, the installation of feed-water heaters and the proper utilization of as much of the heat produced by the burning coal as is possible.

Boiler Efficiency Is Important

The efficiency of the steam plant depends largely on the boiler also, since we may use a good engine on a poor boiler or *vice versa*, and secure very unfavorable results. The number of types of boilers and boiler accessories is almost unlimited and it is really difficult to determine just what type to use under certain conditions. Formerly practically all boilers of any size were placed in a brick setting, but within recent years, several manufac-

*Knoxville, Tenn

turers have brought out types of boilers which are self-contained and require little or no brickwork. These boilers have the advantage in that there are no cracks in the setting or furnace by means of which air can leak through and thus decrease combustion efficiency.

As a usual thing, a feed-water heater should be used with a boiler of any size, so that the water may be pumped to the steam generator at as high a temperature as possible, thus securing a gain in efficiency and preventing damage to the boiler plates by the sudden admission of cold water. As the gases usually leave the boiler tubes at a comparatively high temperature, a considerable saving may be effected by passing these flue gases through an economizer before admission to the stack. The draft in the furnace may depend either on the stack or on a system of fans or blowers. Each of these methods has certain advantages and must be determined upon during the design of the boiler-plant layout.

Two methods of firing boilers are in common use, hand firing and mechanical stoking. For small plants where a careful fireman is employed, the hand method is very efficient, but larger plants and those in which it is difficult to secure competent firemen are largely employing mechanical means to force coal into the furnaces.

Two factors of saving are introduced by the use of mechanical stokers; a saving in labor cost if the plant be of some size and the obviation of the personal element in methods of stoking. The mechanical stoker, if properly installed, fires continuously and uniformly, while it is well known that in hand-fired plants, one man may use 25 per cent. more coal than another without increasing the steam output.

Another saving accrues from the fact that when using a mechanical stoker it is rarely necessary to open the furnace doors, whereas with hand firing, this is an absolute necessity and at every time of fuel replenishment large quantities of cold air are admitted to the furnace, thus, to some extent, cooling the boiler tubes.

A fact worthy of the closest attention is the saving made possible by the use of adequate instruments, for the proper determination of the operating characteristics of both boilers and engines when properly manipulated by a fireman or engineer, having in mind the good of his employer and the necessity for economical operation. Among such instruments may be mentioned draft gages, steam-flow meters, water meters, coal-weighing apparatus, carbon-dioxide recorders, feed-water thermometers, besides the regular equipment of any steam plant, such as steam and vacuum gages and other necessities. If these instruments are properly used, and the engineer is forced to keep a systematic record of the operation of his plant, great gains and economy are possible.

Some may say: "What is the necessity of so closely guarding economy in the power plant of a mining operation where coal is plentiful?" The answer to this point, which is often raised, is that the coal which is burned in the boiler to produce power for mining operations is worth just as much as the coal that is placed on the car for shipment, and if it is worth while to mine the coal, in order to ship it, it is certainly worth while to effect any saving possible by reasonable means in the fuel consumption of the plant. Many mine owners forget that although the first cost of an efficient plant is higher than that of one inferior, the saving from this efficient operation extends over the entire life of the mine and may reach such an amount as would pay for the plant several times over. Another point in favor of a more expensive plant than is usually installed is that such a plant is less liable to breakdown and costly upkeep.

Water Power Is Cheap and Dependable

A power which was rarely used in mine work until recently, but which is coming to the front on account of its continuity of service and cheapness, is water. At the present time, we find many mines served by water power solely and this frequently over long transmission lines. It sometimes happens that a water-power plant can be installed more cheaply than a steam plant of the same size, although this is rarely the case. In any event, however, the operating cost of the water-power plant, if within a reasonable distance from the mine, will be considerably less than that of a steam plant.

Many types of waterwheels are in use, each best fitted for a particular condition to be met and many different arrangements of connection between a waterwheel and a generator are in use. The most common type of hydro-electric plant consists of a reaction turbine waterwheel, direct connected or geared to an alternating-current generator. We frequently find, however, a generator belted to a jack shaft, operated by bevel gears from the wheel shaft. The use of direct-current generators in a water-power plant is not at all common, owing to the fact that the power plant is usually located some distance from the mine operation, thus necessitating a high-voltage transmission line to cut down transmission losses and decrease the size of wire necessary.

In location, design and installation of a hydro-electric plant for use in operating a mine, we are confronted by the same problems which have to be met in the steam plant. That is, we must consider all the peculiarities of the power site and of the conditions to be met in the operation of the plant. Many factors must be considered in the initial design and much preliminary calculation done before a definite layout can be determined.

Many mine owners have recently found that several mines may be adequately served from one water-power plant with a marked saving to all concerned. In some instances, when a good water-power site can be secured, it is advisable for the mine owners to form a stock company among themselves and erect such a plant, from which each purchases sufficient power for his own use.

Many mines can be served from one plant more efficiently than one mine, because the surges or load peaks come at different times on the different plants, thus smoothing out the power-plant load. Again, it takes very little more labor to operate a large hydro-electric plant serving several mines than a plant operating only one. When such an arrangement is possible, the owners of the plant can employ more competent electricians and furnish better service throughout.

It is possible also to use one crew of repair men and trouble shooters for all the mines, thus obviating the necessity of each mine running its own repair shop and employing a crew of men which are idle a large part of their time.

Great possibilities are open to mine owners along these lines as the developments during the next few years will no doubt show. But those reaping the greatest gains will be those who soonest put into effect systems of this kind.

Effect of Panama Canal on World's Coal Markets--II

By F. R. Wadleigh*

SYNOPSIS—The second installment of this article which is confined essentially to a discussion of the merits of our different foreign competitors. Great Britain is the power to be reckoned with in the world's coal trade, but there are other countries forging ahead rapidly which cannot be ignored. The use of fuel oil threatens to be a powerful factor in the situation, particularly in the Pacific Coast markets.

West Virginia's competitors in the Pacific markets are put in two classes by Mr. MacCorkle.

First—Coals from Australia, Great Britain, Japan, South America, China, Vancouver Island, South Africa.

Second—Domestic coals from Virginia, Pennsylvania, western Maryland, Alabama.

Our Welsh Rivals

We may as well admit, for it is a fact, that the best Welsh coals are the best coals in the world in heating value, and general excellence for steam making, especially for ships use; but all of the Welsh coals are not the best and the New River-Pocahontas fuels, properly prepared, can compete on even terms with any but the best.

The author does not seem to realize, however, that there are other British coals beside Welsh, with which we must reckon, the latter being taken as the sole example of the British product. The best Northumberland coals are little inferior to the Welsh grades shipped to South America while their cost at tidewater today is considerably lower ($3.25 per long ton) and the freights to South American ports are about the same. The best Northumberland coals (Davidsons, Cowpen, Bothal) have the following analysis from actual shipments:

Moisture	1.40
Volatile	32.80
Fixed carbon	62.90
Ash	2.90
Sulphur	0.83
B.t.u.	14,601.00

This coal is quite hard, stands handling well and is well prepared.

The following are quotations on Welsh coals:

	Nov. 7, 1913	Mar. 27, 1914
Best Welsh coals	$4.80@4.92	$4.35
Best drys	4.32@4.56	4.14
Best Monmouthshire	3.92@4.14	4.09

Judging from the above, the statement that the Welsh coals are bound to increase in price does not seem to be true. Neither the best Admiralty, nor the dry coals (very low volatile, 10 @ 11 per cent) go to South America, except some Admiralty for naval use. (The Argentine navy has just bought 150,000 tons best Admiralty). The coals that do go are Cardiff seconds and smalls, Monmouthshire bests and seconds, on which prices are quoted today as follows:

Cadiff seconds	$4.20
Cadiff smalls	2.60
Monmouthshire bests	4.09
Monmouthshire seconds	3.90

Welsh Coals at Panama—Our article asks if there can be competition, at such prices, with New River-Pocahontas coals at Panama. Not even the English operators themselves ever thought of such competition.

Other Markets besides Panama—Charter rates quoted are as follows:

	Nov. 13, 1913	Apr. 5, 1914
From Cardiff to—		
Rio Janeiro	$3.71	$3.16
Buenos Aires	3.53	3.28
Santos	3.89	3.28

Quoting further, "One charter was made last week for the transportation of 5500 tons from Hampton Roads to Rio Janeiro at 16s. 6d. ($4.01). On the basis of this last shipment, New River and Pocahontas coals were delivered in Rio Janeiro at a cost of $7.01, as compared with $8.63 as the cost of the best Welsh steam coals. These ports are on the Atlantic but roughly exhibit the opportunity for the sale of coal on the Pacific coasts after the Canal is constructed."

Let us take Rio, at present (Apr. 1) quotations, and compare costs:

	Coal	Freight	Total
New River coal	$2.85	$3.58*	$6.43
Welsh coal†	4.09	3.16	7.25

*Cargo of 5131 tons. †Best Monmouthshire.

As already noted, the best Admiralty coal is not shipped for commercial use to South America. Moreover, the Atlantic ports do not "exhibit the opportunities for the sale of coal on the opposing Pacific ports." On the Atlantic side we have only the competition of British coals to meet, while on the Pacific, we have as competitors, not only the British coals, but the Australian, Japanese, native coals and fuel oil, the latter now being used in large and increasing quantities in both Peru and Chile.

Again, if we have this advantage of 78c. on the east coast in our favor, why have we not been able to take these markets away from Great Britain? Why should we get more west coast trade, after the Canal is opened, when we have not been able to get the east coast with everything in our favor? The distance from Hampton Roads to Rio and Buenos Aires is less than the distance from Cardiff to the same ports. Brazil is now readily accessible to us, yet we have a smaller percentage of her total trade than we have of Peru's.

The article then asks if it is reasonable to suppose that West Virginia thrift and enterprise will allow Welsh coals to compete in these markets at the difference in price. The English coal and steamship people are just as thrifty and enterprising as are the West Virginians, besides which they are strongly entrenched in the markets and know much more about selling conditions and the exporting of coal. They are also interested in steamship lines, have their own selling agencies, coaling stations and docks, and own many of the largest industrial plants, mines and railroads. Take the Argentine, for instance; out of a total of 32,854 kilometers of railways, 22,908 are British owned.

THE AUSTRALIAN COMPETITION

Comparing the quality of the Australian coals with those of West Virginia, we find:

*Consulting engineer, 426 Real Estate Bldg., Philadelphia, Penn.

	Moisture	Volatile	Fixed Carbon	Ash	Sulphur
Australian	1.92	3.509	54.08	2.91	0.541
New River	0.983	20.805	74.983	3.229	0.621

Using one cord of seasoned white oak as the unit of measurement, the U. S. "Navy" Department has determined the following equivalents:

	Lb.
New River, average of 7 tests.....	1676
Australia, average of 10 tests.....	2225
1000 lb. of New River coal has the same fuel value as lb. of Australian coal.	1327

The above analysis of Australian coal is wrong; the sum of the constituents (excluding sulphur, always separately determined) is 62.419 instead of 100, and the ash is entirely too low. Typical analyses of New South Wales bituminous, the coal exported to South America are given herewith.

The greater part of the Australian coals suitable for export come from two districts in New South Wales. That from the New Castle district varies considerably in quality, the best of it being similar to Pittsburgh coal and averaging about 33 per cent. volatile, with 7 to 12 per cent. ash. From the Southern district, the coals resemble Pocahontas more, although higher in ash and volatile and slightly harder, these being the best Australian coals, especially for steamship use.

At any rate, one analysis does not represent Australian fuels; there are many different kinds of coals in that country, as the following typical analyses will show:

	Aberdare	Mt. Kembla	Sydney Harbor	Southern Field[1]	Newcastle[2]
Moisture	1.32	1.37	0.67	0.71	2.01
Volatile	40.47	25.14	19.76	23.65	36.01
Fixed carbon....	52.58	62.29	71.67	63.98	58.27
Ash	5.63	11.20	7.90	11.66	8.71
Sulphur	1.23	0.43	0.44	0.47	0.47
B.t.u. dry	....	....	....	13,200	13,300

[1]Average of 35 samples. [2]Average of 75 samples.

The analysis given of New River coal cannot be maintained in actual shipment, the ash and sulphur both being too low. A typical analysis (actual) of the *best* New River coal, *as shipped,* is as follows: Moisture, 1.107; volatile, 20.50; fixed carbon, 73.37; ash 4.96; sulphur, 0.828; B.t.u., 15,053, while the average of 27 cargoes shipped to the Panama Canal was: Ash, 5.395; B.t.u. dry coal, 14,881.

The oak wood equivalent tests are hardly worth considering. In the first place, it was the United States War Department, not the Navy, that made these tests; the Navy would hardly be guilty of such "tests."

This method of determining the comparative values of coals was started 20 or 25 years ago, to show the values of coals for heating purposes at the various army posts and was carried on until only a few years ago. The samples of coal used were only 1000 lb. in weight and were, in some cases, at least, selected, as I know personally, from the best coal in the mines, while the method was inaccurate and has long been a subject of ridicule, even by the Government officials.

There has never been any question as to the inferiority of Australian coals to New River and Pocahontas in heating values, but the former are hard and lumpy, make steam quickly and are excellent locomotive fuels; their price on the west coast has been such that they could compete with the better-grade coals.

With the opening of the Panama Canal, this difference in value will be overcome and the Australian coals largely eliminated from the west coast markets.

"Japanese as Rivals"

Although in 1913, there were 3,800,000 tons of Japanese coal exported, it is unlikely that there will be any increase for the next year or two as the home consumption is steadily increasing and the price of coal has advanced 74c. per ton for 1914. The total output of Japan was 19,000,000 tons in 1912 and is increasing every year. Practically all of the islands are underlaid with coal and it is estimated that there are 7,002,200,000 tons available.

It is stated in the article under review that Japan's coal seams are usually small and the fuel is often a "dirty coal of steaming grade," whatever that may mean, and high in ash and sulphur; also that in the best fields the coal is mined by shafts and that all the mines are wet.

The principal coal fields of Japan are: Chikuho (most important), Taka-Shima, Hokkaido, Miike.

The Chikuho seams vary from 3 to 8 ft. in thickness. In the Taka-Shima district, there are six seams varying from 3 to 17 ft. in thickness. About 150 seams ranging from 1 to 60 ft. in thickness, occur in the Hokkaido district. The seams in the Miike field are 3 to 8 ft. thick normal, though occasionally 25 ft. thick.

Typical analysis of coals from the different fields is as follows:

	Chikuho	Taka-Shima	Hokkaido[1]	Miike
Moisture	4.21	1.16	2.74	0.66
Volatile	42.92	38.83	41.05	41.74
Fixed carbon	45.71	54.43	50.65	48.24
Ash	7.33	5.58	5.56	9.36
Sulphur	0.68	0.82	0.40	3.64
B.t.u. as received.....	12,965	12,979	13,274	13,427

[1]Analysis of the main seam (24 ft. thick) in the Yuparo district.

The article states: "The Japanese coal will compete in the Far East, but not with ours or that of Australia in markets to which Japan has less convenient access." As a matter of fact, 80,000 tons of Japanese coal was brought into San Francisco in 1913, and 30,000 tons were bought by the Chilean Railways in the same year.

Vancouver Island's Coals

As regards western Canadian coals the article states: "The question of the ability of West Virginia to compete with the Vancouver coal is one demanding careful consideration." This followed an analysis made by the U. S. Government "of coals shipped under the trade name of Comox, Nanaimo and Wellington" which is as follows:

Moisture	1.600
Volatile	30.251
Fixed carbon	56.688
Ash	11.461
Sulphur	0.512

There is also another comparison given of heating value, based on the obsolete and inaccurate seasoned white oak standard, which shows that New River coal is 39 per cent. better than the Vancouver product. This analysis is fairly representative of the Comox coal, but there are three other seams, the Wellington, Douglas and New Castle. Recent analyses of these coals are as follows:

	Wellington	New Castle	Douglas	Comox
Moisture	1.16	1.9	1.54	1.0
Volatile	40.47	39.4	33.30	29.0
Fixed carbon	50.04	45.7	56.23	57.2
Ash	7.80	11.7	8.44	11.9
Sulphur	0.53	1.3	0.49	0.9
B.t.u.	13,410	12,470	13,446	13,010

The statement that New River coal is 39 per cent. better than average Vancouver fuel is absurd, as following comparison will show:

	B.t.u.	
New River	15,006	= 100
Wellington	13,410	= 89
New Castle	12,470	= 83
Douglas	13,446	= 89
Comox	13,010	= 86

It is further stated: "The price of Vancouver coal at the loading port, f.o.b., was $3 to $4.50." Which figure should be taken? There is rather a wide difference. Then: "The sailing distance from San Francisco is about 950 miles" while according to Philip's tables, it is 820 miles. As to the ultimate cost at San Francisco, the article says: "I think we can safely estimate the charter rates at about $1.50 per ton; this makes the *cost* of Vancouver coals alongside at San Francisco not less than $6 per ton." It is clear that this is the *price* asked, not the *cost*.

Then the statement is made that New River-Pocahontas coals can be delivered at San Fancisco at the same price, *omitting tolls*. From present indications, tolls must be figured in, which would add about 50c. per ton to the cost of coal. But even now Hampton Roads coals can be delivered alongside at San Francisco for $6.24, based on a $2.85 f.o.b. price, and a freighting bid to the U. S. Navy of $3.39 for a cargo to be shipped in May, 1914.

The statements as to costs and heating value made by Mr. MacCorkle are said to apply to the whole western coast of the United States and to give the West Virginia coals "an absolute determinable advantage" over the Vancouver fuels at San Francisco, Mexico, Central and South America.

This whole question of the coal competition along the west coast, north of Mexico, cannot be settled or determined until the matter of ocean freight rates and canal tolls is known; it is also more than probable that there will be a readjustment of prices on the Pacific Coast coals. We believe that our strongest competitors for the North Pacific Coast trade, leaving fuel oil out, will be the British Columbia coals.

In 1912, there were 858,981 tons of these fuels shipped to the United States, about 38 per cent. of the total output.

South American Coals

The statement is made: "At times reports have come of good coal in South America. Investigation has never proved the report true." Mr. MacCorkle is evidently not familiar with all of the reports on South American coals as investigations have shown that there *are* quite large deposits of good coal there.

There is excellent coal within 100 miles of the Pacific and a railroad is almost completed from the coal deposits to a port, 410 miles south of Panama. This coal has the following analysis (outcrop samples taken by the writer):

	No. 1	No. 2
Volatile	23.21	23.17
Fixed carbon	68.05	70.58
Ash	7.66	5.38
B.t.u.	14,282	14,680

The extent of this field is not accurately known, but it covers a large territory in the Cauca Valley, Colombia, estimated at 10,000 square kilometres.

There are also good coals in Venezuela, as the following analysis of outcrop samples, taken by the writer, show:

	As Received	Dry
Moisture	1.45	....
Volatile	46.26	46.94
Fixed carbon	50.12	50.86
Ash	2.17	2.20
Sulphur	0.82	0.83
B.t.u.	14,542	14,756

This coal is on the coast and transportation facilities could easily be provided. The Chilean coal is not "all dirty" nor does it "steam badly," nor "deteriorate rapidly." The best of it is a fair steam coal, quite equal to some of the West Virginia fuels. Under certain conditions, it has excelled Pocahontas coal as a locomotive fuel. It shows the following analysis, mine samples:

	Lota	Coronel	Curanilahue
Moisture	4.09	3.61	3.71
Volatile	37.56	34.17	35.70
Fixed carbon	55.64	55.74	55.79
Ash	2.67	6.46	4.79
Sulphur	0.20	0.28	0.64
B.t.u. as received	13,835	13,122	13,403

The total output of the Chilean mines in 1911 was 1,277,000 tons, the price at the mines being from $1.20 to $1.40 per ton.

There are also large deposits of coal in Peru, both semi-anthracite and bituminous, some of which will be available for shipment in the next two years.

China and South Africa—As Mr. MacCorkle says, there are large areas of coal in China, some of it, at least, of good quality, but one need fear no competition from this coal for some time to come.

Alaska coals—The possible competition of Alaska coals is dismissed in a few words as being of small importance, which is probably correct. Alaska mining costs and the transportation by water will be prohibitive for some time to come, apart from the question of quality.

(*To be continued in issue of July 11*)

Alabama Mines Are Active

According to the figures of E. W. Parker, of the U. S. Geological Survey, in coöperation with the Geological Survey of Alabama, the production of coal in that state in 1913 was 17,678,522 short tons, valued at the mines at $23,083,724.

The increase in coal production in Alabama in 1913 compared with that of 1912 was 1,577,922 short tons in quantity, and $2,254,272 in value.

Labor conditions were much better in 1913 than in either 1912 or 1911, and car shortage was less acute in 1913 than in recent years, some of the large coal-carrying roads having added materially to their facilities for handling the output. The increased tonnage went principally to points outside the state.

The relations between operators and mine workers were generally harmonious and increased wages were put into force in February. Earnings by miners and mine laborers in 1913 are said to have been higher than ever before in the history of coal mining in Alabama, and improved sanitary and living conditions put into effect by many companies added to the general betterment.

The number of men employed was 24,552 as against 22,613 in 1912. The total time lost by strikes in 1913 was 27,041 days, 1048 men being idle for an average of 26 days. There were 124 men killed in the coal-mining operations of Alabama in 1913.

Coal is being mined in large areas in Servia and in the Balkan basin of Bulgaria, where many seams of friable coal are found.

The Lignite Briquetting Plant at Minot, N. D.

By G. J. Mashek*

SYNOPSIS—With greater supplies of lignite than all other varieties of coal combined, the time is fast approaching when these low-grade fuels will be briquetted and used. In certain instances, including the one here described, this has already proved a commercial success. The plant at Minot differs from customary practice in that the lignite is carbonized in coke ovens before being briquetted.

The Northern Briquetting Co., of Minot, N. D., has erected a small commercial carbonized lignite briquetting plant. It is rated at from 8 to 10 tons an hour and has been operated up to 11¼ tons per hour, making about 2¼-oz. over-stuffed, pillow-shape briquettes from carbonized lignite. This is the first commercial lignite briquetting plant erected in the United States, converting lignite to fuel practically equal to anthracite coal in heating value and nearly smokeless.

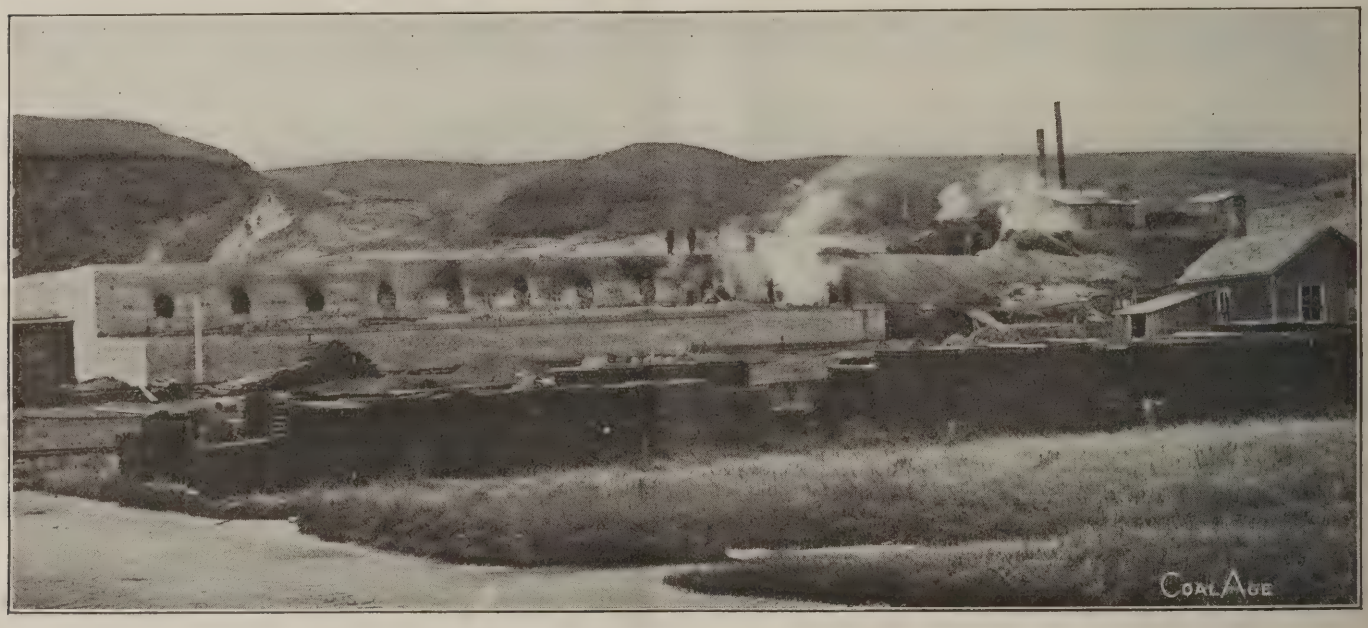


Fig. 1. Beehive Carbonizing Retorts Where the Lignite Is Treated before Briquetting

American vs. European Practice

It might perhaps be proper to mention that while the briquetting of lignite or brown coals in Europe is a large industry, these fuels are considerably different from those of the United States with the possible exception of certain Texas lignites. There are greater deposits of lignite in the Western states than of all the other coal combined, in this country. The main drawback to the development and use of this fuel has been the high percentage of moisture contained and also its air-slacking qualities, which makes it impossible to store it for any length of time.

Thus in spite of all these large deposits, most of the coal consumed in the states having the greatest lignite deposits has been semibituminous, bituminous or anthracite, the price of which, in the Western part of the United States is extremely high. Lignite, however, is available at as low a price as 90c. a ton at the mines.

Many attempts have been made to briquette lignite in its natural state, but all of these have been failures. Raw lignite briquetted is only benefited by the amount of binder introduced, which prevents the tendency to air-slack to some extent. Little better results are obtained during combustion, for the reason that the lignite usually crumbles to dust and much more must be used for steam purposes on account of its low calorific value. Some improvements have been made in the construction of fire-boxes, special grates, etc., so that somewhat better results are obtained with raw lignite under boilers than formerly. However, for domestic use no improvement of any consequence has been made.

A number of European briquette plants have been imported, which, while very successful in briquetting the foreign product, have, as already noted, proved failures when operating on American lignites and under conditions existing in this country. The United States Bureau of Mines, some years ago, made extensive experiments and tests with European machinery to briquette lignite without the use of binders. There have been produced some fairly hard briquettes from certain deposits of young lignites that contain considerable quantity of natural pitch. But these deposits are rather rare. The briquettes made by this process (under a pressure of approximately 20,000 lb. per sq.in.) have withstood the weather fairly well, but when thrown into the furnace they really gave little, if any, better results than lignite in its natural state, clearly demonstrating that briquetting lignite without the use of binders is out of question as a commercial undertaking in the United States.

*President, Mashek Engineering Co., New York.

Development of the Carbonizing Process

The manner of briquetting lignite by carbonizing the raw product first has been a success for upwards of ten years. But no material progress was made in this industry until the fall of 1909 when the state of North Dakota made an appropriation to the State University for the purpose of carrying on further experiments and tests in this direction. The work was undertaken by Prof. E. J. Babcock, Dean of the School of Mines, and the researches, tests, etc., made are of great value to the industry, especially the possibilities which were discovered of producing gas for industrial purposes from lignite.



Fig. 2. Carbonized Lignite Briquetting Plant, Minot, N. D.

The state purchased a small experimental carbonizing, gas-purifying apparatus and briquetting-plant equipment which was installed at the Experimental Station in the North Dakota lignite fields at Hebron. This plant was in operation for upwards of four years, carbonizing considerable lignite and briquetting the same, so as to prove the process a commercial success. The equipment was furnished by the Mashek Engineering Co., "Y" type, having a capacity of about two tons an hour of 2¼-oz. briquettes, being installed.

The tests made on the carbonizing of lignite are particularly valuable as exhaustive experiments were conducted with various types of carbonizers. These varied from a closed retort, where all the gas and byproducts were saved, carefully measured and analyzed, down to what is practically a beehive oven where the byproducts are consumed, assisting in the carbonization, or allowed to go to waste. Dean Babcock's report on "Investigation of Lignite Relative to the Production of Gas and Briquettes," is an important addition to the knowledge on this subject.

The selection of a suitable carbonizer in the installation of a lignite-briquetting plant is an important item. The type of apparatus is dependent on whether it is advisable and profitable to save the gas for use in gas engines or firing boilers. If there is no market for the gas, the simplest type of carbonizer may be used.

Heat Value of the Briquettes

The gas produced by a suitable carbonizer will average from 9000 to 10,000 cu.ft. per ton of carbonized lignite of approximately a calorific value of 500 B.t.u. The average analysis of this lignite gas from practically all the Western and Northwestern lignites is as follows:

Illuminants	3.11
Carbon monoxide	17.24
Hydrogen	45.16
Ethane	0.14
Methane	15.59
Nitrogen	5.49
Oxygen	1.76
Carbon dioxide	11.51

When the lignite is properly prepared and treated in a suitable carbonizer, the gas is all given off at a temperature of 900 to 1000 deg. F. This comparatively low temperature to obtain gas is an important natural advantage which lignite possesses.

The average comparative calorific value of lignite as mined, lignite residue, briquettes and anthracite coal is approximately as follows:

	B.t.u.
Lignite as mined	7,500 to 7,800
Lignite retort residue	10,500 to 11,500
Lignite briquettes	12,000 to 12,500
Anthracite coal	12,500 to 13,500

And these have an average comparative analysis as follows:

	Moisture	Volatile Matter	Fixed Carbon	Ash
Lignite as mined	35.01	25.11	34.67	5.21
Lignite briquettes	0 to 6	2 to 8	75 to 85	10 to 14
Anthracite coal (a market sample)	3.68	3.26	80.51	10.55

It will be seen that converting the lignite into briquettes makes the product practically equal to anthracite coal. The carbonized lignite briquettes, however, are freer-burning and if there is no market for the gas it is necessary to carbonize the fuel only enough to remove the moisture, lighter volatiles, ammonia, etc., leaving considerable volatile matter still in the residue. This produces a smokeless flame during combustion and for that reason and also on account of their free-burning qualities

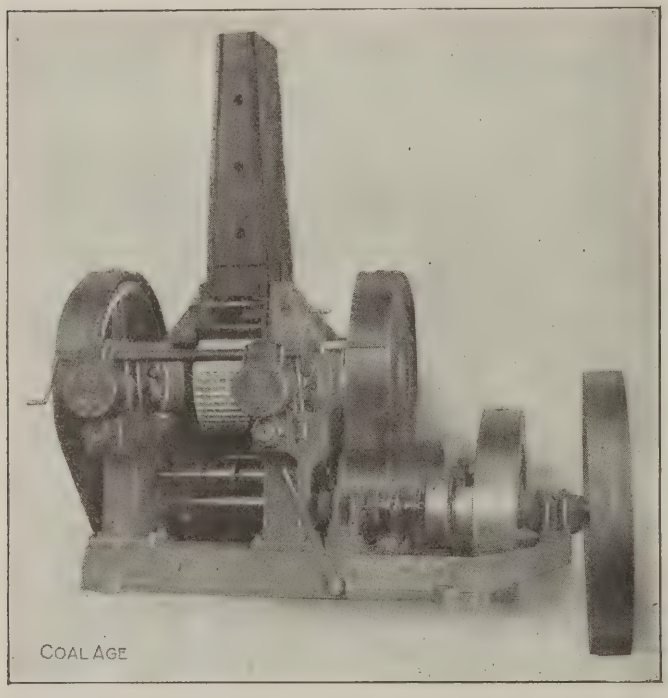


FIG. 3. A SEVEN- TO TEN-TON PER HOUR BRIQUETTE PRESS

the lignite briquettes are preferable to anthracite coal. These data are taken from Prof. Babcock's reports.

DESCRIPTION OF THE PLANT

The Northern Briquetting Co. began construction on their carbonizing and briquetting plant in the summer of 1913. Not having a market for the gas, a special type of beehive carbonizing retort was constructed at the mines, which are located about six miles from the briquetting plant. After the product is carbonized, it is transported in special gravity-discharge steel cars to the briquetting plant located in Minot. A view of the carbonizing plant is shown in Fig. 1 and the briquetting plant in Fig. 2.

This plant is equipped with special lignite briquetting machinery, size "M-1" built by the Mashek Engineering Co., of New York. It is about as small a commercial plant as was deemed advisable to install so that the cost of operation would not be excessive.

The material arriving at the briquette plant proper is discharged from the cars into a track hopper, from which it is taken by an elevator and delivered to the steel carbonized-lignite bin. This bin is 28 ft. in diameter by about 28 ft. high, mounted on steel columns. Adjacent to the steel bin is a three-compartment wooden bin, each compartment having a capacity of approximately 200 tons; these are used for storing bituminous coal screenings, anthracite coal screenings and dust resulting from the breakage and handling of briquettes as they are loaded into cars.

All of these bins are equipped with special, automatic, measuring feeders operated by variable-speed control, the material being fed directly into a conveyor in front of all the bins. This conveyor takes the material, measured out in direct proportions required, into a special type of all-steel pulverizer which reduces the coal so that it will pass approximately a 12-mesh screen.

From the pulverizer the material is elevated to the top of the building, where it passes, by gravity, through a special steam preheater and then to a steam-jacketed mixer; part of the binder is introduced before the material reaches the preheater and the balance in the steam-jacketed mixer. This mixer is so constructed that a satisfactory product can be obtained with as low as 1½ per cent. of liquid pitch or asphaltum. The material is pugged and partially compressed in the mixer and expelled through a contracted opening into three tempering or binder-fixing mixers. From these latter the material passes to the briquette press; the passage from one machine to another, down to the briquette press is by gravity.

THE BRIQUETTE PRESS

The press, which is shown in Fig. 3, is of the two-roll, rotary type, with the briquette-shape molds in easily removable roll shells. This press has been specially built for carbonized lignite so as to get the maximum pressure without over-pressing; it is equipped with positive discharge aparatus, etc. All the gears and working parts are well protected from dust. The roll shells may be changed so that several different weight briquettes can be made, varying from 1½ to 5½ ounces.

The briquettes are conveyed from the press by a belt conveyor to a bucket elevator which takes them to the top of the bin building, where they are evenly distributed on an all-iron cooling table; they remain on this table, which is constantly in motion, for about half an hour and are then discharged into any part of the briquette bin, ready for shipment. The briquette bin is of the usual construction, with spouts and screens for loading into cars; there is a track on one side of the bin with a wagon driveway through the center and on the other side.

The binder-handling equipment in this plant is arranged to take coal-tar pitch, oil-residuum asphaltum or low melting-point gilsonite, and also has appliances for introducing a low-grade flour. This flour, during the process of manufacture, is converted into starch and dextrine. The amount of binder required to make hard briquettes capable of standing transportation and handling, is about 5½ per cent. coal-tar pitch with 1 per cent. of low-grade flour. No attempts have been made up to the present time to use gilsonite, but experiments have shown (depending on quality) that about 4 per cent. will be required to make an extremely hard briquette which is practically smokeless.

The coal-tar pitch briquettes will produce a little smoke on ignition only. The asphalt-residuum briquettes make considerably less smoke, principally on account of the

chemical change that takes place between the starch and dextrine and the asphaltum. The older the briquettes are the less smoke they will produce on ignition; they also increase in hardness with ago. Carload samples of these briquettes have been exposed to the weather in North Dakota for upwards of two years, at the end of which time they were harder than when placed in the pile, and they also burned with considerably less smoke.

The size and shape of the briquette for domestic use is an important item, especially when using lignite. They must be of a size to suit local conditions and about the same as the natural coal the people in any particular locality have been in the habit of using. This eliminates the necessity of giving any special instructions as to how the fire should be manipulated, etc.; such instructions are seldom followed so that the product often fails to give satisfactory results. After considerable experimental work, it was found that carbonized lignite briquettes weighing from 2¼ to 2½ oz. gave the best results in the markets available to this plant. The shape of the briquette should also be such as to leave a little greater air and gas opening between the pieces than would be necessary with harder coals.

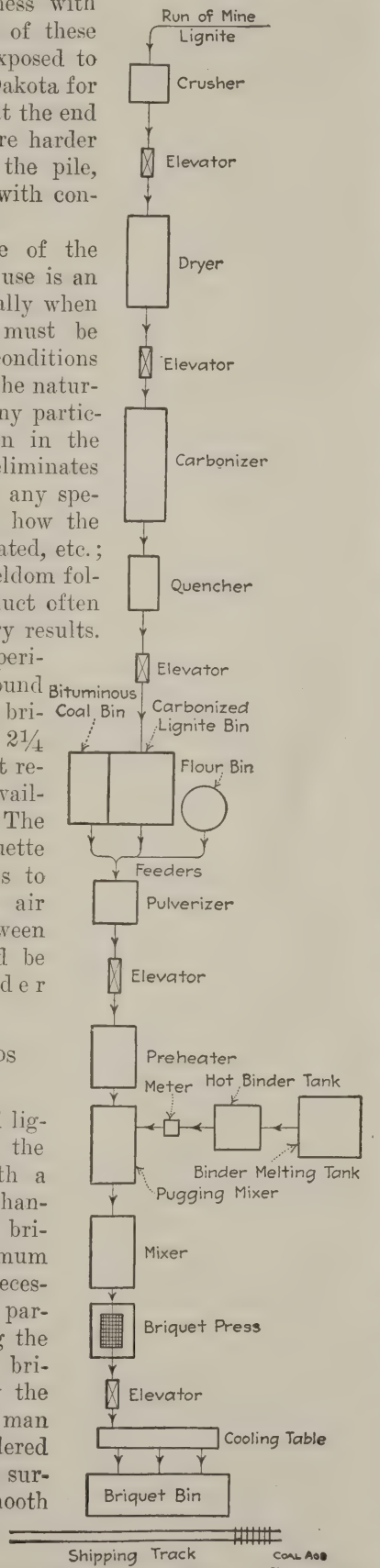


FIG. 4. FLOW SHEET, SHOWING NECESSARY MACHINES FOR PLANT USING A MECHANICAL CARBONIZER

OPERATING METHODS AND COSTS

Since the carbonized lignite is rather weak, the press is equipped with a special adjusting mechanism which forms the briquettes under a maximum pressure without unnecessarily crushing the particles of lignite during the operation. When a briquette will carry the weight of a 160-lb. man it is ordinarily considered sufficiently hard. The surface must also be smooth and equally as hard as the interior.

The power for this plant is furnished by two 150-hp. horizontal tubular boilers, one being sufficient to run the plant continuously, using raw lignite as a fuel. The plant is driven by a 13x16-in. double-cylinder automatic engine. The power required to drive the briquette plant proper is about 72 horsepower.

The plant is automatic from one end to the other, four men per shift being sufficient to operate it. Two outside men will take care of unloading the carbonized lignite and loading the cars. The plant is so arranged that a duplicate unit can be put up without disturbing the arrangement of the machinery now in place.

In the flow sheet, Fig. 4, is shown the sequence and the necessary machines in operating a plant using a mechanical carbonizer.

The cost of manufacture and operation in detail of the complete plant is given in the accompanying table. The labor cost in operating a single-unit plant of larger capacity will be lower as the number of men required are practically the same.

The briquettes produced find a ready market in Minot and throughout the Northwest, and are retailing at from $10 to $11 per net ton. The price of anthracite coal is on an average of $12 a ton.

ESTIMATED COST OF MANUFACTURING LIGNITE BRIQUETTES IN NORTH DAKOTA. TYPE "M-1" PLANT. LIGNITE CARBONIZED—GAS NOT UTILIZED

Lignite Containing 28 Per Cent. to 33 Per Cent. of Moisture, Producing 9 to 10 Tons of Briquettes per Hour, Running Two Shifts of 12 Hr. Each

Labor for Two Shifts:

Men		Rate	Total
3	Loading and unloading cars	$2.25	$6.75
2	Drying and crushing plant	2.25	4.50
2	Carbonizer and quencher	2.50	5.00
2	Boiler firemen	2.50	5.00
2	Mixers and briquette press	3.00	6.00
2	Cooling table, dust and briquette bins	2.25	4.50
2	Oilers and assistant plant runners	2.50	5.00
2	Binder preparing plant	2.25	4.50
2	Foremen	4.00	8.00
1	Clerk and weighmaster	3.00	3.00
1	Watchman	2.50	2.50
1	Laborer and sweeper	2.25	2.25
	Total wages for two shifts		$57.00
	Labor cost per ton of briquettes (210 tons per day)		$0.27

Binder:		
6% coal-tar pitch @ $16 per ton	$0.96	
1% low-grade flour @ $28 per ton	0.28	
5% bituminous slack @ $4 per ton	0.20	1.44
Boiler and Carbonizer Fuel:		
225 lb. of lignite @ $1 per ton		0.11
Rebriquetting degradation, breakage, etc.		0.06
Lignite:		
1.7 tons of lignite slack @ 90c. (25 per cent. moisture)		1.53
Lubricating oil, waste, etc.		0.01
Fixed Charges:		
Depreciation and upkeep of plant @ 10 per cent. estimated on minimum production of 40,000 tons per annum		0.17
Insurance @ 3 per cent.		0.03
General office and sales expense, $7000 per annum		0.17
Contingencies, losses, etc. @ $7000 per annum		0.17
Total average cost per net ton f.o.b. cars at plant		$3.98

The Issaquah & Superior Coal Mining Co., of Issaquah, Wash., has concluded arrangements with the Independent Coal & Ice Co., an old established firm at Portland, Ore., to handle their coal there. It is believed the coal will be retailed at the rate of $8 per ton for domestic purposes. The company's mine is at Issaquah, 26 miles from Seattle, and for the present the coal will be brought in by rail. With the completion of the Washington Canal, tracks will be built from the mines to the wharf thus enabling shipments by water. It is understood that barges will be placed in commission and this will mean a saving of at least $1 a ton on coal shipped to this port. The Issaquah company is owned by a German syndicate organized about 16 months ago and approximately $1,000,000 has already been expended in the ground and development work. Ninety attractive cottages have been erected for the workmen and their families and a good sized community has already been established.

It is the intention of the company to utilize all of the byproducts as is done in the mines in Germany, and it is expected to begin the manufacture of creosote in the near future. There is a big demand for creosote on Puget Sound.

The Labor Situation

SYNOPSIS—Colorado is quiet except for rumors of drastic action by the President. Many firearms have been surrendered in the northern part of the state. "Mother" Jones has been denied admission to Canada by the Immigration authorities. Serious trouble was feared in West Virginia, but affairs there are now pacific.

Quiet still reigns in Colorado, the strong hand of the federal troops not being removed; however some lack not of strength, but of intention threatens to cause trouble. So long as rumors come that the President intends to close the mines on some near date if the operators do not agree to arbitration, the agitators feel that there is hope for success if they can only prevent a resumption of work on the part of the miners now on the union pay-rolls. The date set for this ultimatum of the President is said to be June 20, the day on which this report will leave the press, but this has been denied, not however so vigorously as to remove anxiety that the President is considering such a high-handed proceeding.

To lay men idle is surely one of the last ways in which to promote peace. Idle men are always strife makers. Of course the President would intend should he take this action, not to secure peace so much as to terminate the strike by removing its cause. But in this, his action would not be in any sense military, but legislative and it is clearly not his business to legislate for Colorado. We doubt whether he would compel the arbitration of labor disputes in Vera Cruz should a disturbance arise among the employees and employers in that city, and he has no more right to do so in Colorado. He should be very careful not to interfere with the prerogatives of the legislators of the state or nation.

WHY MARTIAL LAW IS DECLARED

Martial law is declared because it replaces the slow progress of law making for the rapid necessities of a military situation and because it puts the control in the hands of those who being disinterested can deal with the situation without local prejudice. But if the people of Colorado have for years refused to pass a law requiring arbitration should Mr. Wilson pass it for them? The closing of saloons and shutting off of ammunition, an expulsion of those without occupation and like actions are necessary precautions but interference with peaceable industry is not regarded as within the sphere of martial law.

Weakness also is shown in expelling working men while admitting agitators. At first the Union was told that the agitators would probably not be admitted. Later Fred. D. Thomas and Andrew Reese, two Pennsylvania organizers, arrived and were compelled by the troops to remain at their hotels. However, Robert Burt, of Iowa, was permitted to take charge of the Walsenburg headquarters. But Col. J. Lockett finally received orders to let in all the agitators of the Union. They are required, however, to do "nothing which will irritate or inflame the situation."

On June 3, an interurban car enroute to Cokedale was fired at just outside the city limits. The bullets just missed the car which carried many passengers. Two Austrian coal miners on their arrival from Raton, New Mexico, were met by union pickets and taken to headquarters. These Austrians say they were told to join the Union and threatened with death if they went to work at the mine at Sopris, to which they were bound. They were kept at headquarters for two hours, at last making their way through town surrounded by 3000 or more strikers, but they were finally rescued by a policeman and a constable and forwarded on a car to Sopris.

Col. Lockett seems from the reports, which we hope do not do him justice, to be more interested to know whether they were invited to come to work on came of their own incentive than to determine who threatened them with death and who detained them on their way. Could it be possible that the Colorado Fuel & Iron Co. was endeavoring to replace some men who had left because they feared death at the hands of the strikers? This is, from reports, Col. Lockett's problem.

NO IMMEDIATE PROSPECT OF ARBITRATION

As usual there come reports of the probable success of arbitration, but the recognition of the Union is the unvarying demand of the officials and the companies do not seem any more willing than before to concede it. John Lawson says, "I do not know of any prospects of a settlement. The miners will never go back without recognition of the Union if they follow my advice."

INVESTIGATORS ARE PLENTIFUL

Colorado is full of investigators who get most divergent results according to the parties to whom they listen. The state conciliators are back from their various trips and Senator S. K. Burris, the chairman, says "We will settle the strike." Senator Burris and his committee had been in conference with J. F. Welborn, President of the Colorado Fuel & Iron Co., and had been recognized by him as a conciliation or mediation committee.

Meantime Hywell Davies and William R. Fairley have been investigating and have returned to Washington to inform the President regarding conditions. J. B. Densmore, solicitor for the Department of Labor and Ida Tarbell both put absenteeism as the root of the trouble. That is, we believe, partly true. It is not perhaps being helped by the President's continued absence in Washington, from the trouble in Colorado. But the President tries to control the situation, whereas the absentees of the Colorado Fuel & Iron Co. leave that to their lieutenants in the field which is, on the whole, a far wiser plan.

LIQUOR SELLING HAS BEEN PROHIBITED

Governor Ammons has prohibited the sale of liquor all over the northern Colorado strike district and over 500 guns including pistols and rifles and over 5000 rounds of ammunition have been surrendered by the miners in northwestern Colorado. Whether this confiscation has disarmed the law-abiding only, we do not know. The disarming of the citizens who only use arms for defence will not improve conditions when once the military forces are removed.

Representative Keating and Senator Owens respectively introduced into the House and Senate a bill for a commission of five persons to pass upon and inquire into the questions in controversy between operators and strikers in the Colorado coal fields. A report is to be made to Congress not later than Dec. 1, 1914.

MOTHER JONES DEBARRED

Temporarily Colorado has been spared the annoying presence of "Mother" Mary Jones. She went to New York, then to Seattle, and tried to reach Nanaimo, Vancouver, that she might make trouble there, but the Canadian immigration inspection service stopped her and now an appeal has been made to President Wilson in the hope that he will cause the Canadians to admit that "daughter of discord."

MORE TROUBLE AT COLLIERS

The situation at Colliers, West Virginia, was for a time desperate. The village is situated in Brooke County, one of the four counties forming the panhandle of Ohio. The trouble was in the mines of the West Virginia & Pittsburgh Coal Co., and lasted about nine months.

The strike seemed a short while ago to be nearing an end. Most of the strikers had left the region. But at one time there were some 600 men affected who worked normally in three different mines. Two murders had been committed and several persons had been assaulted and shot.

On hearing that the houses occupied by strike breakers of the West Virginia & Pittsburgh Coal Co. had been riddled with shots, Governor Hatfield telegraphed Sheriff George Patterson that he must keep order. The sheriff made an investigation and reported that there was no breach of the peace which he could not handle.

Superintendent R. Z. Virgin had a narrow escape from being shot when he was fired on from ambush, and on June 11 an attack was made on the Locust Grove mine of the West Virginia & Pittsburgh Coal Co. Shots were fired and a dynamite bond was exploded at the mine entrance. The occasion for the recrudescence of trouble seems to be a number of suits listed in the courts of Brooke County for the ejection of strikers from the houses of the West Virginia & Pittsburgh Coal Co. Two months ago, Governor Hatfield sent Captain C. R. Morgan to investigate the situation.

Recently the strikers were told that no further money will be forthcoming as the money used in Ohio and Colorado had depleted the funds. However, President Van Bittner, of Pittsburgh, promised that strike benefits would be paid. It is now stated that the whole trouble is ended by an agreement between the contending parties.

Mine Inspectors' Institute, U. S. A.

By J. T. Beard

SYNOPSIS—Principal features of the seventh annual meeting of the Institute, held at Pittsburgh, Penn., June 8-12, 1914. Description of the demonstration given by the Federal Bureau of Mines for the entertainment and instruction of the visiting members of the Institute, at their testing station in Pittsburgh, and at the experimental mine at Bruceton. Election of officers of the Institute for the ensuing year.

The seventh annual meeting of the Mine Inspectors' Institute of the United States of America, held at Pittsburgh, Penn., last week, was largely attended by the members of the Institute, their wives, daughters and many friends. The visitors included a large number of prominent mining men from different states, who were privileged to attend the open sessions of the Institute and to enjoy the entertainment given the members.

The first day of the session, Monday, was devoted to the registration of members and other preliminary arrangements. A meeting of the executive committee was held to consider various details of the organization and complete the program for the meeting.

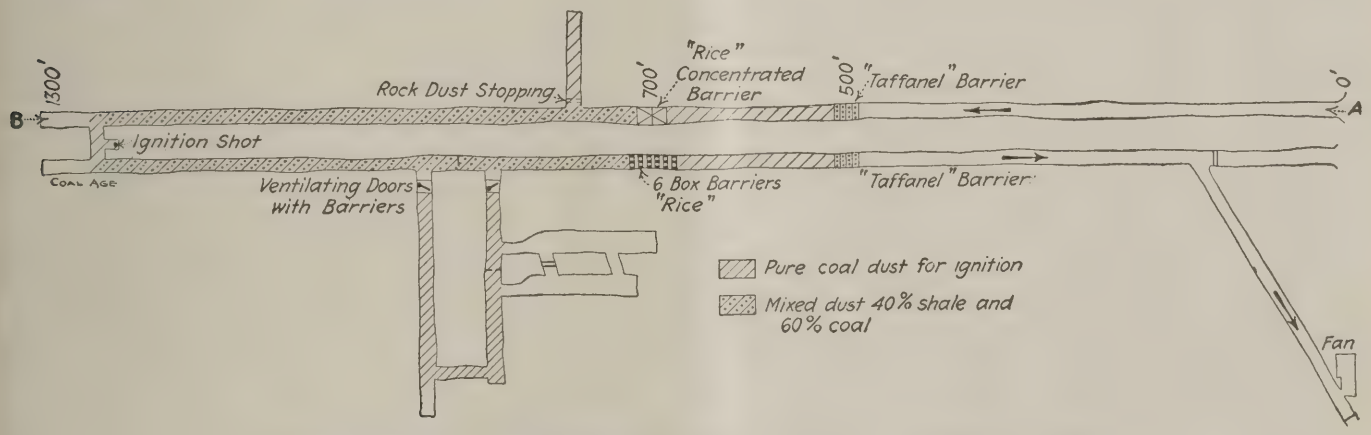


Diagram Illustrating Explosion Test No. 120, at Bruceton Mine

The opening session of the Institute, Tuesday, June 9, was called to order by the former president, Thomas K. Adams, Pennsylvania, who after a few brief remarks introduced City Solicitor Charles A. O'Brien, representing Mayor Joseph G. Armstrong. Mr. O'Brien delivered the address of welcome and was followed by D. P. Black, president of the Chamber of Commerce, who also extended a hearty welcome to the members of the Institute and their friends, in behalf of the Chamber of Commerce.

At the conclusion of these addresses of welcome, the president of the Institute, David J. Roderick, Pennsylvania, responded in a few words expressing appreciation of the welcome so freely extended to the Institute by the city. Mr. Roderick then followed this with a carefully prepared paper, bearing on the prominent features of the coal-mining industry that give rise to mine accidents. He drew special attention to those conditions that have increased the fatality rate in the mines of this country, and which do not exist to the same degree in other countries. Mr. Roderick much deplored the fact that the published lists of mine fatalities in this country did not usually explain these conditions as contributing to the increase of the death rate. Prominent among these causes, he stated, was the employment, in our mines, of an exceptionally large proportion of foreign labor, and a greater production of coal, per capita, than in any other country. The paper was thoroughly discussed by the members, in the afternoon session of the same day.

In the evening the Institute and its guests enjoyed a steamboat ride on the Monongahela River. The steamer "Sunshine" had been engaged for the occasion and was well furnished with refreshments, music by an orchestra and other means of entertainment that contributed much to the enjoyment of the evening. The trip extended as far up the river as McKeesport .

The second session of the Institute, Wednesday, was marked by an interesting and valuable paper by John Dunlop, a former state mine inspector of Illinois. The paper described the utility and advantage of the use of "booster fans," under certain conditions in mining where it was necessary to resort to some means of increasing the circulation of air in the mine, but where the expectation would not warrant the necessary outlay for the installation of another permanent fan on the surface. The paper provoked an animated discussion among the members and proved one of great interest. At the same session a paper on "First Aid to the Uninjured" was read by P. J. Moore, anthracite mine inspector, Pennsylvania. Mr. Moore's paper was valuable, as pointing out the need of precautionary measures to prevent the frequent recurrence of mine accidents, and emphasized the importance of educating the large class of foreign labor and other ignorant workers in the mine, so as to enable them better to protect themselves and avoid injury. While complimenting the great work that had been done in the training and development of efficient rescue corps at many mines, Mr. Moore claimed that the same interest should be taken to prevent, as far as possible, the accidents that made rescue work necessary.

The discussion of this paper was followed, in the evening, by a largely attended banquet of the members and guests, at the Monongahela House. The principal addresses of the evening were made by H. M. Wilson, of the Federal Bureau of Mines; David Ross, former Commis-

sioner of Labor, Illinois; Samuel A. Taylor, mining engineers of Pittsburgh; W. L. Affelder, E. E. Bach and W. R. Crane.

Thursday was devoted to a visit to the testing station of the Bureau of Mines. Following a brief address by H. M. Wilson, of the Bureau, explaining its purposes and describing the work accomplished and that projected, a number of interesting tests demonstrating the explosibility of coal dust, behavior of safety lamps, use of rescue appliances, etc., were witnessed by the members present.

In the afternoon, at the invitation of the Bureau, the members of the Institute boarded a train for Bruceton, where they witnessed an explosion in the experimental mine at that place. The test was designed, primarily, to show the efficacy of different kinds of stone-dust barriers to arrest the propagation of an explosion in the mine entries. The accompanying diagram shows the general arrangement of the mine. Three types of barriers had been constructed in the main headings at points 500 and 700 ft., respectively, from the entrance to the mine. As shown in the sketch, the well known Taffanel barrier was located 500 ft. inby from the entrance. This consisted of ten dust-laden shelves spanning the roadway.

At a point 200 ft. inby from these barriers were located two other barriers designed by George S. Rice, mining engineer of the Bureau. As indicated on the diagram, one of these barriers was of the concentrated type and consisted of two 7-ft. platforms, swung above the roadway and loaded with 2½ tons of shale dust. Between these two barriers, as indicated in the diagram, was a pure coal-dust zone, the dust being placed on shelves along the entry, to the amount of 2 lb. of dust per lineal foot of roadway. This zone was designed to determine whether the explosive wave passed the concentrated barrier at the 700-ft. station.

Inby from that station, the entire entry was stored with mixed coal dust and shale, the latter forming 40 per cent. of the mixture. The load here amounted to 3⅓ lb. per lineal foot, of which 2 lb. was placed on the side shelves and the remainder on the cross-shelves, in the entry. A similar formation of dust zones was prepared on the return entry, as indicated in the diagram.

The ignition shot, as shown, was located in a short blind cut made in the outby rib of the crosscut at the head of the entry. A charge of black powder was fired from a cannon at this point and discharged into the crosscut against the inby rib. The blind cut in which the cannon was placed was stored with 25 lb. of very fine coal dust; and the crosscut was likewise stored with 100 lb. of similar dust, the latter being placed on shelves, while the former was scattered or spread on the floor of the entry.

On the return air courses, the barrier erected at the 700-ft. station consisted of six boxes, spaced 10 ft. apart, center to center, each box being loaded with 700 lb. of shale dust, making the entire load somewhat over two tons. These boxes were arranged so as to be upset by the force of the explosion acting against them. The concentrated barrier at the 700-ft. station on the intake entry was connected by wire with a device about 100 ft. inby on the entry, and so arranged that the hinged platforms would drop and discharge their load into the airway at the moment the explosive wave reached that point.

An interesting feature of this test consisted in the fact that an air current of practically 40,000 cu.ft. per minute was circulated in the mine previous to and during the explosion. This current entered the intake airway at the point marked *A* on the diagram, and passing through the crosscut at the head of the entry returned to the fan, which was operated on the exhaust system. This fan was running at a speed of 245 revolutions per minute.

Pressure manometers stationed at different points in the mine were connected with delicate instruments for recording the pressure throughout the mine at any instant. These instruments were located in the office on the surface and furnished a more or less complete record of what took place in the mine. Tinfoil circuit-breakers, likewise connected by electric wires with instruments in the office on the surface, were used to measure the velocity of the flame. Wires also connected all the rock-dust barriers used in this test, except the Taffanel barriers, and served to indicate the time when the explosive wave reached them.

The test appeared to be quite satisfactory and demonstrated, to a degree, the efficacy of coal-dust barriers to arrest the propagation of an explosion in mine entries. At the moment of explosion there was a distinct shock felt, and a few seconds later a huge puff or blast of smoke and dust issued from the main entry at *A*. This, however, was unaccompanied by any evidence of flame. About the space of three seconds after this blast from *A*, there was a light puff of dust and smoke that issued from the mine where the fan drift enters the return air course. This, however, was very light.

In the evening, the members of the Institute and guests were banqueted at the Seventh Avenue Hotel, at which time all the ladies of the party were present, and an eloquent address was given by David Ross, former Labor Commissioner of Illinois.

The last day of the session, Friday, June 12, was marked by the reading of two valuable papers, the first entitled "The Value of Organized Effort in Increasing Safety in Mines," by Mine Inspector I. G. Roby, of Pennsylvania; and the second entitled "Some Recent Experiments Pertaining to Control of Mine Explosions," by George S. Rice, engineer Bureau of Mines. These papers were both followed by discussion. The reports of committees and the election of officers, together with the selection of St. Louis, Mo., as the place for holding the next annual meeting, closed the business of the session. The afternoon was devoted to an inspection of the principal features of interest in and about the city, automobiles being provided for the purpose.

The following officers were elected for the ensuing year: John Dunlop, Peoria, Ill., president; J. B. McDermott, Helena, Mont., first vice-president; George E. Sylvester, Rockwood, Tenn., second vice-president; Thomas Graham, Victoria, B. C., Canada, third vice-president; James W. Paul, Pittsburgh, Penn., secretary; R. S. Wheatley, Salineville, Ohio, assistant secretary; Joseph Knapper, Dravosburg, Penn., treasurer; J. T. Beard, New York City, editor-in-chief.

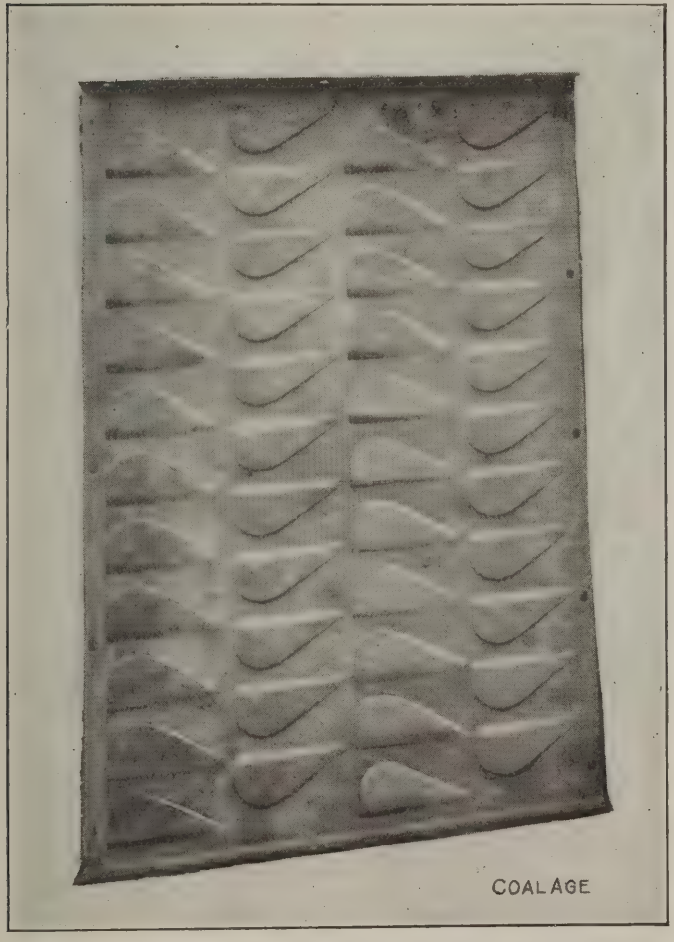
The meeting, taken as a whole, was one of the most successful thus far held. There was a larger attendance of members than on any previous occasion. This was chiefly due to the fact that the place of meeting was the most central point in the coal fields, and more easily accessible than any other point that could have been chosen.

New Anthracite Discovery

An anthracite coal field has recently been discovered in the Province of British Columbia, Canada, within two miles of the G. T. P. Railway, main line. Frank Frank, of Vancouver, B. C., and for years a prominent coal man of Ontario, has located several seams, one apparently 40 ft. wide, and has had an analysis made of the coal outcroppings discovered showing: Carbon, 80.93 per cent.; volatile matter, 7.07 per cent.; moisture, 4.02 per cent.; and ash, 7.98 per cent. Specific gravity, 1.661. The coal makes a strong and lasting fire, free from clinker. The early development of this field will mean a great deal to the entire Pacific coast, as well as to the Asiatic markets. Iron ore is also much in evidence.

A Simple Slate Picker

One of the most difficult problems encountered in the preparation of anthracite is the efficient removal of the slate and refuse from the coal. In the smaller sizes such as pea, hand picking is out of the question, and



Semi-Perforated Plate of the Kerrigan Slate Picker

if this slate is not removed in some manner the ash content of the fuel may be extremely high.

Many ingenious mechanical devices have been tried for slate removal, one of the simplest of which is the Kerrigan slate picker, manufactured by the Cross Engineering Co., of Carbondale, Penn. This consists of what might be termed a semi-perforated plate, as shown in the accompanying illustration, which is usually attached to the end of the screen. The slot leaves cut in the plate are raised to allow the slate, bone, and other flat refuse, which is heavier than the coal, to pass through, while the coal itself passes over.

This device will clean coal from No. 1 Buckwheat up, but has proven especially satisfactory in the removal of flat refuse from pea, nut, and stove sizes, and when placed upon the end of mud screens will automatically remove all but about 2 per cent. of the slate and other flat refuse.

This device is most frequently used on the discharge end of jigging screens, and does not decrease the screening area. It has also been found satisfactory when used at a point above where the coal enters the jig.

The slot leaves are adjusted for a given size of coal such as chestnut, for instance, at the time of manufacture, but may be easily readjusted to meet the sometimes varying conditions found in different localities.

Increasing Hoisting Capacity

By Ralph W. Mayer*

The capacity of the haulage plant at a mine of the Northwestern Improvement Co., at Roslyn, Wash., was almost doubled recently by the addition of one electric locomotive to supplement the work of the hoisting engine.

At this mine the coal measure lies at an inclination of about 20 deg., outcropping at the top of a hill and extending beneath a valley. It is worked by means of a slope driven in the coal. The railroad tracks and tipple are located at the foot of the hill, a tunnel being driven from the tipple until it intersects the slope. Partings and side tracks are made at both ends of this tunnel.

The hoisting engine is located on top of the hill at the mouth of the slope. It had been the custom to hoist the coal up the slope and drop the loads back onto the parting at the slope end of the tunnel. At every second hoist the cars were coupled together on this parting and dropped out of the tunnel to the tipple by the hoisting engine and rope, the grade of the tunnel being sufficient to allow the loads to run by gravity after they had been pulled up the slope a sufficient distance to give them a start.

By using the hoisting engine only to handle the cars on the slope, and depositing them at the parting and providing a motor to handle the cars in the tunnel, the output has been practically doubled at a cost of only a motorman, the expense for power, and the maintenance of the locomotive.

The motor enters the tunnel at the head of a trip of empties, leaving them on the empty track next the slope. This side track is long enough to accommodate several trips of empties, and has a slight down grade toward the slope, so that when the motor is uncoupled there is no danger of the cars running out of the tunnel. This avoids the use of safety blocks or derail switches, and the lost time incidental to their use.

The switch at the outer end of this parting is spring operated and set for the empty track, while the inside switch is an automatic one set for the loaded track. A lever, to which a chain is fastened, is pivoted to an ordinary switch stand. The chain passes over a pulley and a weight is attached to the end of the chain. This holds

*Roslyn, Wash.

the switch set for the loaded track and allows the cars to be pulled off the empty track, but can be thrown over for this track when necessary.

When set for the loaded track it is in the correct position for both the hoisting engine pulling out of the slope and the motor hauling out of the tunnel.

When the motor uncouples from the empties it runs around the end of the parting through the automatic switch onto the loaded track and pushes the loads. The switch stand for the empty and loaded tracks at the tipple is placed a trip's length inside the tunnel from the switch, and connected therewith by means of rods the same as is done on railroads. The motorman pulls his empty trip off the empty track clear of the switch and without leaving his seat throws the lever which sets the switch for the loaded track so that he has a clear road to the end of the tipple when he returns with the loads. A stand is also placed at the switch and so connected that the latter may be thrown from either place.

No Delay in Handling Mine Timber

Formerly all mine timber was loaded on cars while on the main track and the haulage system over the entire mine would be at a standstill while two men loaded the timber. In their eagerness to cause as little delay as possible, they would sometimes fail to fasten securely long timbers and rails and accidents would result. Lowering the timber on the night shift when few men were working was tried. This avoided the delay to the hoisting during the day, but the timbers had to be unloaded in the mine and reloaded during the day to distribute them to the working places. A switch and side track to the timber yard at the tipple has now been put in.

The motorman with the loss of but a few minutes' time drops a trip of empties into this side track and goes on with his hauling. The timber men then load the cars and have sufficient time to do it properly not being rushed for a few minutes and doing nothing for a long time.

Tonnages of Bituminous Coal Plants

We recently called attention to the size of some of the large coal plants in Pennsylvania and Illinois and to stimulate emulation of the records in these states, we print the lists we have collated in full. Many a thriving coal district fails to do as well as the single Iselin plant in Indiana County.

It is only fair to say that if the figures for 1913 were taken, the order would not be the same. Important advances have been made at Vesta No. 5 and at Lucerne. Unfortunately the records of the production of the various states are so far behind the present date that a really timely table cannot be constructed.

TONNAGES OF LARGEST BITUMINOUS PLANTS IN PENNSYLVANIA
1912

	Company and Plant	Tonnage
1	Pittsburgh Gas Coal Co., Iselin Nos. 1-2-3-4	1,776,410
2	Vesta Coal Co., Vesta No. 4	1,555,420
3	Monongahela River Consolidated Coal & Coke Co., Crescent	972,222
4	Westmoreland Coal Co., Export Nos. 1-2	955,622
5	Cowanshannock Coal & Coke Co., Yatesboro	952,027
6	Buffalo & Susquehanna Coal & Coke Co., Sagamore Nos. 13-15 16-17-18	913,786
7	Pittsburgh Coal Co., Moon Run Nos. 1-2-3	798,161
8	Washington Coal & Coke Co., Washington No. 2	740,517
9	H. C. Frick Coke Co., Standard Nos. 2-3	731,005
10	Cambria Steel Co., Rolling Mill	724,168
11	Jamison Coal & Coke Co., Jamison No. 4	723,120
12	Washington Coal & Coke Co., Washington No. 1	716,936
13	Berwind-White Coal Mining Co., Eureka No. 36	709,683
14	Pittsburgh-Westmoreland Coal Co., Acme 1-2	678,837
15	Jefferson & Clearfield Coal & Iron Co., Ernest Nos. 1-2-3-4	673,956
16	Northwestern Mining and Exchange Co., Eriton	658,014
17	Berwind-White Coal Mining Co., Eureka No. 40	645,014
18	Jamison Coal & Coke Co., Jamison No. 2	644,500
19	Pittsburgh Terminal R.R. & Coal Co., G or No. 7	641,040
20	Westmoreland Coal Co., Criterion	622,211
21	H. C. Frick Coke Co., Shoaf Nos. 1-2	599,876
22	Westmoreland Coal Co., Magee	592,707
23	Rochester & Pittsburgh Coal & Iron Co., Lucerne Nos. 1-2-3	591,169
24	Pittsburgh Terminal R.R. & Coal Co., C or No. 3	586,914
25	Pittsburgh Coal Co., Banning	582,896
26	Rochester & Pittsburgh Coal & Iron Co., Eleanora Shaft	579,714
27	Pittsburgh Buffalo Co., Hazel	567,350
28	Pittsburgh Terminal R.R. & Coal Co., B or No. 2	567,209
29	Berwind-White Coal Mining Co., Eureka No. 35	566,577
30	Rochester & Pittsburgh Coal & Iron Co., Adrian No. 1	563,356
31	Ellsworth Collieries Co., Ellsworth No. 2	557,082
32	Keystone Coal & Coke Co., Salem	551,800
33	Pittsburgh-Buffalo Co., Rachel	551,570
34	Pittsburgh Terminal R.R. & Coal Co., F or No. 6	549,888
35	Jamison Coal & Coke Co., Jamison No. 3	548,400
36	Jenner Quemahoning Coal Co., Jerome No. 1	545,306
37	Clearfield Bituminous Coal Corporation, Canoe Ridge Nos. 1-2-3-4	544,764
38	Blaine Coal Co., Blaine	534,846
39	Allegheny Coal Co., Hancock Shaft	531,235
40	Penn Gas Coal Co., Penn Gas No. 2	524,997
41	Ellsworth Collieries Co., Ellsworth No. 1	524,101
42	H. C. Frick Coke Co., Ronco	512,437
43	Penn Gas Coal Co., Penn Gas No. 3	507,604
44	Rochester & Pittsburgh Coal & Iron Co., Helvetia-Stanley	504,826
45	H. C. Frick Coke Co., Buffington	504,579
46	H. C. Frick Coke Co., Edenborn	503,485
47	New York & Cleveland Gas Coal Co., Belmont Nos. 1-2-3	503,225
48	Pittsburgh-Westmoreland Coal Co., Shoenberger	501,729
49	H. C. Frick Coke Co., Leckrone Nos. 1-2-3	493,128
50	Vesta Coal Co., Vesta No. 5	487,039
51	Ellsworth Collieries Co., Ellsworth Nos. 3-4	487,000
52	Monongahela River Consolidated Coal & Coke Co., Alice	485,749
53	Berwind-White Coal Mining Co., Eureka No. 37	476,605
54	H. C. Frick Coke Co., Mammoth Shaft	471,626
55	National Mining Co., National No. 2	470,878
56	Youghiogheny & Ohio Coal Co., Osborne Nos. 1-2	469,569
57	Mongahela River Consolidated Coal & Coke Co., Fayette City	468,896
58	Taylor Coal & Coke Co., Searight	467,302
59	H. C. Frick Coke Co., Continental No. 1	462,410
60	Thompson-Connellsville Coke Co., Thompson No. 1	461,894
61	Bessemer Coal & Coke Co., Bessemer No. 1	461,569
62	National Mining Co., National No. 1	458,537
63	Berwind-White Coal Mining Co., Eureka No. 42	458,415
64	Ocean Coal Co., Ocean No. 2	457,444
65	Keystone Coal & Coke Co., Carbon	455,792
66	Keystone Coal & Coke Co., Sewickley	454,613
67	Monongahela River Consolidated Coal & Coke Co., Black Diamond	453,115
68	Jenner-Quemahoning Coal Co., Jerome No. 2	452,714
69	H. C. Frick Coke Co., Lemont No. 1	452,198
70	Keystone Coal & Coke Co., Keystone Shaft	449,171
71	United Coal Co., Rich Hill	448,910
72	Ocean Coal Co., Ocean No. 1	445,037
73	H. C. Frick Coke Co., Southwest A & B	443,170
74	Republic Iron & Steel Co., Republic	442,389
75	H. C. Frick Coke Co., Leisenring No. 3	441,666
76	Brier Hill Coke Co., Brier Hill	441,655
77	H. C. Frick Co., Bridgeport	440,881
78	Pittsburgh Coal Co., Arnold No. 2	438,840
79	H. C. Frick Coke Co., Trotter	436,878
80	H. C. Frick Coke Co., Leisenring No. 1	436,387
81	Pittsburgh Coal Co., First Pool No. 2	434,932
82	Monongahela River Consolidated Coal & Coke Co., Apollo	434,627
83	Pittsburgh Coal Co., Mansfield No. 2	426,694
84	Diamond Coal & Coke Co., Huston Run	425,678
85	Northwestern Mining & Exchange Co., Dagus Nos. 1-2-3, Eureka	425,201
86	Jefferson & Clearfield Coal & Iron Co., Soldier Nos. 1-2-3-5	424,917
87	Westmoreland Coal Co., Westmoreland Shaft	424,829
88	H. C. Frick Coke Co., Footedale	424,491
89	H. C. Frick Coke Co., Leisenring No. 2	422,297
90	H. C. Frick Coke Co., York Run	422,232
91	H. C. Frick Coke Co., Phillips	421,185
92	H. C. Frick Coke Co., Collier	416,350
93	Valley Camp Coal Co., Valley Camp	415,960
94	Saltsburg Coal Co., Foster Nos. 1-2-3	415,339
95	H. C. Frick Coke Co., Lambert	411,458
96	Pittsburgh Coal Co., Harrison	409,781
97	Allegheny River Mining Co., Conifer No. 3	405,140
98	Buffalo & Susquehanna Coal & Coke Co., Du Bois No. 2	404,934
99	Monongahela Valley Consolidated Coal & Coke Co., Tremont	403,982
100	Rochester & Pittsburgh Coal & Iron Co., Florence Nos. 1-2	402,102
101	Monongahela Valley Consolidated Coal & Coke Co., Lovedale	401,736
102	Pittsburgh Coal Co., Midland No. 1	401,050
103	Lincoln Coal & Coke Co., Lincoln No. 1	401,000

TONNAGES OF LARGEST PRODUCERS IN ILLINOIS

1	Superior Coal Co., No. 3	837,979
2	Superior Coal Co., No. 2	791,835
3	New Staunton Coal Co., No. 1	737,632
4	Superior Coal Co., No. 1	673,717
5	Bunsen Coal Co., Vermilion	640,664
6	Big Muddy Coal & Iron Co., No. 8	570,695
7	St. Louis & O'Fallon Coal Co., No. 2	564,708
8	Bunsen Coal Co., No. 4	561,169
9	Johnson City Coal Corporation, No. 1	540,236
10	Consolidation Coal Co., No. 14	534,485
11	United Coal Mining Co., No. 1	524,163
12	O'Gara Coal Co., No. 9	523,583
13	Consolidated Coal Co., No. 17	516,913
14	Mt. Olive & Stanton Coal Co., No. 2	506,044
15	Saline County Coal Co., No. 2	498,223
16	Chicago, Wilmington & Vermilion Coal Co., No. 1	486,140
17	Ziegler District Colliery Co., N mine	475,386
18	Jones Adams Coal Co., Peerless	472,380
19	Consolidated Coal Co., No. 15	460,116
20	Sesser Coal Co.	424,449
21	Bell Zoller Mining Co., No. 1	423,687
22	Madison Coal Corporation, No. 9	423,556
23	St. Paul Coal Co., No. 1	413,625
24	Chicago & Centreville Coal Co., A	407,420
25	Shoal Creek Coal Co., No. 1	407,025

Milwaukee's Coaling Plants

Milwaukee, which has become one of the greatest coal-distributing points on the Upper Lakes, furnishes a conspicuous example of extraordinary efficiency in the line of coal handling. The necessity for taking care of over 5,000,000 tons of coal during a comparatively short season of navigation, calls for the use of the best modern appliances, and in this respect Milwaukee is not outclassed by any port on the inland lakes.

There are 28 coal-receiving plants along the several channels which go to make up Milwaukee Harbor. More than half of these are located in the Menominee Valley, which is the busiest manufacturing center of the city.



Coal Dock on the Upper Menominee River at Milwaukee

The 28 coal-receiving plants at Milwaukee have a combined storage capacity of something like 4,000,000 tons, while the machinery with which they are equipped represents an unloading capacity of 100,000 tons every 10 hr. and called for an investment of about $2,000,000. Without exception the various plants are equipped with the very best machinery applicable to existing dock situations, but there are several conspicuous examples of capacity and efficiency which deserve mention.

The 16th St. yard of the Milwaukee-Western Fuel Co. is equipped with two portable eight-ton man-trolley bridges and two portable steel towers, the outfit being capable of unloading 20,000 tons of coal in the space of 10 hr. There is only one larger man-trolley on the upper lakes, a 10-ton bridge at Superior, Wis.

The revolving bridge at the works of the Milwaukee Coke & Gas Co. is said to be the largest gantry crane ever constructed. It has a clear span of 360 ft. and cantilever extension of 120 ft., and carries a five-ton bucket. At this plant three fast hoists take coal from vessels at the rate of 300 tons per hour each, or a total of 900 tons per hour. The equipment delivers coal into storage at the rate of 600 tons per hour by belt conveyors, and out of storage by bucket conveyors at the rate of 400 tons per hour. The plant was designed to handle 1,500,000 tons of coal over the dock in the course of a season.

At least six of the yards at Milwaukee are equipped to unload cargoes ranging between 5000 and 10,000 tons in the course of 10 hr. An unusual feature of the coal-handling system is the employment of two river barges which were formerly lake schooners, by the Milwaukee-Western Fuel Co. One of the barges is equipped with elevating machinery by which coal is transferred direct to bins or yards connected with power houses, thus avoiding a vast amount of teaming.

The Youghiogheny & Ohio Coal Co. will soon be in shape to receive coal over its new dock on the South Menominee Canal. The steel hoists are nearing completion and dredges are deepening the canal and slip on which the dock is located. This company contemplates the establishment of another dock on the Kinnickinnic Basin.

In some boiler houses as much as 4.7 kw. per hr. is allowed per rated boiler horsepower. The tendency to force boilers to a higher steam output is on the increase.—Bromley in "Power."

Who's Who in Coal Mining

Alfred W. Calloway

In all the category of coal-mining men there is no name more suitable to conjure with than that of A. W. Calloway. Production and Calloway are synonymous. Maximum output and Calloway also mean the same thing. Yet he doesn't hurry, nor run, nor fuss, nor yell, but somehow or other lots and lots of coal flows over the tipple.

When most men holding high positions of authority change their place of abode and become identified with



ALFRED W. CALLOWAY

new activities in an entirely different field, the question is asked, Can they repeat? Meaning, in plain English, Can they handle the new work with as much success as they did the old? However, there are some men whom we take for granted. Much is expected of them in the way of quantity and quality, and they invariably deliver the goods in exact accord with preliminary specifications. Such a man is Mr. Calloway, and no one of his friends doubts but that he will get as much in proportion out of the West Virginia mines he now manages as he did out of the Pennsylvania plants, which were brought to such a high state of efficiency under his direction.

A. W. Calloway was born June 21, 1872, at Manchester, England. He came to America when 10 years of age and entered the public schools of Brooklyn, N. Y. He graduated from one of the Brooklyn High Schools when he was 16.

This ended Mr. Calloway's school days, and he immediately entered the engineering corps of the Pennsylvania Railroad, remaining in this line of work for the same company during the succeeding five years. Leaving the employ of the Pennsylvania Railroad in 1893, he became identified with the Rochester & Pittsburgh Coal & Iron Co., of Punxsutawney, Penn., his first work being in the operating department. He continued in the service of this corporation for 20 years, winning successive promotions, which finally placed him in the office of the general manager of the company, with headquarters at Indiana, Penn.

During his years of service in Pennsylvania, Mr. Calloway came to be recognized as one of the leading spirits in the bituminous industry of that great coal state. He identified himself with the Coal Mining Institute of America, and after serving as vice-president of that organization in 1910 and 1911, was elected president of the Institute in 1912, resigning in 1913 on account of pressure of other duties. He was appointed to the Bituminous Inspectors' Examining Board of the State of Pennsylvania in March, 1913, for the term of four years, by Governor Tener., and at the first meeting of the board was chosen president.

In December, 1913, Mr. Calloway resigned his position with the Rochester & Pittsburgh Coal & Iron Co., to accept the vice-presidency and general managership of the Davis Coal & Coke Co. In March of this year, Mr. Calloway was elected president of the Davis company, which advancement was due to the quick recognition of his exceptional ability on the part of the West Virginia corporation. Aside from being president of the Davis Coal & Coke Co., he is also president of the Maryland Smokeless Coal Co., and president of the Buxton & Landstreet company.

Alfred Calloway is a modest unassuming man, whose forcefulness, ability and strength of character are indicated by action—never by blatant boasts. He is beloved of his men, respected by his competitors and adversaries. He was married in November, 1893 to Miss Mary Henshey, of Altoona, Penn. They have three children. He is the nearest approach to a one-track man in the matter of occupation that we have ever known. He is familiar with coal mining in all its ramifications, and all his energy is concentrated on his activities in this line. He says that the only important work of a scientific or literary nature he ever did was to sign a subscription blank to COAL AGE.

[*Whenever we have discontinued the short biographical sketches of prominent men, published on this page, inquiries have come in asking why, and readers have requested us to continue the work. It is one of the most popular pages in our paper. Send us the names of men you want us to write a story about.*—ED.]

Editorials

Coal and Other Barons

The expression "coal barons" has received an increased fitness from the events in Colorado. The mine owners have, like the feudal lords of olden time, supported their armed men. We do not think that they themselves would declare that such a retinue was other than ominous and unfortunate. Certainly the citizens generally believe it is to be deplored.

But deploring and condemning will serve but little purpose, the main need is for a cure. Such a correction of the ills besetting our social conditions can be assured by legislation similar to that which eliminated castle-building and the maintenance of private armies, which had been necessary during the Middle Ages. Acts of parliament and court orders were of no avail. In fact, these private armies were the only guarantees of order, the forces of the state not having been created.

There can be no act passed which will prevent an apple woman from defending her stock in trade and similarly no act will prevent men from preparing to meet in battle those who propose to destroy their property or invade their inherent rights without title of law.

The change of the barons from a warlike to a peaceful basis was effected by commuting feudal services for a money payment. This made the state rich and strong and able to impress its power on all those under its tutelage. Secondly, a standing army was brought into existence by which rebellion of either barons or people against the state was made futile. Our British ancestry, like ourselves, feared a standing army, but found in it the only safeguard against the existence of private armies, the continued maintenance of which is unthinkable under modern conditions.

When the law was enforced by a power which to every element was overwhelming, the disarmament of all the citizens followed and private guardsmen became unknown. It is because we have been remiss in providing for good order and for the supremacy of the law that the operator, like the applewoman, has had to be on the defensive.

Give both adequate protection, and the needs for defense being removed, the means for self-protection will not be acquired. The mine guards are the sure outcome of a government, weak because of divided counsels, constitutional restrictions and disrespect for legal enactment. The operators have dispensed with guards and arms twice already, each time as soon as the duly constituted authority promised the enforcement of even a part of the law.

They have submitted even to violations of it at the hands of duly constituted authorities in the hope of peace. For example, they have been forbidden by a presidential ukase from bringing in men to replace those who were driven out by the violence of the strikers and to replace men who were killed in their attacks. But so long as orders of the executive are not too obviously unfair and illegal, they did not and will not protest, even in the courts provided for that purpose.

A better plan than waiting till civil war exists would be to provide a force always ready to require an obedience to the laws, one which would entirely remove from the operators the necessity of self-defense. A small force of constabulary would assure such a result and Colorado should not have failed at its last legislative session to form such a body .

Nothing but opposition to all order explains the defeat of the constabulary bill. There is such a body, in addition to a standing army, in every country from which those people come who have made so much disorder. Here when trouble occurs, we have for weeks neither constabulary, militia nor standing army, for the first does not exist, the second is not assembled till disorder becomes riot, and the last is only to be obtained when riot becomes open rebellion.

Disorder is in the air—there are riots in Colorado, West Virginia, New York and Pennsylvania. All industrial workers are discontented with their lot, all are bound to form trusts to protect their labor and increase their earnings at the expense of each other. In order that their controversies may always be conducted within the law and lawfully restrained, we need in every state a constabulary as amenable to discipline and as well trained as that in Pennsylvania.

Occupational Fatigue

Now comes a doctor who asserts that premature old age is brought on our miners by permitting or encouraging them to spend their leisure time in gardening. The extra work after hours is supposed to cause additional fatigue, lessening industrial efficiency and shortening life.

If this be true, and we must choose between old age and our gardens, let us by all means accept the latter and pay the price by living a shorter span of years. However, we think our medical friend is wrong, for the average coal miner is not unlike the workman in any other industry. We all need relaxation, and there is no greater form of beneficial exercise than gardening when it is done for fun and not for business.

All normal men require diversion—that is, something different from our daily grind. The banker and merchant take up golf, the younger men probably baseball or other forms of strenuous athletics. What could be devised to amuse and profit a miner more than a little garden plot, with its flowers and wholesome vegetables? Also, what is better calculated to create self-respect which comes with decent cheerful surroundings?

Anyone who thinks to increase the efficiency of employees by housing them in shanties erected on clay banks, with an outlook on nature neither fit for beast nor man, is following a mistaken policy by planting in men a type of religion not likely to help in the campaign for good fellowship and contentment so necessary to industrial success.

If we have come to a point where miners are worked to such a limit, that they must recline and rest their bodies from the toot of the closing-down whistle in the evening until the first call to work in the morning, then let us change conditions by still further shortening the hours of labor. No occupation should be permitted to claim a man's energy to the total exclusion of all else.

The doctor is quite in error. Our miners are not such absolute slaves to their trade as he would have us believe.

Concentration of Surface Operations

Some years ago, the man who spread his mine plant over a five- or ten-acre lot, had strong arguments to back his action. He was afraid that a fire, wiping out part of his equipment, would spread to other parts and above all he was desirous that no conflagration he might have would fill his mine with unbreathable gases and suffocate the men.

But times have changed. Nowadays we build all our structures of fireproof material and nothing is gained by spreading our plants over all the ground available. If the plant is not fireproof, it should be made so, not only to save insurance losses and to take care of the workmen, but also so that the plant can be concentrated round the shaft mouth with perfect safety.

We recently visited a plant on which much money had been spent. Coal for the boilers was hoisted up the material shaft and dumped into a larry and then hauled electrically on a steel trestle to the boilers, where it was stoked by hand. The coal should not have been brought up that shaft at all, for the boilers ought to have been fired with the waste from the picking table or by slack screened out of the coal about to be shipped.

The larry should have been replaced by a conveyor, which could have been put in operation without any travel or labor. The money saved, by eliminating the trestle and larry, even had the conveying distance been the same, which was unnecessary, would have paid for the conveyor, and made the labor saving clear profit.

As the power house was located a long way from either shaft, the power losses were bound to be considerable, and poorly laid and maintained lines made this defect even more obvious. Moreover, the blacksmith and carpenter shop lay considerably lower than the collar of the main shaft. As a result it was not possible to lay a tram road connecting the shop with the top of that shaft. Consequently, if any car is found defective when dumped, it must either be laid aside on the ground near the main shaft or dropped to the coal bed, transferred to the material shaft, hoisted, and then trammed to the blacksmith shop. Life is all too short for such methods.

The Clayton Bill

Of all recent legislation, none so vitally concerns the coal industry as the Clayton bill. This law has already passed the House of Representatives and has been referred to the Senate Judiciary Committee. The parts of this bill of especial interest to coal-mining people are as follows:

Sec. 3—That it shall be unlawful for the owner, operator, or transporter of the product of any mine . . . to refuse arbitrarily to sell such product to a responsible person, firm or corporation who applies to purchase such product for use, consumption or resale within the United States or any territory thereof . . . and any person violating this section shall be deemed guilty of a misdemeanor.

Sec. 7. That nothing contained in the antitrust laws shall be construed to forbid the existence and operation of fraternal, labor, consumers, agricultural or horicultural organizations, orders or associations instituted for the purposes of mutual help, and not having capital stock or conducted for profit, or to forbid or restrain individual members of such organizations, orders, or associations from carrying out the legitimate objects thereof; nor shall such organizations, or associations, or the members thereof, be held or construed to be illegal combinations or conspiracies in restraint of trade, under the antitrust laws.

Next of interest, and deserving careful study is the proposed law to cover the issuance of injunctions. It reads as follows:

Sec. 18—That no restraining order or injunction shall be granted by any court of the United States, or a judge or the judges thereof, in any case between an employer and employees, or between employers and employees, or between employees or between persons employed and persons seeking employment, involving, or growing out of, a dispute concerning terms or conditions of employment, unless necessary to prevent irreparable injury to property, or to a property right, of the party making the application, for which injury there is no adequate remedy at law, and such property or property right must be described with particularity in the application which must be in writing and sworn to by the applicant or by his agent or attorney. And no such restraining order or injunction shall prohibit any person or persons from terminating any relation of employment, or from ceasing to perform any work or labor, or from recommending, advising, or persuading others by peaceful means so to do, or from attending at or near a house or place where any person resides or works, or carries on business or happens to be, for the purpose of peacefully obtaining or communicating information, or of peacefully persuading any person to work or to abstain from working; or from ceasing to patronize or to employ any party to such dispute, or from recommending, advising, or persuading others by peaceful means so to do; or from paying or giving to, or withholding from, any person engaged in such dispute, any strike benefits or other moneys or things of value; or from peaceably assembling at any place in a lawful manner, and for lawful purposes; or from doing any act or thing which might lawfully be done in the absence of such dispute by any party thereto; nor shall any of the acts specified in this paragraph be considered or held unlawful.

Another interesting point is contained in Section 20, which provides that in trials for contempt "such trials may be by the court or upon demand of the accused by a jury." Still further in Section 21 it is stated "that the evidence taken upon the trial of any person so accused may be preserved by bills of exception, and any judgment of conviction may be reviewed upon writ of error in all respects as now provided by law in criminal cases; it may be affirmed, reversed or modified as justice may require."

The Senate Judiciary Committee is composed of the following members:

Hon. Chas. A. Culberson, of Texas, Chairman.
Hon. Lee S. Overman, North Carolina.
Hon. Wm. E. Chilton, West Virginia.
Hon. James A. O'Gorman, New York.
Hon. Duncan U. Fletcher, Florida.
Hon. James A. Reed, Missouri.
Hon. Henry F. Ashurst, Arizona.
Hon. John K. Shields, Tennessee.
Hon. Thos. A. Walsh, Montana.
Hon. Hoke Smith, Georgia.
Hon. C. D. Clark, Wyoming.
Hon. Wm. P. Dillingham, Vermont.
Hon. Knute Nelson, Minnesota.
Hon. George Sutherland, Utah.
Hon. William E. Borah, Idaho.
Hon. Frank B. Brandegee, Connecticut.
Hon. Elihu Root, New York.
Hon. Albert Cummins, Iowa.

We urge that everyone interested in the questions covered by the Clayton Bill write his views to some of the members of the committee above mentioned.

Extracts from a Superintendent's Diary

To-day I sneaked off to town to witness my first ball game this season. It was not premeditated in the least. Ten minutes before I left the office, I had not even thought of going. I was sitting at my desk brooding over last month's cost sheet, just completed by our district auditor and sent post haste by special messenger, when I overheard a conversation between my office boy and a commissary driver, standing just outside my office:

"H'its sure gwine to be some game, Sam."

That settled it for me. I followed the impulse. In two seconds I was enroute.

I am quite sure that only two seconds elapsed, because I spoke two words; they were addresed to my chief clerk, "Going out."

I enjoyed the game immensely until about the middle of the second inning, then I happened to turn in my seat to follow a foul with my eyes, when, lo and behold, sitting behind me with his gaze intently upon me, I spied our general manager.

Again, I had an impulse; it was to sink through the floor; but the general manager broke the spell before I could execute it. Come back here, Thompson, he said; plenty of elbow room and a better view of the game. I went.

Here a strange thing happened. The general manager and I began to discuss our likes and dislikes and all but forgot to follow the game. His views, as expressed to me, are worth preserving here. I won't attempt to recall his exact words, nor will I worry with quotation marks.

The trouble with most mine superintendents, said he, and, in fact, with all men in authority around coal mines, is that they don't cultivate an avocation; in consequence, they have about as much imagination and humanity as a ship's stoker. I would rather stake my chances, if I were a miner, on a man who sneaked off to the ball park for an occasional hour, than on any fellow who stuck to his job 365 days in every year. I've generally found that the mining man who takes an interest in base-ball, loves to hunt, fish, raise vegetables, tells capital yarns, loves children and books and knows a few things about human beings in general. Just where our men get their idea that we expect them to be grinding away at their job 24 hours in every day in the year, is more than I have ever been able to figure out. Yes, actually when we propose safety-first contests and prize gardens to some of the superintendents, they are at a loss to understand how they can spare the time to do their part.

Undoubtedly, this narrow interest in things in general explains in part why coal-mine officials are so easily outclassed as debaters, when they get into newspaper controversies with the Union officials, during strike periods.

You can't tell me that a narrow-minded official with no points of live contact with the outside world and no actual knowledge of books or history, has any chance of moving the masses or even the classes, no matter how sound his arguments or outraged his cause, if he has to argue against a man who has bled and suffered, even though the suffering has been self-inflicted.

No, sir! We need red-blooded men in command today, who have at least some idea as to where the pulse of the world can be located.

Another American Mine Safety Association Section

With about 50 miners present from Tower Hill Nos. 1 and 2, Thompson Nos. 1 and 2 and Orient and Republic mines, a meeting was held in the first-aid rooms at Republic last evening to organize the Republic section of the American Mine Safety Association. Following are the officers elected: President, W. W. Fleming; vice-president, Ralph Keena; secretary and treasurer, H. C. Millward; executive committee, William Fowler, D. P. Millward, Richard Minerd, Dr. C. C. Ryan, A. Lake and C. J. Carroll.

The next meeting will be held in the Republic first-aid rooms on Friday evening, June 19. At this meeting a first-aid demonstration will be given in charge of H. O. and D. B. Millward. The former has a Slavish first-aid team, while his brother has two companies of young girls who will execute a first-aid drill. A paper will be read by Dr. C. C. Ryan on "The Physician in Relation to First Aid." D. B. Millward will respond on behalf of the miners. The American Mine Safety Association, of which the new organization forms a part, has already charters in 22 states. The Republic section will give an outdoor meet sometime this summer and will be assisted by a government exhibit. D. B. Millward has a large class of first-aid men, women and boys.

Recent Legal Decisions

Eight Thousand Dollars Not Excessive Recovery for Personal Injury—Eight thousand dollars was not excessive recovery for injury to an employee of a fuel company, attributable to negligence of the company, where his right leg was broken and permanently shortened and distorted. (Wisonsin Supreme Court, Janiak vs. Milwaukee Western Fuel Co., 146 Northwestern Reporter 788.)

Injury to Miner Through Falling Roof—A Pennsylvania mine owner is not responsible for injury to a miner for the foreman's failure to provide sufficient props to support a roof at the miner's place of work, unless the mine owner or his representative knew of the mine foreman's omission of duty, or unless the injured miner voluntarily encountered the risk, knowing the danger. (Pennsylvania Supreme Court, Peters vs. Vesta Coal Company, 90 Atlantic Reporter 65.)

When Miner Assumes Risk of Injury—As a general rule, an employee engaged in making an entry in a coal mine assumes the risk of injury arising from the nature of the work as it progresses, and must take customary precautions to avoid injury to himself. But, if he is injured as a result of omitting timbering at the direction of a superior, the employing mining company may be held responsible, if such direction appears to have been negligent. (Iowa Supreme Court, Williams vs. Craig Dawson Coal Co., 146 Northwestern Reporter 735.)

Liability of Initial Carrier of Interstate Shipment—When a railway company receives carload freight under a bill of lading calling for delivery at a point in another state, but on an understanding that the shipments shall be diverted to points beyond on other lines of railroad, at through rates computed from the place of original shipment, the company becomes liable for loss of, or injury to, the shipments on such other lines of railroad, under the provision of the Carmack Amendment to the Interstate Commerce Act which makes an initial carrier of an interstate shipment liable for loss caused by a connecting carrier. (Illinois Supreme Court, Gamble-Robinson Commission Co. vs. Union Pacific Ry. Co., 104 Northeastern Reporter, 666.)

Right to Recover Under Entire Contract—A coke company which agreed, in consideration of its release from a contract to deliver its entire product for six months, to sell enough coke to enable defendants to fill certain contracts, deliveries to be made throughout a period of five months, is not entitled to recover for a partial delivery, having delivered less in the first month than was called for by the new agreement and nothing during the second month. "The present is a case in which the manifest purpose of the agreement would be defeated were it held to be a divisible contract, thereby allowing the plaintiff not simply to disappoint the defendants in what it was intended they should receive for a specific and express purpose, but requiring from the defendants payments for so much performance as met the pleasure, convenience and advantage of the plaintiff." (Pennsylvania Supreme Court, Producers Coke Co. vs. Hillman, 90 Atlantic Reporter 144.)

The Wage-Scale Conference in Ohio

Outside influences are said to be at work to help terminate the Ohio suspension and a hopeful feeling is expressed by many who are familiar with the situation. After the meeting with the miners' officials, Gov. Cox said he felt encouraged with the day's proceedings and hopeful of the outlook. On the other hand, there are other equally expert opinions that there are no prospects for immediate settlement because of the poor absorbing power of the market. They insist that with the Pennsylvania, West Virginia and Kentucky fields operating at 75% capacity and with a demand greatly below normal, the market is being well taken care of.

Miners in the smaller towns throughout the state are said to be feeling the effect of the strike more than ever because the stores are insisting on cash for goods. Recent estimates show that the miners have lost about $2,000,000 in possible earnings since they quit work and that the operators have lost even more.

Little progress was made Wednesday in the conference. Eastern Ohio operators are still insisting upon a scale of 99.2c. or 41.12c. on the mine-run basis and steadily refuse to consider a higher figure while the miners' officials declare they will not consider such a scale at all. Senator Green, author of the mine-run law and secretary-treasurer of the miners' union, offered a proposition to ascertain the average percentage of screenings in all districts in Ohio, but this proposition was not looked upon with favor by the eastern Ohio operators.

Coal Mining in Michigan

Michigan participated in the general increase in coal production in 1913, mining 1,231,786 short tons, valued at $2,455,227, according to figures compiled by E. W. Parker, of the United States Geological Survey, in coöperation with the State Survey. The increase over 1912 was 25,556 tons in quantity and $55,776 in value. Michigan is an important manufacturing state, particularly in the making of furniture and in the evaporation of salt. The uptodate character of the state's manufacturing establishments is indicated by the fact that most of them are equipped with mechanical stokers using slack coal that is obtained cheaply from West Virginia and is of better quality than the Michigan product. Michigan slack thus becomes a drug on the market, and the coal mines are obliged to depend almost exclusively on the domestic trade, which requires lump coal. The coal mines were practically free from labor troubles in 1913, a strike of seven men for 180 days being the only one reported.

Approximately 10 to 15 per cent. better evaporation per pound of coal will be obtained in a clean boiler as compared with one in which there is a small deposit of scale. Scale $1/64$ in. in thickness causes a loss of 2 per cent. of the fuel burned; $1/32$ in. in thickness, a loss of 4 per cent. of the fuel, and $1/16$ in., 9 or 10 per cent. loss.



It All Depends on the Way You Look at It

Discussion By Readers

A Longwall Proposition

Letter No. 1—Referring to the inquiry of H. R. Hartsuff, COAL AGE, June 6, p. 944, referring to the adaptation of the longwall method of coal mining to the conditions he has described, I would say that the proposition would not be an encouraging one. While it might be a physical possibility to mine this coal by the longwall method, I do not believe it would be commercially profitable.

My duties, for some time, have concerned the solution of just such problems as that presented by Mr. Hartsuff. In one case, the conditions were very similar to those he has described; and, in that case, we found that entries with short, wide rooms driven off both the entry and the air course were impracticable, insofar as obtaining the maximum recovery of coal, per acre, was concerned; and were by no means profitable, from a commercial standpoint, disregarding the completeness of the recovery of coal.

The chief difficulty lies in the fact that both the roof and the coal have greater crushing strength than the unrestricted fireclay bottom. The short rooms will not open up an area of sufficient breadth to permit of a good fall. (The length of the room does not enter into this consideration.) In the instance referred to by Mr. Hartsuff, I doubt whether he could break the absolute roof of the mine, which he refers to as a "sulphur binder" and the overlying strata. I believe this would be a difficult matter to accomplish even with a hard bottom, having a strength equal to or greater than the top slate.

Whether or not the working of any coal seam will prove to be commercially profitable depends on more factors than the physical conditions. But, aside from this, I believe it to be perfectly practicable to break any roof. In my own experience, I have never met with a condition of coal, including the top and bottom, that could not be handled by some means. In Mr. Hartsuff's case, I would suggest that the problem of overcoming the heaving of the bottom and breaking the absolute roof can probably be solved by reducing the load on each pillar and increasing the bending moment of the roof. Under these conditions, however, what is more important than anything else is to rob the pillars clean and permit no stumps of pillars or timbers to remain in the gob. If these are left, they will prevent a good roof fall, and the weight resting on the pillars will cause the bottom to heave; and result in a squeeze that cannot be controlled.

In order to reduce the load on the pillars, the ratio of width of pillar to width of opening must be increased; and to increase the bending moment of the roof, wider rooms must be driven and longer break lines must be established. These should run at an angle of from 45 to 60 deg. with the center lines of the rooms. It seems scarcely necessary to add that the rooms must be driven of a uniform width and on centers. The requirements of ventilation will probably make it impracticable to increase the width of the pillar sufficiently to resist the tendency of the bottom to heave, unless the width of rooms be likewise increased. It would seem practicable to drive the rooms 250 or 300 ft., provided the miners are not rerequired to handle their cars between the face of the room and the entry.

In the instance to which I have referred, our coal was 38 in. thick; and the mine cars were built low so that we did not have to lift bottom in the rooms, but only on the entries. Our rooms were driven 300 ft., with a width of 18 ft., on 65-ft. centers. Pillars were robbed as quickly as the rooms were completed. No more rooms were opened in advance of the robbing than was necessary to maintain a fair tonnage from the entries tributary to the line of robbing. In our case, the roof immediately above the coal was soft and overlaid with a hard sandstone, so that it was necessary to use both cap-pieces and footboards for all timbers. For cap-pieces, we used old car planks sawed 12x18 in.

The double-entry system was employed, the entries being driven at such an angle with the strike of the seam as to give a suitable grade in favor of the loaded cars. The rooms were turned to the rise off one entry only. The mine, in this case, was opened out in the shape of an isosceles triangle, the angles at the base being each 45 deg., and that at the apex or opening, 90 deg. The break line corresponds to the base of the triangle. We experienced the maximum weight when the robbing line had advanced about 350 ft. from the opening. At that time, the cover broke 300 ft. to the surface. Later, breaks in the mine roof occurred at regular intervals; and, at less frequent intervals, breaks extended to the surface.

The coal was mined in a satisfactory manner, the percentage of recovery, per acre, was increased to about 88 per cent., from what was formerly about 50 per cent. This increase in the percentage of coal recovered enabled us to compete successfully with other mines employing more wasteful methods of mining.

A MINE INSPECTOR.

———, W. Va.

Letter No. 2—In reply to Mr. Hartsuff's inquiry, relating to longwall working, I would suggest that this method could be tried without entailing extra expense, and without making any material change in the present system of mining, at first.

The method I would suggest is as follows: Drive two pairs of entries, say 100 yd. apart, to the boundary line. At the head of these entries, start to turn rooms along the line, drawing back the pillars as quickly as the rooms are finished and proceeding thus to work out all the coal from the boundary toward the old workings. This work should be so conducted that the rooms at the head of the entries will be the first to finish, so that the pillar workings can follow up the rooms, in regular order.

An important feature in this method of working would be to drive all the rooms on centers, for the sake of uniformity; but especially should this be the case in respect to the rooms driven off the two inner entries of each pair, so that these rooms will cut into each other in line.

The rooms being driven 150 ft. deep, this method will give a total line of break equal to the length of four rooms, plus the entry centers, or between 600 and 700 ft., which should cause the "sulphur binder" to break and fall, eventually, when the rooms and pillars have been worked back a sufficient distance from the boundary line.

When this fall occurs, longwall working can be started on the retreating plan, the coal being worked back on the butts. There would be 300 ft. plus the entry centers, of working face, to each pair of entries or roads. The coal can probably be cut by longwall mining machines operated across the face. The mining should be done in the fireclay, to avoid the loss of coal. The longwall face should be protected by four or five rows of posts set according to a systematic method, and, for greater safety, two rows of cribs may be used. These should be set on slack or dirt so that they can be readily removed as the work progresses. All timbers should be recovered and used again. The number of men that could be employed on this face would be determined by local conditions and customs.

This system of mining by longwall will afford the loader an increased earning capacity, as the track is carried along the face on steel ties and moved forward as the work advances. The car is thus always close to the coal to be loaded. It is important to employ a sufficient number of men that the face will retreat rapidly.

This system affords all the advantages of the longwall method of mining. The only possible difficulty that could arise would occur in the event of a break closing the longwall face. This, however, is not likely to take place, as I believe the conditions described by Mr. Hartsuff are favorable for such a method of working. The first break would give the roof strata a free end, after which the action of the overburden could be controlled by cribs and posts, as the great weight would naturally settle on the gob, in the rear of the working face.

Should the adoption of this longwall method of working prove successful in Mr. Hartsuff's case, it would not be necessary to continue work longer in the rooms. More entries could be driven to the line and the work brought back in the manner described. No packwalls will be required in this system of mining. The expense for yardage, in driving the entries, will not be as great as shooting down the roof, building the necessary packwalls and keeping open roads, as required in the regular longwall system. All the roads here are in the solid coal, and will require little or no upkeep.

JOHN CRAWFORD,
Foreman, Mine No. 1,
The Pittsburgh-Belmont Coal Co.

Steel, Ohio.

Letter No. 3—I believe the conditions described by Mr. Hartsuff, COAL AGE, June 6, p. 944, are favorable for employing the longwall method of mining. The roof slate, which he states can be shot down, will form good material for the packs; and if these are properly built and kept in good shape, all squeezes can be controlled.

As the "sulphur binder" is strong, it will allow a large area of coal to be taken out before the roof starts to settle. By that time, the packs will have become quite solid, owing to the roof slate drawing away from the rock and settling down on the packwalls. This will form more or less of a cushion over the packs to receive the great weight of the overburden when the first break occurs.

By that time, however, another cross-road will have been started at the coal face, which will cut off the other lengthening roads in which the tracking can then be pulled and used again. It is important to draw all timber when building the packs. With reference to the cost of the work, much will depend on the class of labor employed. The men must understand how to build good uniform packs so as to make them solid, as the success of the method depends largely on the character of the packwalls.

The entire work must be in the charge of an experienced miner who has a thorough knowledge of longwall methods. Good packing means good ventilation. The mine foreman must outline the work and mark where the packs are needed. The work of building these packs is performed mostly by night men. The slate is drilled in the day time and blasted down between shifts, ready for the night men to stow away. It will be sufficient to carry a 12-ft. pack on each side of the roads, which should be turned every 60 ft. The coal face should be "staggered," by which I mean one place should be about 30 ft. ahead of the other. New crossroads should be started every 200 yd., so as to cut out the old territory or worked-out area.

If longwall work is properly conducted, 100 per cent. of the coal can be extracted. This feature alone is a great advantage and goes a long way toward reducing the cost of producton. If Mr. Hartsuff will work one portion of the mine on the room-and-pillar system and operate the other on the longwall system, and compare the cost of the two, he will undoubtedly find that the longwall method will prove the best system to adopt.

JACOB RILEY.

Universal, Ind.

The "Safety-First" Call

Letter No. 1—Referring to the "Safety-First" campaign, so often mentioned in COAL AGE, a short time ago certain West Virginia coal operators appointed "safety inspectors" for service in their mines. The sole duty of these inspectors, as stated, was to assist the mine foreman in regard to everything relating to the safety of the employees and the mine.

The operators, at that time, addressed a letter to the chief of the Department of Mines in West Virginia, Earl A. Henry, acquainting him with their action. Coöperating with them, Mr. Henry, at once, mailed a copy of the letter he had received to every coal operator in the state, in an effort to interest them in similar measures.

In contrast with this safety movement in West Virginia, compare the recent action of 400 miners employed by the J. R. Crowe Coal Co., at their mines Nos. 19 and 20, at Scammon and West Mineral, Kan., who are reported to have "walked out," stating that they would not return to work until the danger signs that had been posted by Gen. Supt. R. A. Gray, in and about the mines, had been removed. The men claimed that they could take care of themselves without such reminders of danger.

These two examples, though not typical, serve to illustrate the relative importance placed on the "Safety-First" movement by some operators and miners. Not all operators go to the same length or take the same interest as

those in West Virginia and Supt. Crowe in Kansas. Neither do all miners go to the same length as those employed by the J. R. Crowe Coal Co. to which we have referred. On the whole, miners as a class, manifest greater indifference to the "Safety-First" campaign than would naturally be expected since it is chiefly in their interest that the work is being pushed.

The extra expense entailed in the effort to secure greater safety in the mine falls wholly on the operators, not a cent being taken from the miners. While it is true that the operators are repaid, to an extent, for this expenditure, by a reduction of the accident list, lawsuits, damages and payments to the Workmen's Compensation Fund, the movement for greater safety does not emanate purely from selfish motives, and the benefits to the miner far exceed in value those derived therefrom by the operator. Who can place a value on a human life? Miners would do well to remember this.

In view of these facts, it is strange that miners as a whole do not take a greater interest in this campaign for safety. While there are many points on which operators and miners will continue to disagree, the safety campaign certainly affords an opportunity for their earnest coöperation. The effort to secure greater safety in mines should appear to all labor leaders, who should take active steps to enlist the rank and file of the miners in the movement. Instead of labor agitators devoting their time and energies to discover points that will arouse dissatisfaction among the workers, if these men would devote a few remarks to the interest of safety in the mines, their services would be more effective and better appreciated by those whom they attempt to serve.

The fact that little space is given to promulgate the safety movement, in labor papers, and the limited efforts put forth by labor organizations to secure the same end, all reflect on the attitude of these workers toward the demand for the hearty coöperation of all parties engaged in the work of mining coal. Miners should apply the official motto of their organization to their own attitude in relation to their employers—the coal operators. This motto "United we stand; divided we fall" if applied and made to include the entire coal industry—operators and miners—would produce an untold effect. Present conditions in the mining world are demonstrating the truth that *the "get-together spirit" is the highway to increased efficiency and increased earnings.*

The "Safety-First" campaign is not a dream but a practical, worthy attempt. The goal, however, can only be reached when all unite in a consistent effort to further the work.

GEO. N. LANTZ.

New Straitsville, Ohio.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Basal Formulas—There are, in fact, but two truly basal formulas, in mine ventilation; the one expressing the **resistance** that an airway offers to the passage of an air current having a certain velocity; the other expressing the **power on the air** producing a certain velocity in an airway, against a certain resistance. These formulas, which have been previously explained, are as follows:

Resistance of airway, $R = pa = ksv^2$

Power on the air, $u = pav = ksv^3$

From these two simple formulas as a basis, with the aid of a few other recognized formulas and principles for determining the quantity, horsepower, water gage, rubbing surface, etc., all the numerous formulas of mine ventilation are derived.

An Important Principle—One of the most important principles of mine ventilation may be stated briefly as follows:

Every airway or mine possesses a certain definite **resisting power,** which is determined by the ratio of its area of passage to rubbing surface. For this reason, a given power will produce a certain velocity and develop a certain resistance, in a given airway; the velocity of the air current varying inversely as the resistance. **Ventilating pressure** is caused by and equal to the resistance developed. **Power,** then, creates **velocity,** which in the airway develops **resistance;** and the resistance produces **pressure.**

The conclusion is, therefore, evident that it is the resisting power of a mine or airway that determines the velocity and pressure a given power will produce in that airway. The airway, it is clear only possesses this resisting power potentially, its development requiring the passage of an air current. Hence, it is proper to term such resisting power, expressed in terms of the airway, the "potential of the airway" or the "mine potential," in respect to a mine.

As has been explained, the equivalent of the mine potential, expressed in terms of the power, quantity or pressure, is properly called the "potential of the circulation."

Illustration of Formulas—To illustrate the use of formulas in mine ventilation, and to make clear their application, the following table is given, in which most of the formulas in common use are classified under their proper heads. Many of these formulas, as will be observed, are simple transpositions of another formula or obtained by substitution. The calculations, in the table, all refer to an airway 5x10 ft. in cross-section and 4000 ft. long, passing an air current of, say 25,000 cu.ft. per min.

The Airway—

Perimeter,		$o = 2\,(5 + 10) = 30$ *ft.*
Length,		$l = 4000$ *ft.*
Rubbing surface,	$s = lo$	$s = 4000 \times 30 = 120{,}000$ *sq.ft.*
Sectional area,		$a = 5 \times 10 = 50$ *sq.ft.*
Potential of airway or mine,	$X = \frac{a}{\sqrt[3]{ks}}$	$X = \frac{50}{\sqrt[3]{0.00000002 \times 120{,}000}} = 373.4$

The Coal Age Pocket Book

The Air Current—

Velocity,	$v = \frac{q}{a}$	$v = \frac{25{,}000}{50} = 500$ *ft. per min.*
	$v = \sqrt{\frac{pa}{ks}}$	$v = \sqrt{\frac{12 \times 50}{0.00000002 \times 120{,}000}} = 500$ *ft. per min.*
	$v = \sqrt[3]{\frac{u}{ks}}$	$v = \sqrt[3]{\frac{300{,}000}{0.00000002 \times 120{,}000}} = 500$ *ft. per min.*
	$v = \frac{u}{pa}$	$v = \frac{300{,}000}{12 \times 50} = 500$ *ft. per min.*
Potential of circulation,	$X = \frac{q}{\sqrt[3]{u}}$	$X = \frac{25{,}000}{\sqrt[3]{300{,}000}} = 373.4$
	$X = \sqrt[3]{\frac{q^2}{p}}$	$X = \sqrt[3]{\frac{25{,}000^2}{12}} = 373.4$
Quantity,	$q = av$	$q = 50 \times 500 = 25{,}000$ *cu.ft. per min.*
	$q = a\sqrt{\frac{pa}{ks}}$	$q = 50\sqrt{\frac{12 \times 50}{0.00000002 \times 120{,}000}} = 25\,000$ *cu.ft. per min.*
	$q = a\sqrt[3]{\frac{u}{ks}}$	$q = 50\sqrt[3]{\frac{300{,}000}{0.00000002 \times 120{,}000}} = 25{,}000$ *cu.ft. per min.*
	$q = \frac{u}{p}$	$q = \frac{300{,}000}{12} = 25{,}000$ *cu.ft. per min.*
	$q = X\sqrt[3]{u}$	$q = 373.4\sqrt[3]{300{,}000} = 25{,}000$ *cu.ft. per min.*
	$q = X\sqrt{Xp}$	$q = 373.4\sqrt{373.4 \times 12} = 25{,}000$ *cu.ft. per min.*
Pressure,	$p = \frac{ksv^2}{a}$	$p = \frac{0.00000002 \times 120{,}000 \times 500^2}{50} = 12$ *lb. per sq.ft.*
	$p = \frac{ksq^2}{a^3}$	$p = \frac{0.00000002 \times 120{,}000 \times 25{,}000^2}{50^3} = 12$ *lb. per sq.ft.*
	$p = \frac{u}{q}$	$p = \frac{300{,}000}{25{,}000} = 12$ *lb. per sq.ft.*
	$p = \frac{q^2}{X^2}$	$p = \frac{25{,}000^2}{373.4^2} = 12$ *lb. per sq.ft.*
	$p = 5.2$ *w.g.*	$p = 5.2 \times 2.3 =$ *say* 12 *lb. per sq.ft.*
Resistance,	$R = pa$	$R = 12 \times 50 = 600$ *lb.*
	$R = ksv^2$	$R = 0.00000002 \times 120{,}000 \times 500^2 = 600$ *lb.*
	$R = \frac{u}{v}$	$R = \frac{300{,}000}{500} = 600$ *lb.*

Inquiries of General Interest

Cubic Contents of a Bushel of Coal

Kindly state the number of cubic inches contained in a bushel of coal, assuming 80 lb. per bu., for loose coal.

J. S. Watson.

Baxter, W. Va.

The cubic capacity of the standard U. S. bushel is 2150.42 cu.in. The weight of this volume of water is 62.5 × 2150.42 ÷ 1728 = 77.7 lb. Taking the average specific gravity of bituminous coal as 1.3, the weight of this volume of solid bituminous coal would be 77.7 × 1.3 = say 101 lb.

The legal weight of 80 lb. per bu. of coal in West Virginia, Ohio, Indiana, Illinois, Iowa, Colorado, and other states, allows only 20 per cent. for voids in the loose coal, while the legal weight of 76 lb. per bu. for bituminous coal in Pennsylvania, Kentucky and Montana, allows practically 25 per cent. for voids in the loose coal. These data evidently refer to a well shaken bushel, as the allowance for voids commonly ranges from 30 to 35 per cent.

Cleaning Safety Lamp Gauzes

Will you kindly suggest the best method of cleaning safety-lamp gauzes, so as to expedite the work, save time and obtain the best results. The usual method of cleaning the gauzes of a large number of safety lamps, especially where two gauzes are used in each lamp, consumes much time and is often imperfectly done. Without a close inspection of each gauze, it is difficult to detect when this work has been slighted.

Aside from the use of the common handbrush, which we are employing at the present time, is there any other cheap and convenient method of doing this work effectively and avoiding the necessity of installing a special machine for that purpose? Inquirer.

Johnstown, Penn.

Some time since, a correspondent stated that the best way to clean a safety-lamp gauze was to hold it before a comparatively strong steam jet until perfectly clean; then dry before an air blast or in a drying chamber through which a current of warm air is passing.

Two Questions of Safety

There are two questions I would like to ask, in Coal Age, that affect to a greater or less extent the safety of mine operations.

1. The coal in our mine is all undercut with chain machines, at night. The first thing in the morning, the machine cuttings or slack is loaded out from probably fifty working places. This is done and the places sprinkled, before any shots are fired. I have always thought that the dust raised by from 30 to 50 miners loading this fine slack ("bug dust" as they call it), at the same time, floated in the air and produced a dangerous condition before firing. Is this the case?

2. Is it considered a good plan to carry a part of the intake current through some old workings, before conducting it to the working places? The present arrangement could be changed so as to ventilate the old places with the return air current, which I think, would be safer and better.

Mine Foreman.

————, W. Va.

In answer to the first question, there can be no doubt but that the loading of the fine dust produced by the cutting machines, a short time before firing shots throughout the mine, is a dangerous practice and should be discontinued. Some arrangement should be made by which this dust could be loaded out during the night, so that three or four hours will elapse before shots are fired in the mine. The working places should then be thoroughly sprinkled for a distance back from the face, before shots are fired.

In answer to the second question, it is always a bad plan to permit the intake air current or any portion of it to circulate through abandoned workings, before reaching the working face. The ideal plan of mine ventilation is to conduct the intake current along the main roads or air courses to the farthest point inby, as far as practicable, and then cause it to return along the working face. All abandoned workings should either be ventilated by a separate "scale" of air, if this can be spared from the general circulation at the face; or the return air current should be made to circulate through the abandoned places, on its way out of the mine.

Engineer of Mines

Referring to the inquiry relating to the title "Engineer of Mines," Coal Age, May 9, p. 784, and the answer there given, I want to ask, If a man has had seven years' experience in mines of different kinds and has completed the mining engineering course contained in 14 volumes of the International Correspondence Schools of Scranton, Penn. and holds their diploma for finishing that course, is he entitled to write the letters, E. M., (engineer of mines) after his name? I would like to learn the opinion of reputable mining engineers on this subject. My question has reference only to the title, "Engineer of Mines," and not "Mining Engineer."

Ralph W. Mayer.

Roslyn, Wash.

As principal of the school of mines to which correspondent has referred, for a period of 16 years, this question often came to me from students who had completed their course; but then, as now, I was compelled to reply that the school was not authorized to give the degree, "Engineer of Mines;" and, therefore, while students who completed the course in mining engineering as given by that school, were practical mining engineers and could rightly so style themselves, they could not properly use the letters, E. M., which refer to a degree the school could not give. See, also, Coal Age, May 9, p. 784.

Examination Questions

Pennsylvania Bituminous and Anthracite Examinations

(Bituminous Questions, May 5-6, 1914)

Ques. 10—What information would you enter, in your daily report, to comply with the bituminous mine law?

Ans.—Art. 4, Sec. 18, requires the mine foreman to enter each day, in a book provided for that purpose, and to sign with ink a report of the condition of the mine, stating any danger he may have observed during the day or that has been reported to him; besides stating whether or not there is a proper supply of material on hand for the safe working of the mine, and whether or not the requirements of the law are compiled with.

Ques. 11—What are the legal duties of a shotfirer and what instructions should he be given?

Ans.—Art. 4, Sec. 14, makes it the duty of a shotfirer employed in a mine generating explosive gas in quantities sufficient to be detected by an approved safety lamp, to charge, tamp and fire all holes properly placed by miners, and to refuse to charge any holes not properly placed. The shotfirer shall use none but incombustible material for tamping, which must be provided by the mine foreman at convenient places inside the mine. All such holes shall be fired by an electric apparatus.

Each shotfirer shall keep a record and report to the mine foreman every hole he has refused to charge, every blownout shot and every hole that has misfired. Every shotfirer or miner permitted to fire his own shot must fired, before leaving the mine, to see that no fire or other visit and examine the place where such shots have been danger is present. No shotfirer shall fire a shot in a place where he can detect explosive gas with his safety lamp; and, in gaseous and dusty mines where locked safety lamps are employed, no holes shall be fired in entries and rooms that have not been thoroughly wetted for a distance not less than 80 ft. back from the hole to be fired.

Ques. 12—The water gage reads 2 in., the velocity of the air current is 500 ft. per min., and the length of air course is 4000 ft.; what would the water gage read if the length of this air course be extended to 8000 ft., and the velocity of the air current be increased to 800 ft. per min.?

Ans.—Both the pressure and water gage vary as the length of the airway and the square of the velocity of the air current. In other words, the water-gage ratio is equal to the length ratio, times the square of the velocity ratio, which gives, in this case,

$$\frac{w.g.}{2} = \frac{8000}{4000}\left(\frac{800}{500}\right)^2 = \frac{2}{1}\left(\frac{8}{5}\right)^2 = \frac{2 \times 64}{25} = 5.1 \text{ in.}$$

Ques. 13—If a workman had his leg broken or had arteries severed, what would be your method of rendering first aid to him, in both cases?

Ans.—Handle carefully, place in as comfortable a position as possible, with soft coal or cushion under fractured limb. Use a cushioned splint and apply a bandage to hold the limb firmly and prevent the broken bones from moving one against another, being careful not to bandage too tightly.

If arteries are severed, press the wound tightly to stop or diminish the flow of blood, using a handkerchief or cotton over the fingers to prevent getting dirt into the wound. As quickly as possible, apply a tourniquet over the artery between the wound and the heart.

(Anthracite Questions, May 17-20, 1914)

Ques. 13—Describe fully your method of examining a mine for firedamp, beginning with your preparation before entering the mine; and explain each step taken until the examination is completed and report made to proper officials.

Ans.—Properly clean, fill, trim, examine and adjust the safety lamp to be used in the examination of the mine. Before descending the shaft, observe the operation of the ventilating fan, and note whether it is running at its usual speed. Then, place a suitable danger signal at the entrance as a warning for men not to enter the mine. Proceeding at once to the foot of the downcast shaft or intake opening, note whether the usual quantity of air is passing into the mine.

Following the intake air current, proceed to examine, in turn, all airways, rooms and other working places, to ascertain the possible presence of gas in dangerous quantities, taking note also of the condition of the roof and coal face in each working place. Where gas or other danger is found, fence off the entrances to the place and mark the same with the usual danger sign. In this manner, proceed throughout the section of the mine to be examined, and, on completing the work, return at once to the shaft or slope bottom and enter the report of the examination in the book kept for that purpose. If the mine is in safe condition for the men to enter and proceed to work, remove the danger signal from the entrance to the mine and report to the mine foreman that all is safe for the men to enter, except the places where you have found any danger. The checks of the men working in these places should be removed from the board so as to prevent them from entering the mine.

Ques. 14—What device would you use to remove gas from holes and cavities in the roof of gangways or breasts?

Ans.—It is often necessary, in such cases, to erect a special brattice of canvas that will deflect the air current into the cavity in the roof and sweep out the gas. It is not a safe operation to attempt to brush the gas out of such a cavity with a piece of canvas.

Ques. 16—What quantity of air is passing through an airway 7 ft. 4 in. high, 11 ft. 9 in. wide, when the velocity of the air current is 434 ft. per min.?

Ans.—The sectional area of this airway is $7\frac{1}{3} \times 11\frac{3}{4} = 86\frac{1}{6}$ sq.ft. Assuming the given reading is an average reading for this cross-section, the quantity of air in circulation is $86\frac{1}{6} \times 434 = 37{,}396$, say 37,400 cu.ft. per min.

Coal and Coke News

Washington, D. C.

In a speech before the National Gas Association of America at St. Louis, which has just been made public here, Joseph A. Holmes, Chief of the Bureau of Mines, again emphasizes the necessity for a careful use of natural resources.

Mr. Holmes, who believes that conservation of these resources is one of the most important problems confronting the people of the country today, said,

I am not interested in any way in that sort of conservation which looks toward the locking up of the natural resources of the country for the future when we need those resources ourselves during the present generation. I think we will all agree as a practical doctrine of conservation, that while we have a right to use everything we need at the present time, we have no right to waste unnecessarily what is the heritage of generations yet to come.

It is hard, I find, to get people to realize the importance of conserving our natural resources under this principle, especially in view of the fact that we have a new, and to some extent, undeveloped country, but in talking with people from the older countries like Great Britain where they have operated industries for a thousand years as compared with our one hundred years, I find that they realize what a thousand years means and they realize how the resources which they are now using at so rapid a rate will, in a few hundred years, be practically exhausted and that when those resources are exhausted it means almost annihilation for any country situated as Great Britain is, and which is so entirely dependent for its commercial success upon the development of its various mineral resources with which it has been so generously blessed.

And when we realize the importance of preventing waste of mineral resources, drawing our information from the experience of the older countries, it makes us more serious in dealing with this important problem in this country.

In the last few decades, we have become a great manufacturing and industrial nation. In the earlier years of our history we were an agricultural people, but when you look at our production of coal, which is becoming more and more an index of the great industrial progress of the nation, it makes us realize pointedly the importance of conservation in view of increased demand, for you will find that during the past 100 years—it was just about 100 years ago that we began to use coal in the United States—we have doubled our consumption of fuel every decade. In other words, from 1900 to 1910 we used almost as much coal as we had used during the 75 years preceding.

When you say that to a man he is apt to reply, "Of course that cannot keep up indefinitely," but why may not the consumption of coal increase enormously? We used 30 years ago about one ton of coal per capita. During the past year we used nearly six tons of coal per capita.

More and more we are becoming a labor-saving country; more and more we are becoming a manufacturing country; more and more we are becoming a country of transportation and all our industries depend upon the utilization of our natural fuels.

My opinion is that replacement of fuels by water power is going to be somewhat like the replacement of the street transportation facilities of a great city like New York by sub-ways and elevated roads. You may remember when the construction of elevated roads in New York City was proposed people said that these roads would destroy the surface lines, but they are crowded; and when the subways were projected they were to accommodate everybody, and yet the surface cars are just as crowded now as they were before the elevated or the subways were used.

I don't believe we will ever notice a difference in our consumption of coal or natural gas—except locally—through the development of our water power, for that will be an incident, not a big factor, in the future development of this country. These great resources with which nature has provided us are resources which we ought to use wisely and by using wisely I mean that they should be used with common sense, with rigid economy and without any unnecessary waste.

Would Settle Colorado's Difficulty

Representative Keating has introduced the following resolution in the House:

That the President of the United States is hereby directed to appoint a commission of five persons, distinguished in experience, discretion and integrity, and free from any interest in the disputed questions, to invite the coal operators and coal miners of the State of Colorado to immediately submit the questions in controversy to said commission for settlement. Said commission shall inquire into, consider, and pass upon the questions in controversy, and, if submitted, settle the same upon a just and permanent basis, with a view to preventing the recurrence of such difficulties in the future, and in any contingency make a full report of the facts and their conclusions to Congress at the earliest practicable date, and not later than Dec. 1, 1914.

HARRISBURG, PENN.

When the Public Service Commission meets again, the members will have before them the books presenting arguments in the case brought against the anthracite carriers for the purpose of obtaining a reduction in the rates for transportation of hard coal from the mines in the state to Philadelphia. After due consideration is given the arguments the decision will be rendered.

Since this case was heard the Supreme Court of the United States has rendered an important decision which may have some effect upon the opinion of the Commissioners. The traffic in the anthracite case is known as intrastate traffic, because it is wholly within the state of Pennsylvania, originating at the mines in this state and having a destination which is also within this state. It is thought by some of the Commissioners that the Shreveport decision of the United States Court would not have any bearing upon the anthracite case.

Anthracite shipped to Philadelphia for consumption in that city and vicinity may be regarded as wholly independent of interstate traffic, but shipments made to this port for transportation "beyond the capes" as the trade expresses it when anthracite is destined to New England, would probably fall within the scope of the Interstate Commerce Commissions jurisdiction whose orders would in such cases be paramount to those of the State Commission. The Shreveport case gives an entirely new aspect to the anthracite case and consideration must be given by the State Commission when rendering its opinion.

Briefs on the case to test the constitutionality of the anthracite coal tax are now being prepared by attorneys for both the coal operators and the state. They will be filed shortly, meanwhile the Auditor General is marking time on collections.

PENNSYLVANIA

Anthracite

Mt. Carmel—Three men were caught in an explosion of gas at the Sioux colliery on June 8, resulting in the death of one man, while the others were severely injured. The men fired an unusually heavy charge of explosive, which ignited the gas.

Pittston—The families of Edward Delaney and Jacob Serma at Port Griffith had an unusual experience early on the morning of June 8. The two houses in which the families lived dropped into a mine cave almost up to the second stories. All were gotten out however from the wrecked dwellings.

Pottsville—The mine foremen's Examining Board in the 19th Anthracite District on June 13, announced that 81 candidates successfully passed the examination for mine foremen and assistants. The validity of the papers of several of the successful candidates will be tested in Court by the United Mine Workers of America who assert that only practical miners should be allowed to become mine foremen, and that the examination should not be open to all classes of employees around the collieries.

North Scranton—On June 12, lightning struck the shaft tower at Cayuga colliery of the Delaware, Lackawanna & Western R.R. Co., breaking off a section of the wood-work, disarranging the electric wires and interfering with the hoisting apparatus. For a time it was believed the entire electrical appliances of the mine were destroyed.

Wyoming—Because several of the workmen employed at the Westmoreland colliery of the Lehigh Valley Coal Co., failed to have their union dues paid up to date, 400 men, the entire force went on strike on June 10. The strike is contrary to the agreement entered into by the operators and miners and union officials are endeavoring to make it short-lived.

Sugar Notch—Officials at No. 9 colliery, Lehigh & Wilkes-Barre Coal Co. which was forced to shut down June 10, as a result of the workings being flooded from a pond running into a part of the mines though a 100 ft. cave, expressed fear that the colliery will not resume operations for at least two weeks. The efforts to block up the cave in the bottom of the pond with bales of hay, stumps of trees and other débris were of little avail. Much damage was done by the water, as the dirt is washed from beneath the tracks and a large quantity of mud is deposited in the gangways.

Bituminous

Pittsburgh—The adjustment of the wage scale in the Pittsburgh district resulted in many of the 40,000 miners returning to work under a contract that is to be in force for

two years. Machine men are to be paid 69c. per ton; pick miners, $1 per ton, and each miner is to be provided with an electric safety cap lamp.

Connellsville—The coke trade appears to have settled down to a 50 per cent. basis for the summer. The shutting down of furnace ovens in this region has ceased for the present, and it is hoped no further curtailment will be necessary. Merchant plants are making better time. More than half of them are working their active ovens six days per week, while the remainder will average between four and five.

Rockwood—The Mountain Smokeless Coal Co. at Casselman which has been closed down for several months will again resume operations in the near future.

Washington—Three men were killed in the mine of the Meadowland Coal Co. near here June 12. They were all caught under a single fall of slate.

Lynn Station—The sale of the Cyrilla No. 5 plant of the Sunshine Coal & Coke Co. was postponed on June 12 to June 26. The sale was started at Cyrilla at 1 o'clock; the first bid being $250,000, and the highest $350,000. The latter was thought to be insufficient by the trustees and the sale was postponed until the above mentioned date.

Evans Station—The Evans Coal & Coke Co. which has been running three days a week for some time past is now operating on full time, and giving steady employment to about 200 men. The production is about 800 tons per day, and the demand promises to continue sufficiently good to keep up steady work for a considerable length of time.

WEST VIRGINIA

Charleston—A liberal estimate places the number of men now idle in the Charleston district at 5325, although about 12,000 quit when the strike was called June 1. It is further estimated that the loss to the miners in wages amounts to $266,250 per month while the strike lasts. A number of operators in the district have, however, signed up with the Union.

Lookout—George Wills and Samuel Cook were killed, and Lawrence Wills and Samuel Flint were probably fatally injured recently when an electric locomotive crashed into the tipple of the Blume Coal Co. The men were thrown from the tipple into a deep ravene.

Colliers—The strike of the miners at the West Virginia and Pittsburgh Coal Co. was declared off June 12, following the announcement of leaders of the miners that they would waive demand for recognition of the Union. It was unofficially stated that the company had granted the eight-hour day, the wage of the United Mine Workers of America in the Pittsburgh district, and given the miners the protection of the Insurance Department of the West Virginia Public Service Commission.

Moundsville — During a severe thunder storm, recently lightning struck the powder house at the Rail & River mine No. 3 at Big Run, destroying 2000 dynamite caps but not injuring 1500 pounds of dynamite that were stored near them in the same building.

Bluefield—It is understood that the Sandy Ridge Coal & Coke Co. has decided to increase its holdings on Lewis Creek, and plans are being made for opening one or more mines in the near future.

KENTUCKY

Lexington—Contracts have been made by three of the southeastern Kentucky coal companies by which they will receive the electrical power for operating machinery at their mines from the Kentucky Utilities Co., with headquarters in Lexington. The mining companies concerned are the Wallings Creek Coal Co., the Clover Fork Coal Co. and the Harlan Coal Mining Co. These concerns have been manufacturing their own power, but before the end of the summer will cease to do so and receive the current direct from the central station along the transmission line which the Utilities company is building into that section. Other similar business will likely come to the Utilities company, which is steadily increasing its operations in the eastern and central part of the state.

Whitesburg—Development undertakings are to be begun soon by the Mineral Development Co., owning large boundaries of fine coal lands in Letcher County along the L. & E. R.R. Numbers of announcements have been made as to the plans of the company, but actual work has not been started.

OHIO

Hartford City—The signing of a three-year working contract between the coal operators and the thousand or more men employed in the Pomeroy Bend coalfield has been reported. The miners are granted the check-off and a number of other concessions not heretofore enjoyed.

Columbus—The application for an injunction by Ohio operators to prevent the anti-screen law from being enforced was denied by the Supreme Court of the United States June 15, which finally settled the question of the constitutionality of this law. No further action on the part of Ohio operators is contemplated.

It is estimated that the cost of changing tipples in Ohio to conform to the new anti-screen law will mean an outlay of about $2,000,000. None of this work has been started as yet.

INDIANA

Sullivan—The shops and offices of the Consolidated Indiana Coal Co. are being moved from Hymera, Ind., to this city, to a site given by the Sullivan Boosters Club. The plant has been at Hymera for 10 years.

Linton—The Froschner Coal Co. has opened a new stripping plant six miles north of this city.

Brazil—Six men recently narrowly escaped asphyxiation in the mine of the Brazil Colliery Co. near Billtown. The men failed to come to the top when their shift was completed, and a searching party of miners found them lying on the bottom of the mine unconscious from inhaling gas. They were quickly taken to the top, and soon revived. It is thought that the accident was due to the men being late in firing their shots, as the other miners had discharged their shots and the smoke and gas accumulated to such an extent that the men were overcome before they could reach fresh air.

ILLINOIS

Belleville—The Kolb Coal Co., of Mascoutah, has filed, in the recorder's office here, an increase in stock from $6000 to $20,000.

Trenton—The last Trenton coal has been mined, and the name will be but a memory in coal-trade circles hereafter. The Breese-Trenton Mining Co. found the producing cost too high to finish out the small unworked acreage, and has abandoned and dismantled the mine. This mine was sunk about 12 years ago on the last section containing Trenton coal. During the past winter the daily output was 800 tons. The regular summer price for the screened sizes of this coal was $1.75, and the winter price about $2—the highest priced coal in the inner district.

Danville—The Bunsen Coal Co. has effected an agreement with its miners for the ensuing two-year period.

Hillery—Work, probably not steady but somewhat over half time, will soon begin in this district again. It is understood that as soon as proper arrangements can be made, the mines will work from three to five days each week, some perhaps doing even better than this.

Canton—According to reports, the new Gilchrist mine No. 5 of the Alden Colliery Co. has been closed down indefinitely. Operations will be resumed, it is understood, as soon as the busy season opens in the late summer or early fall.

Springfield—Out of 96 applicants for mine managers, first and second grade, mine examiners, and hoisting engineers, examined by the State Mining Board at the last examination, April 20, fifty-eight have been given certificates of competency. The details of the list are as follows: Mine Managers, first class, examined, 39; passed 21; Mine Managers, second class; examined 10; passed 10; Mine Examiners, examined 26; passed 16; Hoisting Engineers, examined 21; passed 11. Total number of men examined 96; total number passed 58.

MISSOURI

Kansas City—The interstate field meet proposed for Kansas City is now a certainty, though the exact date has not yet been fixed. The five state tournaments held in Iowa, Missouri, Kansas, Arkansas and Oklahoma were successes in each instance and interest in safety-first and rescue work is at a high pitch. H. D. Ryan, of the Bureau of Mines, is in charge of the plans for the interstate meet, which will probably take place in September. The last of the state competitions took place at Pittsburgh, Kan., on June 13.

MONTANA

Red Lodge—State Coal Mine Inspector, John Sanderson, reports that all of the eight applicants for positions as mine foremen and fire bosses who took the examination for the state certificate recently passed with high marks. The persentage of 75 is required to obtain a certificate. Every applicant turned in papers that came above 80; the majority of them over 90. Carl B. Cheek of Washoe turned in the best paper, receiving 99 per cent.

ARKANSAS

Heber Springs—A bed of anthracite was discovered in court square by blasters who were working on a well, on June 8. The vein, 4 ft. thick, was struck at a depth of 36 ft. Another measure is separated by a layer of soil. The anthracite is believed to be of a high grade.

PERSONALS

Otis Mouser has been elected Vice-President of the Stonega Coke & Coal Co., in charge of sales and traffic matters.

E. J. Prescott has resigned as Comptroller of the Interstate Railroad Co., and has been elected Vice-President of the Virginia Coal & Iron Co.

Governor Dunne of Illinois recently appointed George Denny, of Peoria to membership on the State Mine Rescue Commission succeeding Stephen Wolschlag, deceased.

Morris H. Bush, son of the late C. G. Bush, long connected prominently with the big iron furnaces in the Birmingham district, was recently elected President of the Shelby Iron Co.

Edward Johnson, chairman of the board of directors of the Lorain Coal & Dock Co., of Columbus, Ohio, left recently for a trip to European health resorts. He was accompanied by his son.

James E. Roderick, Chief of the State Department of Mines of Pennsylvania, was recently operated on in Baltimore for an internal ailment of long standing. His condition is reported good, and an early recovery is anticipated.

Frank Bradford, Superintendent of the W. J. Rainey plant at Moyer, has been retired on a pension. He had been in the W. J. Rainey service for 33 years, being superintendent at Moyer since the death of Thomas Jones a number of years ago. He has been succeeded by Robert Hogsett, of Uniontown.

OBITUARY

W. S. Cherry, a pioneer in the development of the northern Illinois coal fields, Federal Superintendent of the Chicago, Willington & Vermillion Coal Co., died recently at his home in Streator, Ill.

TRADE CATALOGS

The Standard Underground Cable Co., Pittsburgh, Penn. "Standard Wires and Cables and Cable Accessories." Leaflet of 12 pages, 3¼x6 in.

The Buckeye Engine Co., Salem, Ohio. Bulletin No. 111-B. "Buckeye-Mobiles." Sixteen pages, 8x10 in., illustrating and describing various applications of Buckeye-Mobiles.

The Standard Underground Cable Co., Pittsburgh, Penn. "Steel-Tape-Armored Cables." Twelve pages, 6x9 in., illustrating and describing this type of cables and accessories.

The Link-Belt Co., Philadelphia, Chicago, Indianapolis. "Wagon and Truck Loaders." Thirty-two pages, 6x9 in., illustrating and describing wagon loaders and their application.

Helmick Foundry-Machine Co., Fairmont, W. Va. "Frogs and Switches." Twenty-two pages, 5x8 in., illustrating and describing frogs, switches, crossovers and other track equipment.

The Ingersoll-Rand Co., 11 Broadway, New York. Forms Nos. 8011 and 8011-1. "Little David Riveting Hammers" and "Rivet Set Retainer for Little David Riveters." Twelve pages, 6x9 in., illustrated.

Morgan-Gardner Electric Co., Chicago, Ill. Catalog 57. "Mining Locomotives." Forty pages, 7x10 in., illustrating and describing the sizes and details of construction of Morgan-Gardner locomotives.

The Chicago Pneumatic Tool Co., Chicago and New York. Bulletin No. 154. "The Chicago Stoper." Twenty-four pages, 6x9 in., illustrating and describing the Chicago stoper with dust allayer attachment.

The Ohio Brass Co., Mansfield, Ohio. Catalog No. 14. "Overhead Materials, Rail Bonds, Car Equipment, Specialties and High-Tension Porcelain Insulators." Bound volume of 606 pages, 6x9 in., illustrated.

The Ingersoll-Rand Co., 11 Broadway, New York. Form No. 4020 second edition. "Leyner-Ingersoll Water Drills." Thirty-two pages, 6x9 in., illustrating and describing Leyner drills and some of their applications.

The Hess-Bright Mfg. Co., Philadelphia, Penn. "Hess-Bright Ball Bearings for Axle Lighting Generators." Twelve pages, 4½x7 in., giving a brief discussion concerning ball bearings and their application to axle generators.

The Link Belt Co., Philadelphia, Chicago, Indianapolis. Advance Section A of General Catalog No. 110. "The Original Ewart Detachable Link-Belt and Sprocket Wheels." One hundred and twelve pages, 6x9 in., illustrating and describing this type of link-belt and its attachments.

PUBLICATIONS RECEIVED

Department of the Interior, Bureau of Mines, Technical Paper 67, "Mine Signboards," by Edwin Higgins and Edward Steidle. Fifteen pages, 6x9 in., illustrated.

Department of the Interior, U. S. Geological Survey. "The Cement Industry in the United States in 1913." Twenty-six pages, 6x9 in., containing many tables and curves.

Illinois Coal-Mining Investigations Bulletin 4. "Coal-Mining Practice in District VII," by S. O. Andros. Fifty-three pages, 6x9 in., illustrated with many drawings and halftones.

Department of the Interior, Bureau of Mines. "Abstracts of Current Decisions on Mines and Mining, March to December, 1913," by J. W. Thompson. One hundred and forty pages, 6x9 in.

Department of the Interior. "Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior for the Fiscal Year Ended June 30, 1913." Ten pages, 6x9 in., unillustrated.

Mellon Institute of Industrial Research and School of Specific Industries, Smoke Investigation Bulletin No. 7. "The Effect of Soot in Smoke on Vegetation," by J. F. Clevenger, M. A. Twenty-six pages, 6x9 in., illustrated.

University of Illinois, Engineering Experiment Station, Bulletin No. 71. "Tests of Bond Between Concrete and Steel," by Duff A. Abrams. Two hundred and forty pages, 6x9 in., with many drawings, diagrams, curves and tables.

Department of the Interior, Bureau of Mines, Bulletin 57. "Safety and Efficiency in Mine Tunneling," by David W. Brunton and John A. Davis. Two hundred and seventy-one pages, 6x9 in.; profusely illustrated with drawings and halftones.

West Virginia Geological Survey, County Reports, 1914, Kanawha County. Bound volume of 679 pages, 6x9 in., with many tables, drawings and halftone illustrations. This volume is accompanied by three large folder maps in neat cloth-bound container of the same size as the book.

CONSTRUCTION NEWS

Scranton, Penn.—Bids will be received within a short time by the Scranton Poor District for the erection of a conveyor and coal pocket at Clark's Summit on the railroad siding used for freight for the Hillside Home.

St. Louis, Mo.—The building of the Laclede Gas Co.'s coke plant is now under good headway. This work was held up on account of the death of Jacob L. Haehlen, the coke expert of the Laclede Gas Light Co., who lost his life in the M. A. C. fire.

Streator, Ill.—Edward E. Evans, Joseph F. Baldwin, and George M. Baldwin have taken the preliminary steps toward forming a corporation for the purpose of mining coal. They have also leased land lying south of this city, and have commenced work on sinking a mine.

Cairnbrook, Penn.—The Loyalhanna Coal & Coke Co., contemplates the erection of several large blocks of houses to be built here in the next two months. After these are completed, the company will erect a large office building, a store and other structures.

Pittsburgh, Penn.—The Anthracite Coal Co., which is controlled by a number of Pittsburgh banks will soon hold a meeting to consider the erection of another breaker. This firm has developed and proven over 4,000,000 tons of Lykens Valley coal and controls 2400 acres.

Chicago, Ill.—T. A. Lemmon, receiver of the Chicago, Wilmington & Vermillion Coal Co., has appointed the Allen & Garcia Co., Engineers, McCormick Building, Chicago, as consulting and constructing engineers to complete the construction work at the Orient, Franklin County mine, including a new rescreening plant, concrete lining for shafts, etc.

Birmingham, Ala.—The Tennessee Coal, Iron and Railroad Co., expects to begin work next month on putting in the mining towns and operating the Bayview Mines which have been under preparation for the past two and a half years. The output at the beginning will be somewhat over 1000 tons of coal daily.

Penny, Ky.—An incline 800 ft. long will be constructed by the Elkhorn & Shelby Creek Coal Co., W. J. Christopher, manager, in the development of two mines. In addition a power plant, which may be second hand, will be purchased. A 150-hp. boiler will be procured and a small hoisting engine for the supply track as well as a drum to hold 1000 ft. of ½-in. wire rope.

Winchester, Ky.—A new railroad in the coal fields of eastern Kentucky is being surveyed by a force from the Wisconsin Steel Co. This will be an extension of the Cumberland Valley Branch of the Louisville & Nashville R.R. It is to run up Poor Fork from Benham, in Harlan County, through a tunnel under Pine Mountain, near Hurricane Gap, following thence the route of Line Fork to its mouth, connecting there with the Lexington & Eastern Ry., also an L. & N. line. The length of the road will be 10 to 14 miles. It will give Winchester a short route to the Harlan coal fields.

NEW INCORPORATIONS

Mascoutah, Ill.—The Kolb Coal Co. has increased its capital from $11,000 to $200,000.

Chicago, Ill.—The Marquette Third Vein Coal Mining Co. has changed its name to the LaSalle-Hennepin Coal Co.

Hillsboro, Ill.—The Oconee Coal Co. has been organized to do a general coal mining business. The capital stock is $10,000, and the incorporators are Frank L. McDavid, Amos Miller and John R. McDavid.

McAllester, Okla.—The Kennedy Coal Co., of McAllester has been organized with a capital stock of $10,000. The incorporators are G. O. Nolley of Wister, L. P. Sorrells, and W. E. Harley, of McAllester.

Davenport, Iowa—The Wisconsin Mine & Development Co., of Davenport, Iowa, has been organized with a capital stock of $20,000 for the purpose of mining coal. The incorporators are Carl L. Lambach, Leon J. Zoeckier, Charles S. Simpson, Jacob Vogler and Z. E. Haywood, all of Davenport, Iowa.

INDUSTRIAL NEWS

New York, N. Y.—The Seaboard Air Line Ry. recently placed an order for between 500,000 and 600,000 tons of coal. This order was divided between the Pratt Consolidated Coal & Iron Co., the Alabama Fuel & Iron Co., and the Alabama Co.

Spokane, Wash.—Effective July 1, the rate on coal from the Bear Creek, Mont. district to Spokane, will be reduced by all railroads from $3.60 to $3.50. This will make the rate on Bear Creek coal equivalent to that on coal from the Red Lodge district.

Republic, Penn.—Fifty miners recently organized the Republic section of the American Mine Safety Association. The following officers were elected: W. W. Fleming, president; Ralph Keenan, vice-president; and C. H. Millward, secretary and treasurer.

Pottsville, Penn.—Surface rights of a 32-acre farm lying between Minersville and Pottsville, and known as the James Farm have been purchased by a syndicate for $14,000. A part of the tract will be laid out as a town, but much of it will be developed for coal mining.

Johnstown, Penn.—A $60,000 coal deal was consummated recently when T. S. Davis of Eversburg purchased through Howard Davis, the Conemaugh real estate dealer, several tracts of valuable coal land lying between Conemaugh and Mineral Point, comprising about 800 acres in all.

Des Moines, Iowa—Seven of the 9 railroads which began action in the United States District Court in December, 1910, to prevent the enforcement of lower rates on coal ordered by the State Railroad Commission have abandoned their cases, while the two remaining roads, the Rock Island and Minneapolis & St. Louis, are expected to dismiss their suits within the next few days.

Pittsburgh, Penn.—The first shipment of Monongahela River coal forwarded direct from Pittsburgh and consigned to the Panama Canal Zone will follow an expected rise in the Ohio River. The towboat "Exporter" has a tow of 22 barges of coal to be delivered at New Orleans, there to be transferred to colliers and by them unloaded at the receiving station at the Panama Canal.

Victoria, B. C.—A considerable quantity of sawdust briquetts is being manufactured at Victoria, while a firm at Vancouver is building a briquette factory. The refuse from the saw mills is cut into small pieces, thoroughly dried, and finally compressed. The briquetts are 3 in. in diameter, and the total cost of production is said to be only $3 per ton. The selling price will be governed by that of coal. It is claimed that these briquetts are a better fuel than either coal or wood.

Connellsville, Penn.—The Baltimore & Ohio R.R. has found coke breeze a satisfactory fuel for use in locomotives equipped with automatic stokers. This is indicated by the fact that the railroad is loading two or three carloads of this waste material every day at Leisenring and is taking quantities away from Juniata and other points, while it is unofficially stated that negotiations are being made with the H. C. Frick Coke Co. for the entire coke breeze output of its plants.

Birmingham, Ala.—The Tennessee Coal, Iron & Railroad Co. announces the addition of another plant to its operations. This firm will erect a plant for the manufacture of basic slag fertilizer at a cost of between $300,000 and$500,000. The utilization of basic slag for fertilizer has never before been attempted in this section. The fertilizer to be made is said to be superior to the basic bessemer slag fertilizer which is used in the German Empire, and about 20,000 tons of which are imported to this country each year.

Toronto, Ont.—The Pacific Coast Collieries, Ltd., is offering an issue of $500,000, of 30-year 6 per cent. bonds, at 98 and interest. Its authorized bond issue is $3,500,000, of which $1,600,000 are issued. The company was incorporated to acquire the Pacific Coast Coal Mines, Ltd., with valuable coal holdings at South Wellington, Suquash and other points on the east coast of Vancouver Island. The South Wellington and Suquash properties are estimated to contain 200,000,000 tons of bituminous coal, approximately half of which has been proved.

Pensacola, Fla.—Loading 5000 tons of coal in one day, the navy collier "Brutus" recently sailed for Galveston with the initial shipment of Alabama coal for the Navy.

Pittsburgh, Penn.—According to operators more coal has been moved to the Great Lakes during the past week or ten days than during any other period of this year. The resumption has been made possible by a better iron ore movement which brought vessels for coal cargoes to the lower lakes. The shipment has increased mining operations and a larger force of men have been put to work, with the prospect, the operators say, of a complete resumption of lake coal shipment by July 1.

Milwaukee, Wis.—Judge Page of the District Court recently found that there was an unlawful combination in restraint of the sale of anthracite coal in Milwaukee County, but that the guilty persons were not in the jurisdiction of said county. The Court held that no coal was sold in Milwaukee, either wholesale or retail, in the open market by dealers in competition. The evidence produced during the investigation has been submitted to Attorney-General MacReynolds to be used in possible prosecution of dealers in Pennsylvania and Ohio, from which states most of the coal used in Milwaukee is received.

Toronto, Ont.—The Nova Scotia Commissioner of Works and Mines has introduced a bill in the legislature for aiding the Intercolonial Coal Co. to acquire the property formerly owned by the Acadia Coal Co., and to install plant for working the same. The bill proposes to guarantee the payment of a loan not exceeding $100,000 and interest at 5 per cent. The output of the Intercolonial has been steadily decreasing, owing to the increased cost of working at a greater depth. The same difficulty caused the stoppage of work at the Acadia property adjoining. The reorganization now undertaken provides for the more economical working of the Acadia vein by the Intercolonial with the aid to be afforded by the government.

Coal Trade Reviews

General Review

Further curtailment in the anthracite regions and demand easing off all along the line. Bituminous consumers crowding operators for better prices and market weak with more declines in sight. Lake trade fair in some sections. Uncertainties in the Ohio situation rapidly clearing up.

Many of the hard coalers are still working full time, but curtailed operations are becoming more general throughout the mining regions, and the end of the current month will see practically all companies on a short schedule. The demand is gradually easing off all along the line, and there are complaints from different quarters as to the poor business, but as a rule the trade generally is pulling along at about the customary midsummer rate. The opening period saw a slow movement, particularly in the Lake trade, and it is possible that the summer business may be accelerated in order to wipe out the deficiency made there.

The general heaviness in bituminous has been further accentuated during the past week. The market seems to be absolutely devoid of any absorbing power, and consumers are more thoroughly in control of the situation than at any time during the current year; they are eagerly taking advantage of the weakened condition of the market to crowd the agencies for better prices, and in most cases find the latter ready to make concessions in order to hold favored business. An increased demand from the West and Northwest, as a result of the labor unsettlement in Ohio, supplemented by an abnormal export business, have been the only favorable developments in the Atlantic Seaboard trade.

Under the stimulus of the increasing Lake trade, and a complete shutdown throughout all the Ohio fields, the Pittsburgh district is enjoying a steadily increasing business. Contracts as a rule continue at the full circular, although prices in the spot market are irregular, and the line trade light. However, persistent work by the selling agencies has resulted in keeping the coal moving while operators are becoming less insistent upon working the mines full time, and the trade seems to be on a more equitable basis.

Insofar as market conditions go, there has been little change in the situation in Ohio, the most important development of the week being the decision of the Supreme Court upholding the constitutionality of the new screen law. What the ultimate effect will be remains to be seen, but at any rate the uncertainty has been removed, and the participation of Governor Cox in the labor conferences, toward the close of the week, gives promise of a speedy solution of the wage-scale question also.

The bunkering trade at Hampton Roads was abnormally heavy during the week, although the dumpings as a whole were only fair, and Coastwise business rather light. The Southern markets slowed down somewhat, orders for both steam and lump coal being few, and the majority of the mines reducing operations to four days a week, although a few still maintain full time. A heavy demand from the country trade in the Middle West, due to the large crops, has injected a rather better tone in the situation, and the market is relatively strong. Prices are somewhat firmer, while an unexpected car shortage on one of the main coal roads has created some apprehension over the outlook this fall.

EASTERN MARKET

BOSTON

Market largely in buyers' hands; Pocahontas and New River still being forced on inland territory. Water freights very low and steamers being tied up. Pennsylvania grades unchanged, with some operators trying to meet low prices on other coals. Anthracite business continues fair, with no difficulty about filling June requisitions.

Bituminous—There is no relief to the generally weak market that prevails in this territory, particularly on Pocahontas and New River coals. Prices are practically in the hands of the buyer, whether in small lots or by the cargo. Practically every discharging point today has quantities of coal in bottoms waiting for orders and so long as cargoes come forward unsold in this way so long will the market show its weakness. More than one steam collier has been laid up within a fortnight because orders are so scarce and it would be no difficult matter to charter transportation from Hampton Roads to Boston for one trip, say, at 50c., perhaps the lowest water freight that has been named in several years.

There is no longer any more than a thinly veiled pretence of asking $2.85, f.o.b. Norfolk or Newport News. Delivered prices are frankly based on nearer $2.65 on the few sales that are being made and on any but the fanciest grades. Even on this basis the tonnage is small and in an ordinary year it would be considered negligible The less favorably known coals are being offered down to as low as $2.50. In brief, the New England tidewater market is about as near being demoralized as at any time since 1909. A three- to five-week wait on large vessels for the cargo to be disposed of is now nothing unusual, and if the situation holds at so low an ebb there will be some demurrage bills to pay.

Under such conditions it is rather a poor prospect here for coals mined in Pennsylvania. In a few instances, however, operators there have met the situation and are getting some scattered business at prices that net down to $1.10@1.20 for grades that are well regarded. The number of mines in position to keep running in times like these is relatively small and the volume of coal placed is hardly significant. The position of Georges Creek coals in this market bears close analogy to that of the better Pennsylvania grades. They, however, in considerable degree have their own transportation and are enabled to make delivered prices that defy analysis. F.o.b. prices on Georges Creek are firmly held on the season basis.

Anthracite—There are no new developments in hard coal. New business is still subject to short delay in shipment, but the companies are freely soliciting orders for June delivery. There is only a scattering business, however, and not enough to keep the mines on full time for much longer. One small feature of the anthracite market just now is the extreme slowness with which fancy grades of Lehigh are being shipped. There are many April orders that are still unfilled.

Current quotations on bituminous at wholesale are about as follows:

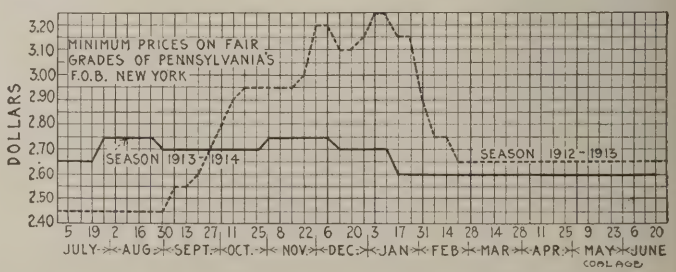
	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.90@1.45	$1.10@1.60	$1.67@1.77	
Philadelphia*	2.15@2.70	2.35@2.85	2.92@3.02	
New York*	2.45@3.00	2.65@3.15	3.22@3.32	
Baltimore*	.....	.....	2.85@2.95	
Hampton Roads*	.....	.....	.....	$2.60@2.85
Boston†	.....	.....	.....	3.40@3.68
Providence†	.....	.....	.....	3.30@3.68

* F.o.b. †On cars.

NEW YORK

Bituminous production still further restricted. Requisitions on contracts at about 60%. Anthracite heavy, but about normal for this period. Stove the only active size. Much coal going into storage.

Bituminous—There is a total absence of any new features in the New York soft-coal market and, if anything, the general heaviness has been further accentuated during the past week. While present indications are that June will show a heavier movement than May, due principally to the delay in



getting under operations in the latter month, production for the current week will be less than last week. Requisitions on contracts range from nothing in some lines, such as steel, for instance, up to full quotas in others, such as municipal and public-service corporations, the general average on all contracts probably being around 60%.

The indications that operators are refraining from sending consignment coal to Tidewater, still prevail, no embargoes being reported and coal on demurrage seldom heard of; but, on the other hand, there is considerable coal being carried on boats to avoid demurrage. West Virginia mines shipping this market are on about 40% capacity, while the western Maryland operators are down to about three days per week. An unusual demand from the Western roads, due to the shutdown in Ohio, has created some activity in West Virginia gas fuel.

Most agencies continue optimistic over the future and see indications of an active market this fall, but the current trade is about as dull and flat as could be expected. The nominal market, at which probably no prompt business is being negotiated, continues unchanged as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.60@2.70; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—While some companies continue on a full-time basis, restriction of operations in the hard-coal regions is becoming steadily more general. The end of the current month will probably see all the large companies working on a curtailed basis. However, as a rule, the trade is pulling along about as is to be expected at this period of the year, although there are many complaints of poor business in some quarters. Undoubtedly, the market is easy on all grades. Large tonnages of the steam sizes are reported afloat where they have been placed as a last resource to avoid demurrage.

Stove coal continues the leader and is the only grade in which there can be said to be any demand at all. Egg and nut are slowing up, considerable of both grades going into storage; the Erie R.R. is reported short of egg coal, however. In the steam department, pea, buckwheat and barley are all in excess supply and difficult to move even at substantial concessions on the circular. No. 2 buckwheat is the only steam grade at all active and it is only in fair demand. We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.80	$4.55@4.70	$4.75	$4.50@4.65
Egg	5.05	4.80@4.95	5.00	4.75@4.90
Stove	5.05	4.95	5.00	4.90
Chestnut	5.30	5.00@5.20	5.25	4.70@5.15
Pea	3.55@3.60	3.30@3.60	3.45@3.50	3.10@3.45
Buckwheat	2.80	2.60@2.80	2.50@2.75	2.00@2.75
Rice	2.30	2.25@2.30	2.00@2.25	1.60@2.25
Barley	1.80	1.60@1.80	1.70@1.75	1.25@1.70

PHILADELPHIA

Anthracite business continues to shrink, and demand is practically centered on certain sizes. Curtailed operations likely this month. No improvement in bituminous.

Anthracite—It is more apparent daily that the usual falling off in the demand for anthracite is developing earlier than usual. There is practically no call for chestnut, and it is safe to say that 50% of the small sizes now being produced would more than meet the requirements on contracts. With this surplus, and with storage facilities already crowded, the producing interests are rather chary about continuing operations, and full-time work will be the exception rather than the rule from now until fall.

Prices on chestnut and pea have been cut heavily by the individual operators, and if the demand for stove was not sufficient to take care of the entire output, the large companies would not have the only incentive the customer has in placing orders with them for other sizes. It has proved a potent lever in more than one instance, in securing orders. While it is understood that the New England business still continues fair, there is every indication that the dealers are becoming filled up, and the end of June may find this branch of the trade in the same condition. Prices at tidewater are quoted about on a parity with the week previous.

Bituminous—Taking the situation as a whole, there is little improvement, although there seems to be a feeling in the trade that conditions will grow more favorable as the coal year advances. Spot coal appears to be in better demand, although customers are loth to pay any advance over existing prices.

BALTIMORE

Improvement in anthracite trade and an increasing export business in bituminous. Soft coal spot market weak, and contract demand light.

An element of briskness to the anthracite trade developed the past week. The delayed purchasing of storage fuel for the coming fall and winter season has at last awakened. There was considerable movement along that line. Industrial fuels remain in poor demand as a whole. All classes of hard coal are in easy supply, and yards as a rule are well stocked for the season.

The most promising features in bituminous are the inquiries from the Northwest and West, and the heavy export business. Prices are steady, West Virginia three-quarter gas holding around 80c., run-of-mine at from 70 to 75c. and slack 50c. Pennsylvania low-grade coals command from 95c. to $1.10, with best fuel holding firmly around $1.35 to $1.40.

Export business is taking a wider range all the time. Heavy shipments sent to French, Italian, Spanish and Egyptian ports are cutting heavily into a field that was at one time almost monopolized by coals from Great Britain.

CENTRAL STATES

PITTSBURGH

No change in activity from formal acceptance of wage scale. Mining operations at over 75%, almost wholly on Lake business. Prompt prices still irregular. Coke stagnant; shipments exceeding production and tending to liquidate accumulations.

Bituminous—There was no return of the miners to work last week, as reported in the daily press. The formal acceptance of the wage scale for the new period occurred, but the men had already gone back to work to the extent that employment was available for them.

Mining operations have shown a slight further increase. Some large interests are operating almost full, or at 80 to 90% of capacity, and the average for the whole district is probably above 75%. The line trade is still extremely light, and the domestic trade amounts to very little, but Lake shipments are very good, considering the dullness in other quarters. The Pittsburgh district is naturally profiting by the partial idleness in other sections.

Prices for free coal continue to be quite irregular, and some important contracts are being booked at concessions, but as a rule contracts are reported as being made at full list prices. Slack on some divisions continues to sell down to 55c., but only in prompt lots. The majority of operators refuse to make contracts for slack for less than twelve months, then quoting 90c. or in a few cases 80c. Regular list prices are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

Connellsville Coke—The market continues to drag. There is no demand for prompt furnace coke and as it is offered at less than contract prices quoted, furnaces are disposed to buy from hand to mouth rather than contract for third-quarter or second-half. There is somewhat more interest in foundry coke, as most contracts expire at the end of this month, but negotiations for the new twelve-month are not yet very active. The market is quotable as follows: Prompt furnace, $1.75@1.85; contract furnace, $1.85@2; prompt foundry, $2.35@2.65; contract foundry, $2.35@2.65, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending June 6 at 243,609 tons, a decrease of 419 tons, and shipments at 254,831 tons, an increase of 1394 tons. Shipments appear to have exceeded production by 11,222 tons, helping to make up for the many weeks in which the balance was in the opposite direction.

BUFFALO

Bituminous steady. No improvement in sight, though the volume of business is slowly increasing. Activity hardly possible before fall. Anthracite moving about normally with a light local trade.

Bituminous—There is a small increase in the movement of bituminous due largely to hard work on the part of the selling agencies. The trade is slowly settling down to a more steady business. Nobody expects to sell more than a moderate amount but all are making an effort to sell the coal before it leaves the mines, as it is a hard matter to make a profit on anything that is sold under pressure.

The operators are not so insistent about working and if a representative cannot keep the mines running they are prepared to slow down. There are few operations tributary to this market that are running more than half time, but only a few are shut down, for it is possible to make some profit. There is no complaint at present of cheap coal offering at consumers' prices and the situation is clearing up materially in that direction. There is some coal selling on contract at prices close to those of a year ago. The railroads are only buying moderately; they refuse to stock up and are not likely to make any sort of outlay that they can avoid.

There is less report of price cutting, though it is not denied that only the best coal can command full quotations. Pittsburgh lump brings, per circular, $2.80; three-quarter, $2.70; mine-run, $2.55 and slack, $2.15, with Allegheny Valley sizes about 25c. lower.

Coke—There is still a falling off in the coke production, due to the slow operations at the iron furnaces. Districts in any way dependent on the large coke-making centers for business report an added quiet condition of late. Prices are lower, $4.25 for best 72-hr. Connellsville foundry now being quoted.

Anthracite—The Lake movement is fair, the rail line-trade quiet and the city demand light. These conditions commonly prevail at this time of the year, but they were not preceded by the usual shipments early in the season, so that the shippers would be pleased to be able to make up some of the deficiency. If it is not done through the summer it will have to be done next fall, when the demand is excessive.

Reports from the Upper-Lake docks are not reassuring, as consumers are not buying heavily enough to relieve the docks very much. It is believed that the coming heavy crops alone will insure liberal buying in the fall, but it is likely all to come in a lump and embarrass the shippers as is usually the case. Shipments by Lake for the week amount to 169,000 tons, according to the custom-house report.

TOLEDO

Market continues heavy but the outlook much improved. Threshing demand already coming in and record-breaking crops will stimulate business generally. Unfavorable outlook in transportation lines.

The coal movement continues sluggish although there is some indication of improvement and it is generally conceded that threshing coal will be in heavy demand within a short time. Ohio is slated for unusually large crops this season. Crops all over the country are looking good and coal men are predicting a big car shortage the coming fall. The railroads have been buying little or no equipment to replace that condemned a couple of years ago. The mine difficulties should be adjusted shortly, while factories, which have been using up their surpluses, will again be in the market for coal and the Lake movement will be heavier.

Pocahontas coal is exceedingly scarce and high in price. The situation here has not been affected in the slightest degree by the closing down of Ohio mines; in fact it is believed to have been a good thing for the market. The list prices thus far remain unchanged although it is expected that some changes will be made the first of the month.

CLEVELAND

Trade dull in all lines and the general situation in coal unchanged. Many concerns still reported to have large stocks. Prices about the same as last week.

A resumption of operations in Ohio may be brought about after the meeting this week between the Ohio operators and the scale committee of the miners, at which Governor Cox will probably be present. Many of the Ohio mine owners are of opinion that an adjustment will be agreed upon along the lines of the western Pennsylvania mine-run basis.

Pittsburgh slack is offered for shipment at from 45c. to 55c. at the mines, freight rate $1, Cleveland, with the absorbing power about one fifth of normal. Fairmount mine-run is quoted at $1.90 to $1.95 f.o.b. Cleveland and ¾ inch lump at $2 to $2.05.

The general feeling is that when fall orders begin to come, the railroads will be unable to handle shipments because their equipment is in such poor condition.

Lake Shipments have decreased slightly since last week. With poor demand throughout the Northwest and with some of the docks at Duluth and Superior still out of commission because of the recent gale, the other docks have become jammed, making coal cargoes not quite so plentiful.

Shipment prices are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.15		
Lump, 1¼-in.		$2.35	
Lump, ¾-in.		2.25	$2.00@2.05
Mine run	2.60	2.10	1.90@1.95
Egg	3.15		
Nut		2.15	
Slack	2.20@2.35	1.60	1.65

CINCINNATI

Heavy curtailment as a result of the labor trouble has not yet affected the market. Abnormally slow steam demand hampering the entire trade. Both rail and Lake business is very poor.

The business depression in practically all lines continues to exercise an unfavorable influence, practically offsetting even the good domestic demand for smokeless. The difficulty in moving slack has so curtailed the production of domestic smokeless and splint that there is not sufficient to meet the call of the trade. The bituminous market is weak, however, and it can hardly be said that there is any encouraging factor at present.

The prospects for continued idleness in the Kanawha field do not seem to have affected the market as yet, although there is just cause for apprehension on the part of the retail trade. But dealers are not worrying, and are making no effort to lay in coal. It is estimated that the number of idle miners in Ohio and West Virginia is close to 60,000, and this necessarily means a serious fuel shortage somewhere. Of course, the present dullness in manufacturing lines wipes out a part of the shortage, but, aside from this, there is little coal in stock. The demand is bound to come later on, and from present indications there will not be enough coal to supply it.

COLUMBUS

Conference of the scale committee before Governor Cox. Decision from the U. S. Supreme Court on the constitutionality of the anti-screen law. Trade still playing a waiting game.

The latest development in the mining situation in the Buckeye State is the calling of another conference of the scale committee made at the request of Governor Cox who is anxious to see the wage scale adjusted. The decision from the United States Supreme Court upholding the constitutionality of the Green anti-screen law has cleared away this uncertainty.

Some increase in the demand for steam grades is reported from certain sections of the state. It appears that the surplus stocks are exhausted and steam users have been compelled to purchase West Virginia coal. Prices for that class of fuel are extremely low, mine-run being quoted down to 80c. Some demand for domestic sizes has also developed but dealers' stocks have been sufficient to take care of this trade. Some of the larger users of domestic grades are laying in their fuel supply. Orders have been placed with dealers for delivery during the latter part of June or early in July. Pocahontas and West Virginia splints are the favorite grades in the domestic demand.

While Ohio mines are still idle there is a considerable tonnage from West Virginia and Kentucky being shipped to the Lakes for the Northwest. The Toledo docks of the Hocking Valley Railway have handled more than a half million tons since the opening of navigation. The ore trade is quiet and this has a bad effect on an active Lake trade for coal.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50@$1.40		$1.50@$1.40	$1.50@$1.40
¾-inch	1.35@ 1.30	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.30@ 1.25		1.25@ 1.20	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.05
Nut, pea and slack	0.85@ 0.80		0.35@ 0.80	0.80@ 0.75
Coarse slack	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.65

DETROIT

No actual improvement noted but a generally better feeling prevails. Anthracite gradually slowing down.

Bituminous—While there has been little improvement in the coal business itself, there is a decidedly more hopeful feeling in general industrial circles which should be reflected in the coal industry shortly. In fact, the market seems to be gradually gaining strength and prices are already stiffening, though without any specific advance as yet. The high price of $2.25 on Pocahontas egg and lump is still being nominally held, though sales down to as low as $2 are reported. Slack is weak and considerably in over-supply, selling down to 55c. per ton and in some cases as low as 40c. An increase of 15c. is predicted by the first of next month. West Virginia operators are now demanding $1.50 for lump coal. There is little or no Ohio fuel coming into this market, and there will be none until the labor situation is straightened out there.

Anthracite—The hard-coal market is gradually slowing down, business so far this month being confined to receiving last month's shipments. However, it is expected that the end of the month will find the customary activity which prevails when the summer discount is in effect.

Coke—The coke market continues dull and unsatisfactory, several cars of Connellsville having been disposed of at a substantial concession in the circular, although circular prices are generally being maintained as follows: Connellsville, $2.90 and Solvay, $3.25, f.o.b. ovens.

HAMPTON ROADS

Shipments during week only fair. Large fleet of bunker steamers taken care of. Quantity of loaded cars on railroad yards still in excess of normal.

Although there has been a large number of vessels in port during the week the dumpings over the various piers will in all probability show up only fair. Cargoes destined both foreign and coastwise have not been extra heavy but the supply of bunker steamers has been large. Such cargoes as have moved foreign went to Kingston, Trieste, Santiago, Montevideo, Manaos and Para.

In addition to cargoes of New River and Pocahontas mine-run there has been some movement of nut and slack and high volatile coals to the New England ports and to the South as well. The government has also taken two cargoes of Pocahontas coal for the stations at San Diego and Mare Island, Calif.

Perhaps the largest quantity of bunker coal loaded into any one vessel at this port for some time went into the S. S. "Banffshire" which took 3750 tons. This vessel was en route from New York to Sydney, N. S. W.

LOUISVILLE

Prices stiffer in the eastern Kentucky field, with indications of still better conditions in the fall.

A continued stiffening of the domestic market is the principal feature in the eastern Kentucky field, while little change is reported from the western end of the state, the demand for domestic sizes from that section usually being a later development. Eastern Kentucky operators have booked orders well on through July and August, at an average advance of 10c. on the ton for each month. On September business operators are finding it possible to hold out for higher prices. Little change for the better has been marked in the industrial demand, though it is considered that the situation with respect to the Kentucky market will improve shortly.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Coal market not quite as active, although a big railroad order was placed. Little improvement in coke. Pig iron slightly more active.

The market on both steam and lump coal fell of slightly, few orders being booked for either lump or steam coal. While some of the mines are running on full schedule, the majority are only working about four days a week. Both furnace and foundry coke remain quiet with little evidence of improvement in the near future. Blacksmith coal is about normal for this season of the year. While not quite as large a tonnage of pig iron was booked as last week, more orders were taken in smaller quantities, with prices about the same.

The placing of a contract by the Seaboard Air Line, involving between 500,000 and 600,000 tons of coal, was the main feature of the week. The order was distributed among three companies, the Pratt Consolidated Coal & Iron Co., the Alabama Fuel & Iron Co. and the Alabama Company.

INDIANAPOLIS

Indiana mines working about half-time. Usual number of contracts closed but coal not being ordered out. Prices at customary summer level, except on screenings. Domestic movement slow.

Conditions in the Indiana coal fields are at the usual summer quiet. Mine owners say they have closed an average number of contracts for the season but the coal is not being taken. The mines are on not much better than half-time and operators say this means that the buyers are on about the same schedule. The fact that no Ohio coal is in the market seems to have made no difference. Agents say coal from the Virginia fields can be had at about the same price as from the Indiana mines.

The fact that there is plenty of free coal on the market has not affected prices, as it has been found that concessions do not increase the demand, so the general policy is to hold prices at a fair level. Screenings are still scarce and command 90c. to $1 as against the contract price of 80 to 90c. Among the factories the largest in the state are on short time but the smaller ones are running about normal. One operator says his largest buyer has closed down for the first time in many years.

The wheat harvest has begun in the southermost counties of the state and will work rapidly north. It will make more work for the railroads and they will need more coal. Whether the increased activity will extend to related industries is what coal operators are waiting to see.

CHICAGO

Prospects for future beginning to brighten up. Improvement anticipated in steam and domestic coal after July 1. Smokeless market showing better form. Demand for screenings exceeds supply and price increases. Coke demand stronger for future delivery.

Railroad conditions take an important part in what is expected in the Chicago coal market. The railroads expect to obtain the increase in freight rates which will mean that the curtailment in expenditures will be ended and naturally the coal market will be affected favorably. Most of the railroads close their fiscal year June 30 and so are spending as little as they possibly can for the time being. It is expected that after July 1 they will begin buying coal for storage as a heavy rush is looked forward to in the fall. Another factor in the expected improvement is that large orders are anticipated by the steel trade on account of the advanced freight rates.

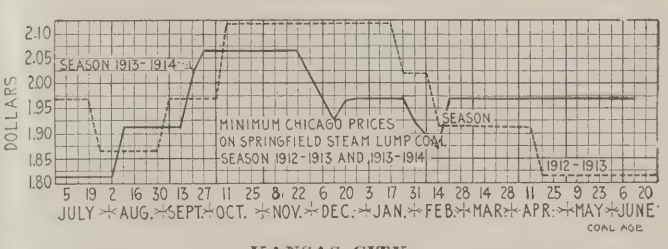
Although anthracite sales have been below normal since Apr. 1, the year's business will be up to the usual figure, with rush deliveries during August, September and October. Reasonably strong conditions prevail in the smokeless coal market. While there is considerable of this grade offered at $1 a ton, the larger companies are holding to the circular price of $1.25 for mine run, on contract coal. There is little demand for lump and egg, but the supply is no better.

There is a variety of prices demanded for Franklin County coal. One company is getting some business at $1.50 for lump, egg and No. 1 nut while another, now getting $1.35, announces that the price will be advanced to $1.50, July 1. Several companies are quoting $1.25 and others have even gone below that figure. Mines in this district are running an average of three days a week. Prospects are fair in the Carterville district, with price conditions similar to those in Franklin County. With the demand for screenings increasing there is a scarcity evident which was not anticipated. During the week the price has increased about ten cents a ton for the better grade and five cents for the ordinary. Dull conditions still prevail in the spot market for hard coke, but an improvement is looked for during the second half of the year.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	$2.07	$2.30@2.40	$2.12	
Steam lump.....	1.97		1.97	
Egg.....		2.30@2.40		$3.95
Mine-run.....	1.87	2.15@2.25	1.87	3.05@3.30
Screenings.....	1.62@1.67	1.95@2.05	1.62@1.67	

Coke—Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.65; gas house, $4.25.



KANSAS CITY

Kansas City market improved. Demand from wheat belt causes slight increase in operations. Market steady on summer basis.

Movement of coal in this section has shown a distinct improvement during the past week. The wheat crop has materialized in good shape and threshermen are actually beginning operations, though it will be a week before all of the separators in the Kansas, Missouri and Oklahoma wheat belts are in full swing. Operating time has been increased as the result of the brisker movement, three days being the minimum in all quarters, with four and five the average. The market has held steady, and with a stiffening tendency which may result in a slight advance shortly. Some danger of a car shortage is felt, though railroads are coping with the situation effectively so far.

ST. LOUIS

Improved demand from country trade due to the heavy crops. An unexpected car shortage on the Iron Mountain causes apprehension over the outlook this fall. Prices unchanged but firmer.

There was a better tone to the high-grade market during the past week, occasioned perhaps by the fact that there is considerable country buying. This is largely in anticipation of the harvest and the coal for threshing purposes is beginning to move. This is not, however, affecting the Standard market any, and the same conditions exist in that field that have for several weeks past.

There has been practically no change in quotations, in either the high-grade or Standard field; screenings and steam sizes seem to be holding their own, but it is likely that in the next week there will be an advance in Carterville and Franklin County screenings on account of the gradually increasing car shortage. For five days straight the Iron Mountain failed to furnish cars, and the only apparent reason for this is that the road is not fixed financially to repair its

equipment. This road is in bad shape financially, while the C. & E. I., one of the other heavy coal carriers in the southern Illinois field, is in the hands of a receiver, and cars are not at all plentiful on it.

The Illinois Central and the Burlington are the only two roads out of the high-grade field that are financially strong. The Burlington does not enter St. Louis from the south, which leaves the Illinois Central as the main carrier and this road has never been able to furnish more than 35% of the equipment demanded by the mines during the fall months.

There was a dropping off in the orders for anthracite last week, and several cars were reported under demurrage at East St. Louis. This is mostly independent coal, and it is somewhat hard to move, being in open cars and in many cases drop bottoms which the dealers refuse to receive.

The market is now quotable as follows:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	.....	$1.15	$0.80 @ 0.90	$1.15
3-in. lump	.....	.....	.....	.....	.....
6-in. lump	$1.20 @ 1.35	.....	1.25	1.00 @ 1.15	1.35
Lump and egg	1.85 @ 2.15	$2.00	.....	.....	1.15
No. 1 nut	1.20 @ 1.35	.....	.....	.....	.....
Screenings	0.85 @ 0.95	.....	0.80@0.85	0.70 @ 0.80	0.75 @ 0.80
Mine-run	1.00 @ 1.15	.....	.....	0.75 @ 0.80	.....
No. 1 washed nut	1.40 @ 1.50	2.25	1.50	.....	.....
No. 2 washed nut	1.25 @ 1.35	.....	1.35	.....	.....
No. 3 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 4 washed nut	1.25 @ 1.30	.....	.....	.....	.....
No. 5 washed nut	0.80 @ 0.85	.....	.....	.....	.....

Coke—Gashouse $4; byproduct, $4.75, both f.o.b. St. Louis.

PRODUCTION AND TRANSPORTATION STATISTICS

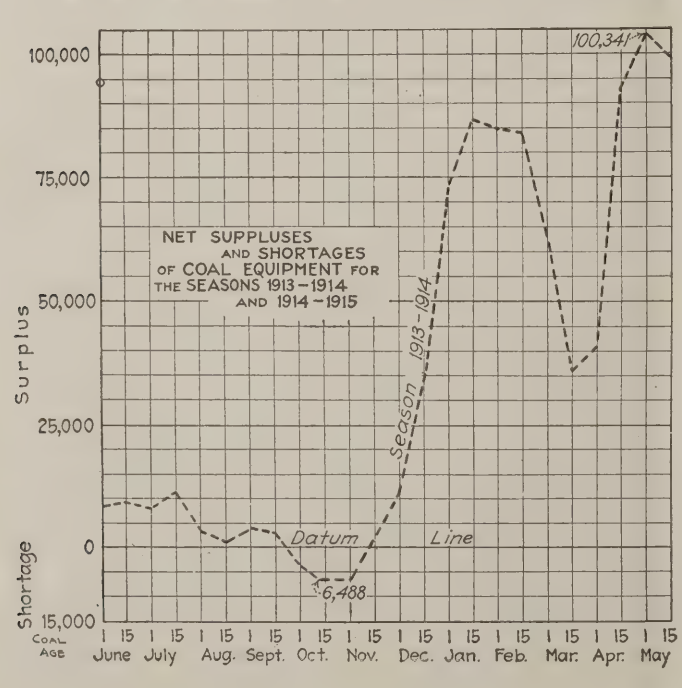
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended June 1, as follows:

	Surplus	Shortage	Net*
New England Lines	1,633	0	**1,633**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	18,452	0	**18,452**
Ohio; Indiana; Michigan; Western Pennsylvania	45,689	0	**45,689**
West Virginia, Virginia, North & South Carolina	3,645	0	**3,645**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	10,761	0	**10,761**
Iowa, Illinois, Wis., Minn.; North & South Dakota	8,311	6	**8,305**
Montana, Wyoming, Nebraska	2,142	0	**2,142**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	1,497	0	**1,497**
Texas, Louisiana, New Mexico	226	0	**226**
Oregon, Idaho, California, Arizona	2,414	1	**2,413**
Canadian Lines	0	0	**0**
Total	94,770	7	**94,763**

	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1	Apr. 15	May 1	May 15
Surplus	85,489	84,775	64,822	39,133	41,055	41,055	100,370	99,664
Shortage	102	239	1,394	3,282	615	615	29	313
Net*	**85,387**	**84,536**	**63,428**	**35,851**	**40,440**	**40,440**	**100,341**	**99,351**

***Bold face** type indicates a surplus.



NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during May and the past four months of the current year in short tons:

	February	March	April	May
Pocahontas Field	942,477	1,161,793	1,156,670	1,239,653
Tug River District	204,074	246,490	221,344	263,155
Thacker District	198,228	274,786	232,181	280,148
Kenova District	71,401	88,616	96,116	101,768
Clinch Valley District	152,769	153,704	156,502	150,916
Other N. & W., Territory	3,694	2,741	2,827	2,596
Total N. & W. Fields	1,572,643	1,928,130	1,865,640	2,038,236
Williamson & Pond Creek R.R.	26,314	43,865	79,828	74,875
All other railroads	67,518	140,123	171,818	225,561
Grand total	1,666,475	2,112,118	2,117,286	2,338,672

Distribution of shipments for April and May compare as follows:

	April			May		
	Shipped	Tipple	Total	Shipped	Tipple	Total
Pocahontas	1,066,583	16,336	1,082,919	1,123,694	16,249	1,139,943
Tug River	219,221	2,123	221,344	260,887	2,268	263,155
Thacker	222,770	9,411	232,181	270,356	9,792	280,148
Kenova	87,884	8,232	96,116	92,958	8,810	101,768
Total	1,596,458	36,102	1,632,560	1,747,895	37,119	1,785,014

Shipments of coke, entirely from the Pocahontas field amounted to 64,340 tons in April as compared with 60,949 tons in May.

FOREIGN MARKETS

Lower Coal Freights from Wales—The heavy fall in freights for coal from Cardiff may be seen in the table herewith. This table covers certain selected ports in which American coal exporters may be expected to have a special interest:

Ports	Highest in 1912	Highest in 1914	Lowest in 1914	Ports	Highest in 1912	Highest in 1914	Lowest in 1914
Alexandria	$3.28	$2.00	$1.67	Gibraltar	$2.55	$1.67	$1.39
Algiers	3.08	1.54	1.35	Havre	1.76	1.09	0.85
Barcelona	3.28	2.00	1.82	Montevideo	5.71	3.40	2.79
Bordeaux	2.02	1.20	0.96	Port Said	3.10	2.06	1.64
Cape Verde	3.04	1.82	1.58	Rio de Janeiro	5.95	3.52	2.85
Genoa	3.52	1.91	1.45	River Plate	6.07	3.71	2.79

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending June 13:

Stocks	Week's Range High	Week's Range Low	Week's Range Last	Year's Range High	Year's Range Low
American Coal Products	....	....	85½	96½	82
American Coal Products Pref	....	....	105	106	102
Colorado Fuel & Iron	27½	27½	27½	34½	24
Colorado Fuel & Iron Pref	....	....	140	140	140
Consolidation Coal of Maryland	....	....	102½	....	....
Island Creek Coal Com	50¼	49	50	....	....
Island Creek Coal Pref	89¼	87½	89½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20⅞	20	20½	23½	17⅞
Pittsburgh Coal Pref	89⅞	88½	89	93½	84
Pond Creek	18	17¾	18	....	....
Reading	166	164¾	165	172½	158½
Reading 1st Pref	..	..	89⅝	89½	87½
Reading 2nd Pref	88¼	88¼	88½	93	87½
Virginia Iron, Coal & Coke	..	..	45	52	40

Bonds	Closing Bid	Closing Asked	Week's Range or Last Sale		Year's Range High	Year's Range Low
Colo. F. & I. g n. s f. g. 5s	92	..	92	May '14	91½	99
Colo. F. & I. gen. 6s	105	..	107¼	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	73½	74¾	74	June '14	73	82
Cons. Ind. Coal Me. 1st 5s	..	70¾	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89	91½	90½	May '14	89	90½
Gr. Riv. Coal & C. 1st g 6s	89	..	99⅛	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	98½	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	91½	..	93	Mar. '14	93	93⅛
St. L. Rky. Mt. & Pac. 1st 5s	86½	87½	86½	86½	84	88¼
Tenn. Coal gen. 5s	78	80	77	Apr. '14	77	82
Birm. Div. 1st consol. 6s	103	Sale	103	103	97⅛	103½
Tenn. Div. 1st g 6s	101⅝	103	101⅜	May '14	101½	103
Cah. C. M. Co. 1st g 6s	101⅝	103	101⅜	June '14	101	103½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	101¼
Victor Fuel 1st s f 5s	..	84	73	Apr. '14	73	73
Va. I. Coal & Coke 1st g 5s	90	93⅝	91	May '14	90	95

DIVIDENDS

Little Schuylkill Navigation Railroad & Coal Co.—Dividend of $1.50, payable July 15 to holders of record June 11-14.

Coal & Iron National Bank—Regular quarterly dividend of 1½%, payable July 1 to holders of record June 10.

American Coal Products Co.—Regular quarterly dividend on both the common and preferred of 1¾%, payable July 1 to holders of record June 24.

COAL AGE

DEVOTED TO COAL MINING AND COKE MANUFACTURE

Volume 5, No. 26
Issued Every Saturday
Hill Publishing Company

NEW YORK, JUNE 27, 1914

Ten Cents per Copy
Contents, First Page
Advertising Index, Last Page



Men and mules labor incessantly all over the earth getting the coal to surface, but

Conveyor Belts
Elevator Belts
Transmission Belts
Hose—all kinds
Packing
Valves, etc.

Goodrich LONGLIFE CONVEYOR BELT

carries the big load

"Longlife" does more work than any other belting—and at lowest tonnage cost. Its great tensile strength, combined with perfect flexibility and good friction, make it the leader in its field. Its edge construction is unequaled. Users of "Longlife" eliminate spillage, edge wear and guide idlers from their mine problems.

We will gladly refer you to plants which are finding our belts the best.

There is nothing in Goodrich Advertising that isn't in Goodrich Goods

The B. F. Goodrich Company

Factories: Akron, Ohio — Branches in All Principal Cities

Makers of Goodrich Tires and Everything that's Best in Rubber





What Users Say About the Bronze Sleeve Bearings Supplied on

Baldwin-Westinghouse

Electric Mine Locomotives

The modern bronze sleeve bearings with oil and waste lubrication used in the motors on Baldwin-Westinghouse Electric mine locomotives give such satisfactory life that many testimonials have come from satisfied users commenting upon this feature.

One large mining company in Arizona operating eight 15-ton locomotives for a period of two years advises that they never replaced an armature bearing and a careful test on one set of bearings at the end of two years showed the wear to be only .003 inch.

A company in Utah, which has had in operation four 18-ton locomotives since 1910, states that none of them have ever been out of service for repairs to the armature bearings and that all motors are still running with the original armature bearings. Some of these locomotives have operated three shifts a day for three years, handling 1250-ton miles per shift.

A very large mining company in Montana has had nine 3-ton locomotives with sleeve bearing motors in operation for three years working three shifts a day and all armatures are still in the original bearings.

Several large companies in Pennsylvania which have used all types of bearings prefer the modern bronze sleeve bearing.

These facts prove that bronze sleeve bearings satisfactorily meet the exacting demands of mine locomotive service.

Specify Baldwin-Westinghouse Barsteel Electric Mine Locomotives and you are assured of reliable operation.

Address either company for full information.

The Baldwin Locomotive Works, Philadelphia, Pa.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

COAL AGE

FLOYD W. PARSONS, *Editor.*

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication. Subscription price $3 per year, in advance, for 52 numbers to any postoffice in the United States or possessions, and Mexico. $4 to Canada.

Published Weekly By HILL PUBLISHING COMPANY
505 Pearl Street, New York, N. Y.

JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.

Cable Address, "COAGE," N. Y.

$5 or its equivalent to any other foreign country. Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London Office, 6 Bouverie St., London, E. C., England.
Notice to change address should be written to the New York Office in every instance.
Advertising copy should reach New York Office by Thursday of week prior to date of issue.
Entered as second class matter, October 14, 1911, at the Postoffice at New York, New York, under the Act of March 3, 1879.

VOLUME 5 JUNE 27, 1914 NUMBER 26

CONTENTS

WITH PRINCIPAL ARTICLES SUMMARIZED

*Illustrated Article

FOREWORD: *Page* 1035

Back to the Mines. Poem by Berton Braley.

*THE MOVING PICTURE IN COAL MINING: *Pages* 1036-1040

The American mining industry is a confusion of tongues; pictures, however, may be clearly understood by all. Recognizing this fact, a progressive West Virginia company has adopted the cinematograph as a means of instructing its employees in methods of both safety and efficiency. Frank H. Kneeland. COAL AGE, Vol. 5.

PUMPING OUT AN ANTHRACITE MINE: *Page* 1040

*NOTES ON THE MINERAL FUEL CO.'S DEVELOPMENT IN EASTERN KENTUCKY: *Pages* 1041-1043

Some comments on recent developments in the Elkhorn field of Kentucky, with interesting notes on the preliminary steps. Construction was carried on along unusually elaborate lines and involved heavy initial expenditures. COAL AGE, Vol. 5.

OUTPUT OF ANTHRACITE COAL BEATS ALL RECORDS: *Page* 1043

*A SIMPLE METHOD OF CALCULATING THE RESISTANCE OF BONDED RAIL JOINTS: *Pages* 1044-1045

Formula and tables are given, by the use of which the resistance of any compressed terminal bond may be ascertained in terms of feet of unbroken rail. Vincent Rhea. COAL AGE, Vol. 5.

*COMBINED ELECTRIC LAMP AND GAS TESTER: *Page* 1045

THE CALAMITY TRAIL: *Pages* 1046-1046

A somewhat satirical soliloquy on the design and operation of steam engines, with particular attention to those of the genus high-speed; also a few remarks on the shortcomings of steam boilers, piping and separators, and the ignorance and gullibility of coal operators in general. C. W. Crawford. COAL AGE, Vol. 5.

*A MINE AT THE PANAMA-PACIFIC EXPOSITION: *Page* 1047

EXAMINATION QUESTIONS WITH ANSWERS: *Page* 1063

COAL AND COKE NEWS: *Pages* 1064-1067

THE NECESSARY TRAINING OF MINE OFFICIALS: *Pages* 1048-1050

In the past many ignorant and unscrupulous officials have made a reputation for themselves at the expense of their employers by "hogging." The day is probably coming when only men of integrity, who are fitted for their particular work by education or experience, can secure or hold a position of trust or responsibility. P. J. Brennan. COAL AGE, Vol. 5.

EXTRACTS FROM A SUPERINTENDENT'S DIARY: *Page* 1050

WHAT SHALL BE CONSIDERED MAXIMUM RECOVERY: *Pages* 1051-1053

The percentage of recovery varies widely in different fields, and frequently in the same locality widely divergent results are obtained. High figures secured in one field may not necessarily be a criterion for another, even though physical conditions may be similar. A. W. Hesse. COAL AGE, Vol. 5.

EXPLOSION AT HILLCREST, CANADA: *Page* 1053

SUMMER MEETING OF COAL MINING INSTITUTE OF AMERICA: *Pages* 1054-1055

The institute held a short meeting at Monongahela, Penn., of which perhaps the most interesting features were the address by the mayor, the paper of William Lauder, the address by A. P. Cameron and the question box. COAL AGE, Vol. 5.

WHO'S WHO IN COAL MINING: *Page* 1056

Brief sketches of the lives of William H. Taylor, president of the St. Clair Coal Co., Pottsville, Penn., and Jesse S. Cheyney, vice-president and general superintendent of the Stonegap Colliery Co., of Glamorgan, Va.

EDITORIAL: *Pages* 1057-1058

Methane in Mine Air—Should Electricity Be Debarred from Mines?—The Cause of the Colorado Strike—The Foreigner.

DISCUSSION BY READERS: *Pages* 1059-1061

*The Air Factor in Mine Explosions—The Safety-First Call. Letter No. 2—Effect of Short-Circuiting Air on Speed of Fan.

STUDY COURSE IN COAL MINING: *Page* 1061

INQUIRIES OF GENERAL INTEREST: *Page* 1062

Problems in Rescue Apparatus.

COAL TRADE REVIEWS: *Pages* 1068-1072

ADVERTISING INDEX: *Page* 26

NUMBER OF COPIES PRINTED THIS ISSUE 10,250

None sent free regularly, no returns from news companies, no back numbers.

A Message To You From The President Of The West Virginia Coal Mining Institute

The Weekly Ad-Talk Page

You will be interested in the following remarks by Neil Robinson, president of the West Virginia Coal Mining Institute, delivered at the recent meeting at Cumberland.

" * * * The value of the mining journal to the superintendent, mine-foreman and every ambitious employee of a mine is simply amazing; and the members of our Institute can perform no greater service to the industry they represent than by encouraging, I may almost say coercing, the men under their direction to subscribe for and read and study at least one of the many good papers available.

"We would not care to employ a lawyer who knew it all and never kept in pace with new laws and new decisions; nor would we knowingly entrust a doctor with the care of our physical ailments if advised that he never read a medical journal and only had vague hearsay knowledge of new medicines and new treatments.

"If we apply this test to the men who are to pass upon points of law, and those who are to treat the ills of an individual, how much more rigidly should we apply it to the men who are responsible for hundreds of lives in the depths of the mines? No man can keep abreast of the times who fails to profit by the wonderful stores of knowledge presented every week and every month in the journals that specialize on coal and coal mining. The advertising columns, with illustrated descriptions of new machinery, have a value almost equal to the literature in the body of the paper, and we can truly say that a good journal will give us a profit from cover to cover. The fine periodicals now at our disposal will carry to every mining village in our State quick knowledge of progressive methods wherever they may be adopted, whether in our country, Germany, Belgium, Great Britain or far-away Australia.

"My message is brief but it is important. Let me urge, with all possible earnestness, that every member of this Institute shall lend his best efforts to the dissemination of the wonderful stores of information contained in the trade papers, to the end that the men connected with the mines in West Virginia may become the best posted men in the mining world."

This is a fine illustration of the value the leading coal mining men place upon both the advertising and editorial sections of the modern coal mining papers. Their advice is good—are you following it?

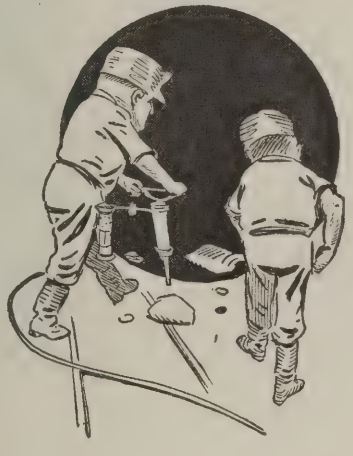
COAL AGE

Vol. 5. NEW YORK, JUNE 27, 1914 No. 26

Back To The Mines

By Berton Braley

Written expressly for Coal Age



Back to the mines with you, drawers of dividends,
Back to the mines where your treasure-house lies,
Back to the men who are digging your coal for you
Back where the Job is right under your eyes,
Dingy and dull is the mining community,
Ugly its outward and visible signs,
—Therefore it gives you the more opportunity
Back to the mines!

Though it is gay in the mighty metropolis
Far from the mining town, grimy and grim,
Far from the spot where the miners are laboring
Down in the galleries dusty and dim,
THESE are the people who daily are needing you,
Life runs for them on the hardest of lines,
Go and live close to the folks who are feeding you,
Back to the mines!



Distance is dulling to kindness and sympathy,
Dulling to skill and efficiency too,
Absentee owners grow careless and cynical
Anxious for nothing but dividends due,
Back to the mines—and to justice and sanity,
Learn how the other half struggles and pines,
Back with the woes and the joys of humanity,
Back to the mines!

The Moving Picture in Coal Mining

By Frank H. Kneeland

SYNOPSIS—The American mining industry is a confusion of tongues; pictures may, however, be clearly understood by all. Recognizing this fact a progressive West Virginia company has adopted the cinematograph as a means of instructing its employees in methods of both safety and efficiency.

Any language, either articulate or written, has its limitations, territorial or otherwise. Numerous as have been the attempts to invent and establish a world tongue, they have all met with dismal failure, and we have at the present time no speech or dialect which may be universally understood.

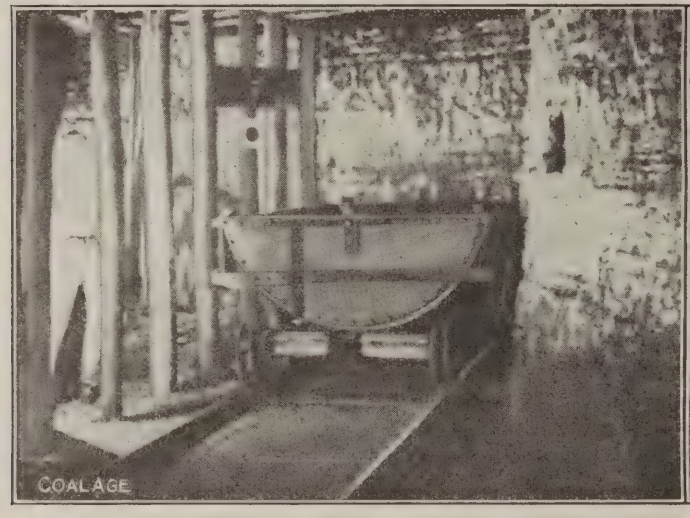
This does not signify, however, that a person speaking one language is unable to communicate with those unfamiliar with his particular tongue. On the contrary, by the use of motions, gesticulations and grimaces, he may readily make his wants and wishes known. In other words, communication may be established by means of signs.

The engineering profession perhaps possesses the nearest semblance to a universal written language that the world has yet seen. The working drawing and sketch are not hedged in by the limitations of time and know no territorial boundaries. The plans of Hiero and the drawings of Leonardo da Vinci are as intelligible to the engineers of today as they were to the Egyptican workmen 200 years before the dawn of the Christian era or the Italian artisans of the middle ages. Thought preserved in the form of a properly made drawing is universally intelligible throughout all lands and eras to those who plan.

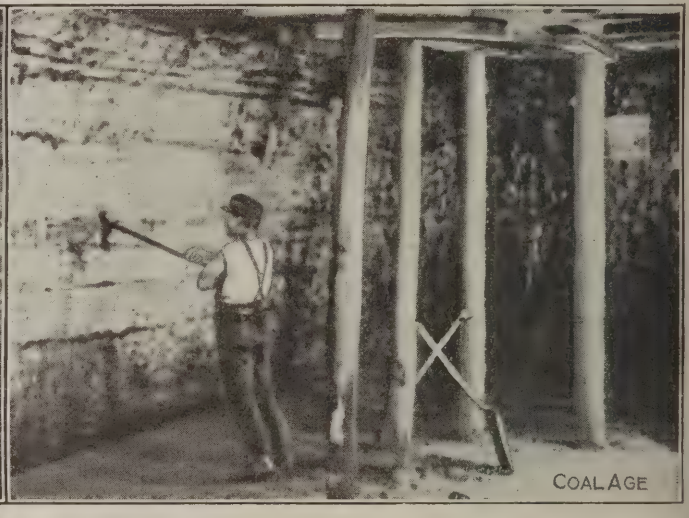
The working drawing, however, is made with one primary and fundamental object; namely, construction. If we wish to convey other ideas than those structural, we must resort to other means, of which the picture is the most common and intelligible. Furthermore, a picture or painting conveys a meaning and an idea to those who may be utterly ignorant of sound symbols and punctuation marks. The only means at present at our command, therefore, whereby ideas may be transmitted from one person to another without a knowledge of a common tongue, is by means of sign language; in other words, a visual language without an alphabet.

The ranks of our present-day coal miners are recruited largely—probably considerably over half—from the countries and municipalities of southern Europe, where illiteracy is prevalent and where the languages and dialects are numerous. In short, our coal-digging forces are composed largely of Italians, Greeks, Poles, Slavs, Lithuanians, Bulgars, Montenegrins, Huns, Armenians, with a more or less generous admixture of races from other climes, such as Germans, Scandinavians, Russians, Hindoos, Chinese and Japanese.

Many, if not most of these men, when they first apply for work at our coal mines, are not only utterly ignorant of our language and customs, but also of the first principles of coal mining. It is at present the law in the anthracite region of Pennsylvania that no man may assume the duties and responsibilities of a miner who has not first served at least a two years' "apprenticeship," passed a miner's examination and must hold a miner's certificate. A similar statute is in force in Illinois, and there is and has been strong agitation for like enactments in other mining localities.



Loading Out the "Bug-Dust." Note Danger Board on Third Post



Drilling the Center Shot Hole. Notice Cleanness of the Place

This "Apprenticeship" Is Not Perfect

While this "apprentice" system may be an improvement over the conditions existing in these fields before its adoption, and is greatly superior to no instructions in the trade whatever, it nevertheless leaves much to be desired and is frequently subject to deplorable abuses. The possibilities of the evasion or perversion of such a statute are so well known as to require no further comment here.

Furthermore, however much knowledge the prospective miner may acquire under this system of the gentle art of coal digging, it is certain that not all, and probably only few of the instructors are men both careful and efficient in their daily work.

The result is obvious. The apprentice learns not only the few proper and efficient methods of his instructor, but acquires his many foibles and shortcomings as well.

It is probable that the state law requiring a term of mining apprenticeship was not promulgated with the primary idea of either rendering the calling more safe or insuring greater efficiency of the individual worker. On the other hand, this measure was doubtless fostered by the miners' union with the intention of throwing a legal barrier around the member and his job, and thus rendering it unlawful for the coal operators to place at work as miners men who had not seen at least two years' service in the mines of Pennsylvania.

In those coal fields not employing this apprenticeship system, conditions may be either worse or better than where it is in vogue. In most mining localities the old method of procedure still prevails. A man applies for work and is asked certain questions concerning previous employment. As his principal object is at the time to secure a job, he usually answers "yes" or "no" to the questions propounded as he deems most advantageous to his cause. His fellow countrymen and friends have probably coached him as to what to expect and what to reply.

We will suppose that he is successful in securing a position as a miner and reports for work. If he then knows how to take care of himself and keeps out of danger, all is well; if not, he is possibly either injured or killed. In this latter contingency the reports of the accident show that he had received all customary attention and instructions, and that his misfortune was due solely to his own fault, the foreman under whom he worked and the company employing him being blameless.

Progressive Companies Make Sure

Among the most progressive companies, however, and especially those considering "safety first," it has been the custom for some time to take nothing for granted, and to be sure that all men entering their employ are properly instructed in the work they are expected to do. When hired, every man is given a book of instructions printed in several different languages, and upon going to the mine is placed in charge of a sub-foreman, who watches him closely, giving from time to time such verbal instructions as he may consider necessary.

In coal mining as in most other occupations, there are but few movements or operations to which "scientific management" may not be applied with benefit. To do this intelligently, it must be done by efficient instructors and all false motions and unnecessary movements avoided. Here, as elsewhere, there is one, and usually only one, right and proper method of procedure, and this right and proper method of performing any operation is the one in which the workman should be thoroughly instructed.

In order to render this instruction effective, one or more of several methods may be employed. The men may be taught verbally at frequent intervals by a sub-foreman or other person, who must not only give them detailed instruction, but illustrate the same by frequent examples. Where the men to be instructed lack a knowledge of the language in which the instructions are given, or are unable to understand any language if put in scientific terms, or those necessary to give full and detailed explanations, it is impossible to teach them verbally; they must be shown. There are two ways of showing such men; one is to have experts do each particular kind of work under their observation. It will be necessary to have this work gone through with three or four times before the men will comprehend what the expert is driving at, and such teaching becomes an endless job.

The Adaptability of the Moving Picture

The other method is to have motion pictures made of an expert doing each particular kind of work, then have these exhibited before the men as often as it is deemed necessary. This can be done more quickly, more perfectly and more economically, produces better results and can be more readily comprehended by the men themselves than any amount of verbal instructions given in the mines. For just as the working drawing is comprehensible to the engineer, so the moving picture is understandable by everyone, child or adult, alien or native.

It was with the idea of familiarizing its employees not only with means and methods of greater safety in the mines, but also with the standardization of mining processes that the United States Coal & Coke Co., a subsidiary of the U. S. Steel Corporation, with mines in McDowell County, W. Va., adopted the moving picture as a means of instruction.

The stereoptican had been in use for some time by the H. C. Frick Coke Co., and other steel corporation subsidiaries in teaching methods of accident prevention. It was believed, however, that this means of instruction was open to many objections. It showed how *not* to do things, rather than how they should be done. Furthermore, when a series of lantern slides were exhibited, illustrating a number of fatal accidents, the impression made upon the audience was unquestionably a bad one, and particularly so upon the women, who, understanding little or nothing of actual mining operations, would imbibe the belief that coal mining was an extremely dangerous calling and would hardly care to have any of their male relatives engaged therein. They at least would fail to grasp the fact that the four or five accidents which they had seen illustrated upon the screen in the course of the evening had been scattered through perhaps a year's time and had occurred in several different mines. So far as the miners themselves were concerned, the pictures showed what they should not do, and the result of failure to observe certain precautions. While this was in a sense beneficial, it left the miner to a considerable extent at sea as to what should have been the proper method of procedure.

Furthermore, it was utterly impossible to show in lantern slides the most efficient methods in coal mining. With moving pictures on the other hand, it is possible to show to the novice and man of long service alike, the best methods which years of experience have been able to devise for the prevention of accidents and the attainment of efficiency.

The Method of Taking the Pictures

The best method of taking moving pictures underground had to be determined by experiment. Although careful inquiry was made, both by the company and by the U. S. Bureau of Mines, whose photographers actually took the pictures, no data were found anywhere about the light required for taking such pictures. After a few trials with arc headlights, it was found necessary to install eight direct-current "Kleighlight" lamps, with a capacity of 5000 c.p. each, and using a specially prepared carbon rich in violet rays, in order to cover the work with-

out casting shadows and to get the light uniform and sufficiently strong for instantaneous exposures. The power consumption of the lamps when in operation was about 75 kw., and as they were connected to the trolley wire and there was a considerable reduction in the voltage when the mine locomotives were pulling heavily, most of the pictures were taken after these machines had stopped running in the evening. The lights were connected to the trolley line by 2-0 wire, were set on movable pedestals, and provided with adjustable reflectors.

In order to show the work in detail it was necessary to cover as large a space as possible at the working face, so that two men might be shown at work simultaneously and illustrate each operation as it was performed. This necessitated cutting a pocket at the face of the room, about 15 ft. deep on one side and 25 ft. deep on the other.

The men selected as subjects for the moving pictures were careful workmen who always looked well after their own safety and who performed their tasks neatly and quickly with the fewest possible motions. This, of course, necessitated selecting efficient men, who habitually performed a considerable amount of work daily.

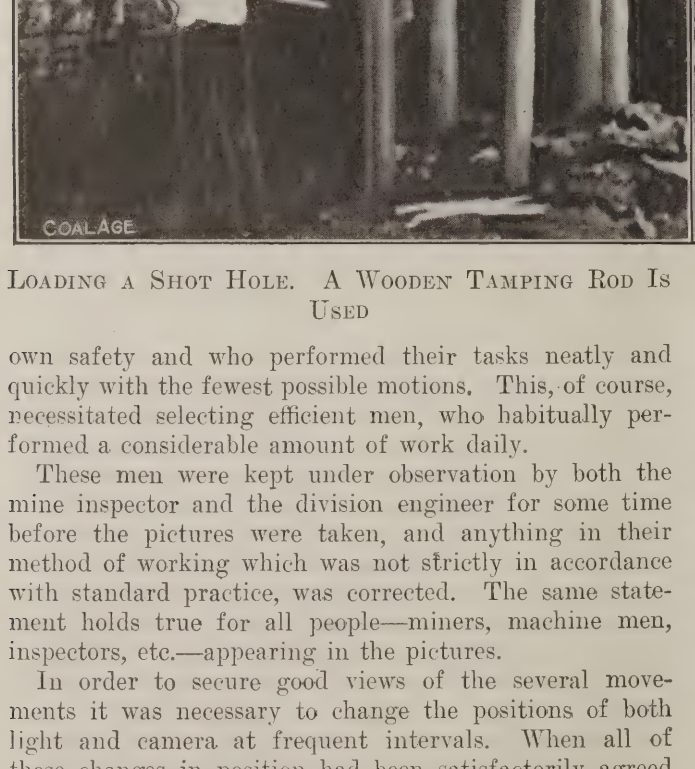
These men were kept under observation by both the mine inspector and the division engineer for some time before the pictures were taken, and anything in their method of working which was not strictly in accordance with standard practice, was corrected. The same statement holds true for all people—miners, machine men, inspectors, etc.—appearing in the pictures.

In order to secure good views of the several movements it was necessary to change the positions of both light and camera at frequent intervals. When all of these changes in position had been satisfactorily agreed upon, the men practiced their parts three or four times within the range of the camera before pictures were actually taken. This was deemed necessary on account of the nervousness of the operatives more than for any other reason, as in doing this work before the camera they would commit mistakes which ordinarily would not be perpetrated. In spite of this nervousness, however, the pictures were remarkably good and showed that but little attention was given the picture-taking machine when the men were actually engaged in their work.

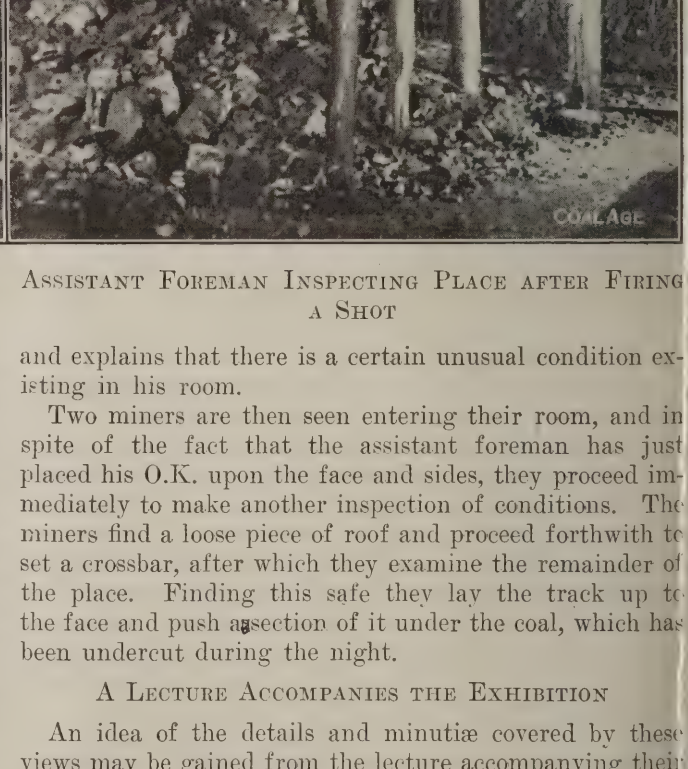
The Entire Process of Coal Production Is Illustrated

The series of pictures taken illustrated the entire process of coal mining, from the working face to the railroad car. The assistant mine foreman was first shown entering his section of the mine and closing a gate, forming a danger board and debarring the miners from entering. He is then seen going into a room up to the working face, testing the air for gas, and the roof and face for loose coal and slate, and placing his O.K. and the date upon the face of the room and the sides.

The miners are seen arriving at the entrance of the section and waiting outside the closed gate, in the meantime reading the special notices and accounts of accidents as posted upon the bulletin boards. The assistant foreman is then seen returning to and opening the gate, allowing the miners to enter. He calls one man to him and explains that there is a certain unusual condition existing in his room.



Loading a Shot Hole. A Wooden Tamping Rod Is Used



Assistant Foreman Inspecting Place after Firing a Shot

Two miners are then seen entering their room, and in spite of the fact that the assistant foreman has just placed his O.K. upon the face and sides, they proceed immediately to make another inspection of conditions. The miners find a loose piece of roof and proceed forthwith to set a crossbar, after which they examine the remainder of the place. Finding this safe they lay the track up to the face and push a section of it under the coal, which has been undercut during the night.

A Lecture Accompanies the Exhibition

An idea of the details and minutiæ covered by these views may be gained from the lecture accompanying their exhibition to the company's employees, from which we quote as follows:

The miners are now laying track in order to run the mine cars up to the face of the coal for loading. It is necessary to take up the short length of track each evening after the coal is loaded out in order to allow the mining machine to properly make its undercut for the next shift. You will notice that Carnegie steel room ties and 20-lb. rail are used. These steel ties do not require spikes or bolts, there being a clip about 6 in. from the end which turns around and fastens the rail to the tie. With these ties and using 20-lb. rails the track can be laid under the coal where it has been undercut by the machine. When the coal which has been shot down

over the track is being loaded out the car can always be kept at the face and the coal loaded over the side.

Approximately 4.3 per cent. of the total time spent by the miner in the working place is consumed in laying track.

The workmen are now making the track straight, which is extremely important. Crooked tracks are often the cause of derailments allowing men to become injured in wrecks or in replacing cars, to say nothing of the expense and time lost by such accidents. The track as laid leaves an 8-in. clear space between the side of the cars and the props and rib. The driver is now bringing in an empty car for the miners to load. While he sets the brakes a miner puts a safety block under the wheel to keep the car from running away. This mine is equipped with all-steel mine cars, many of which are supplied with Carnegie rolled steel wheels made in the same manner as those used on passenger and freight cars.

The miner is now loading the fine coal made by the mining machine in the undercutting process. This fine material or "bug-dust" must be loaded before shooting to lessen the possibility of an explosion of the fine coal or dust by a blown out shot. The dust is also cleaned out from under the cut so that the coal may be shot down more readily.

You will here get a good view of the systematic timbering, which requires posts to be set 3 ft. on centers on roadways, with 6-ft. cap pieces turned at right angles thereto, which affords some protection over the roads. The back rows of posts are set on 6-ft. centers and cap pieces are placed parallel with the roadway, the cap piece being 4 ft. long in rooms.

This system of timbering requires three rows of posts in all places over 18 ft. wide. Posts are required to be kept within 6 ft. of the coal that is being worked at all times, and where conditions are bad, they must be set closer than this. Approximately 6.5 per cent. of the total time spent by the miner in the working place is consumed in timbering.

You will notice the safety board hanging on the post, upon which the assistant mine foreman marks the time of his visit each time he enters the place, which is of great assistance in determining the time the assistant mine foreman was last in the place in case a man should become injured between his visits. This board also shows the length and width the place is to be driven. It is moved up as the working place advances.

The car is now about loaded and the driver comes in to take it down to the landing for the haulage motor. Notice that the miner removes the safety block from the front of the wheel, and that the driver rides on the rear end of the car, as it is against the rules of the company for anyone to ride on the front end of motors or mine cars whether empty or loaded.

PROPER METHODS OF SHOOTING ARE ILLUSTRATED

After the machine cuttings have been loaded out, one miner drills a center hole for shooting down the coal. It is the rule of the company to shoot the coal down with three shots, one being in the center of the room, or heading, and one upon either side, the center shot being made first, and only one hole being fired at a time. The shot hole must be thoroughly cleaned so that there will be no fine coal left in it. While one of the miners is drilling the hole for the center shot the other is preparing cartridges of clay tamping and putting his detonator in the powder charge. He makes the hole in the latter for the detonator with a wooden pin provided for this purpose. Clay for tamping is brought in from the outside and put in each working place.

Having completed his cartridges he starts back to the working lace where his "buddy" has been drilling the center hole for the shot. The miner is now loading the center hole. The assistant mine foreman is required to examine the place and tamping, attach the wire and shoot the hole. You will notice that a wooden rod is used for tamping, also that one miner is drilling the rib hole while the other is loading the center hole, thus losing no time.

The shot is now properly tamped. The assistant mine foreman attaches the wire and he and the miners leave the place, one of the latter taking out all of the tools.

Having reached a place of safety, the assistant mine foreman fires the shot by means of an electric battery, after which he returns to examine the place before the men are permitted to enter. Finding some loose slate, he directs the miners to take it down. The assistant mine foreman is required to stay with the men until all dangerous slate is removed and all necessary posts set. If that piece of slate had fallen on a man, it would have killed or severely injured him.

After the slate has been taken down, both the assistant mine foreman and the miners examine the roof to see that it is safe. Approximately 2 per cent. of the miner's time is consumed in taking down loose slate.



PLACING A PROP BEFORE LOADING OUT AFTER A SHOT



COAL CUTTER READY TO START ON THE SUMPING CUT

MINUTE DETAILS ARE SHOWN

This picture shows a closer view of the hole being charged for shooting, with two miners doing the work. They tear the paper off the end of the adjoining sticks of explosive so that the latter will come together. This makes the explosive one mass and avoids any liability of having one stick fail to detonate when the shot is fired. The limit of charge allowed in the mine is 2 lb. for one hole and only one hole may be fired at a time.

No explosive is permitted to be used that has not passed the test of the U. S. Bureau of Mines and been designated as a permissible safety powder. In former years it was the custom to use black powder for shooting down the coal. This was extremely dangerous. The permissible safety explosives give a much shorter flame and a lower exploding temperature.

Approximately 4.3 per cent. of the miner's time is consumed in drilling, 3.8 per cent. in charging holes and 0.4 per cent. in waiting for shots.

As the miners load the coal, they are required to throw back the slate and refuse which accompanies it. The coal adheres to the slate and has to be cut loose. The miner at the rear makes room for the car to be pushed to the face, which enables both men to load from the sides. Approximately 7.3 per cent. of the miner's time is consumed in cleaning the coal. Undercutting to a depth of 8 ft. 6 in. allows the room to be driven 20 ft. wide and provides a full day's work for two men and also enables practically all the coal to be loaded into cars without rehandling.

Approximately 41½ per cent. of the miner's time is consumed in loading coal, while only 3.2 per cent. is consumed in reshoveling.

The pictures show the miners removing a short section of the track after the day's work has been done and the coal completely loaded out, the assistant foreman making his evening inspection to be certain that the place is safe for the incoming machine men. The miners leave the mine, hanging their checks upon the check board. The machine men with the undercutter enter the working place, unload the machine, draw it to the face, make their sumping cut, make the crosscut, remove the machine, load it upon its truck and move out. In all of these operations, a standard practice is carefully shown, and the work is accomplished with the least possible manual labor, the least loss of time and with the greatest possible safety.

Processes Outside the Mine

Views are also shown of the haulage motors leaving the drift mouth at the head of a loaded trip. The trip is seen arriving at the tipple, the motor uncoupling, passing around a special runaround and recoupling to a waiting trip of empty cars. The coal cars are shown passing over the dumps of the tipple, discharging their contents and proceeding thence to the empty track. A view is also shown underneath one of the tipples, where a 70-ton coal car may be loaded in approximately one minute.

The primary idea for taking and exhibiting these pictures, as explained above, was to show how the various operations of coal mining might be done with the greatest safety, efficiency and dispatch. Upon their exhibition before the company's employees considerable interest was aroused and no small amount of discussion among the miners themselves was stirred up. Such discussion is, on the whole, beneficial, as a miner will frequently see some point which the expert may have entirely overlooked.

It is the intention later to take detailed pictures of many of the single operations necessary in mining and to standardize these at all mines.

Educational Value Quickly Appreciated

Although these photographs were primarily made for exhibition before the employees of the United States Coal & Coke Co., their possibilities as a means of instruction were quickly recognized, and they have accordingly been exhibited quite generally throughout Westmoreland and Fayette counties of Pennsylvania, both in the mining towns and the larger communities as well. They have been shown in New York, Philadelphia, Harrisburg and Pittsburgh; in the states of Indiana, Illinois, Virginia and West Virginia and will shortly be sent to New Mexico. They have also been shown before the Canadian Mining Institute, at Montreal, and a copy of the film is being prepared for use by the University of West Virginia in mining-extension work.

As stated above, these pictures were taken by and under the direction of the U. S. Bureau of Mines. From the best information available they are the only extensive views of the kind ever secured and, together with the stereoptican slides of the H. C. Frick Coke Co., previously mentioned, form what is believed to be the most comprehensive exhibit ever gotten together illustrating coal-mining devices and methods for the attainment of both safety and efficiency.

While it is doubtless true that the full significance of these pictures cannot be acquired without a thorough understanding of the accompanying lecture, yet it is unquestionable that much good is done the miner who sees the picture, but is unable to understand English. The constant and ever-recurring inspection of the working places by all those who enter them, regardless of their mission or purpose, the placing of the safety blocks on the rails, the careful setting of timbers to support a weak roof, and the other safety precautions, cannot fail to be intelligible and to have their effect upon the most ignorant or most unintelligent person in any mining community. He is dull, indeed, who cannot understand a picture.

Pumping Out an Anthracite Mine

Floating on two rafts on the surface of the slowly receding water of the Schooly mine of the Pennsylvania Coal Co., which has been flooded for the last 15 years, are two 2-stage centrifugal pumps which will lift 2000 gal. of water 375 ft. in one minute. The pumping out of this mine began on Jan. 27 of this year and will take many months to accomplish. The mine is 588 ft. deep, and the water was lowered about 130 ft. in the first two months of work. At 181 ft., the pumpers began removing water from the gangways and chambers as well as the shaft, and the work has proceeded more slowly. At this depth they met the Checker vein. At 311 ft. they will meet the Pittston vein, at 389 ft. the Marcey vein, and at 581 ft., the Red Ash vein.

The method of freeing the mine from water is unique and interesting. The pump, which is driven by a vertical motor placed directly on top of it, is contained in a huge iron tank which forms the float. The buoyancy of the float or raft is sufficient to sustain the weight of the tank, pump and motor, but the tank is suspended by wire ropes which are paid out as the water recedes. These are for use in case of emergency, and have proved a wise precaution. The water is pumped up through a fixed pipe in the shaft, connected to the pump by a flexible rubber hose of large diameter. When the hose, which must stand a pressure of 200 lb. to the square inch, is stretched to its full length, the pumping is stopped and a new length added to the fixed pipe in the shaft.

The estimated amount of water in the mine is 600,000,000 gal., but there is an additional flow of 2000 gal. a minute coming into the mine to be coped with. There are other operations near this flooded mine, separated by barriers, and the Pennsylvania Coal Co. does not want to leave that vast body of water threatening its workmen, whether the operation is profitable or not. The two 10-in. streams which are contending with this huge quantity of water are making slow but steady progress, but the prize to be won is 7,000,000 tons of coal.

In the early days of the enterprise the water in the main shaft got 20 ft. lower than that in the adjacent air shaft, and when the latter finally caved at the sides, or the obstruction which was holding back the water gave way, the pump, motor and men were hurled upward in the main shaft. Fortunately, no harm was done, and the wisdom of having the wire ropes instead of relying exclusively on the buoyancy of the tanks was effectually demonstrated.

Notes on the Mineral Fuel Co.'s Development in Eastern Kentucky

Special Correspondence

SYNOPSIS—Some comments on recent developments in the Elkhorn field of Kentucky, with interesting notes on the preliminary steps. Construction was carried on along unusually elaborate lines and involved heavy initial expenditures.

For two years the Elkhorn field, of eastern Kentucky, has been attracting unusual attention throughout the country, and a number of large concerns have come into the territory. Among these is the Mineral Fuel Co., composed largely of Maryland, Pennsylvania and West Virginia capitalists.

Three years ago there was not a railroad line within 50 miles of this field, but at that time the Louisville & Nashville and the Baltimore & Ohio became interested. The former purchased the Lexington & Eastern, extending from Lexington to Jackson, Ky., 94 miles and made immediate plans for construction along the North Fork of the Kentucky River from Jackson to Boone's Fork, a distance of about 103 miles. The Baltimore & Ohio, made arrangements with the Chesapeake & Ohio's Big Sandy Branch and built a line from Shelby Station through a rich field, penetrating the narrow valley of Elkhorn Creek to its headwaters where the Consolidation Coal Co. (after purchasing 100,000 acres of coal) announced a mammoth development program. Today the terminus of the Louisville & Nashville is at the town of McRoberts, built by the Consolidation Coal Co., three miles above Fleming, the center of the operations of this company. The terminus of the Baltimore & Ohio is at Jenkins, four miles away on the Elkhorn Creek side. All this territory is rapidly becoming a great industrial section.

Some time ago the Mineral Fuel Co. was organized after purchasing approximately 10,000 acres of coal on Boone's Fork on the Louisville & Nashville railroad, and started the development of about 5000 acres of this property. Mines 301 and 302 were opened and the first shipments were made in October, 1913. When the construction at Fleming had been completed, the company set to work on a similar town on Pottersfork, called Haymond, in honor of Thomas S. Haymond, the manager of the work. Mines Nos. 303 and 304 were opened here. The Louisville & Nashville then let a contract for the construction of a three mile branch up Pottersfork to Haymond and another mining town on Yount's Fork, called Hemphill, was started. Mines 305 and 306 were opened here. The railroad company then began construction on another three mile branch up Yount's Fork. The output of mine No. 301 at Fleming is being shipped to the markets of the Northwest, while mine No. 302 is shipping to the Central West and South.

Construction of the Towns

About 300 houses have been completed in Fleming, all of which are occupied. An unusually large company store, a substantial, well built office, a municipal building, a hotel, Y. M. C. A., post-office and bank building have been completed, while school and church buildings, hospital, etc., are planned for the immediate future. A water system is now under way, the present supply being obtained from wells.



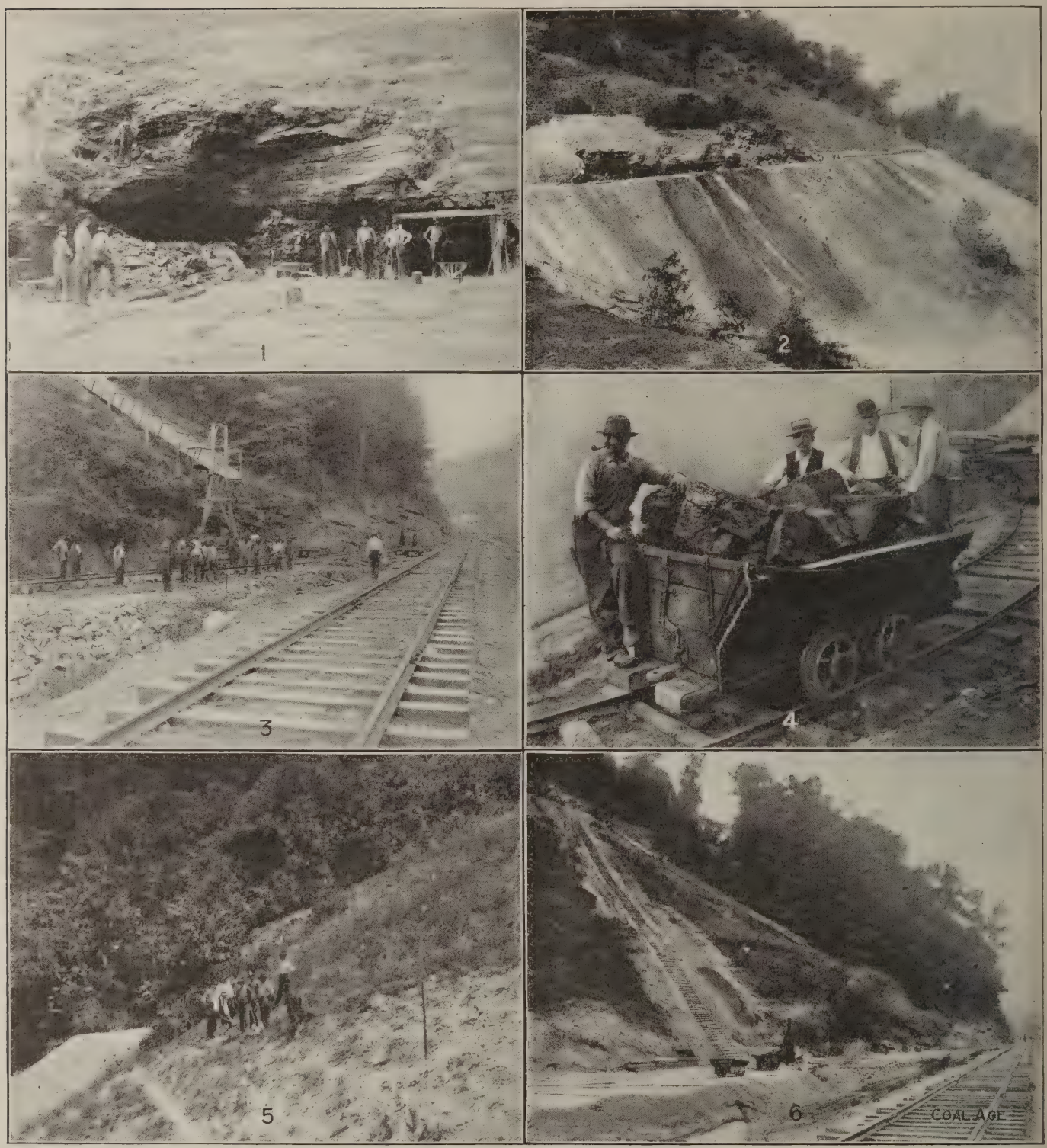
Miners' Houses at Haymond, Ky.



New Construction Work at Fleming, Ky.

At Haymond, 250 buildings are completed, over 100 of which are occupied, and this will shortly have to be increased by another 100, making a total of 350 for the whole town. It is also probable that another 100 will be necessary. These will include a number of modern business blocks, hotel, office building, machine shops, supply houses, commissary building, etc., while churches and schools are under way and will be built this year.

Hemphill's buildings will consist of 300 houses, about the same as those in Haymond, with a probability of another 150 in the near future. Fleming, according to a late announcement, will have 230 more houses built this year. The Nicola Building Co. of Pittsburgh, Penn., has the unusually large building contract and is prosecuting the work vigorously. They constructed the cities of Jenkins and McRoberts, and are also building Wayland and Weeksbury for the Elkhorn Fuel Co. on Beaver Creek. The Elkhorn company is a subsidiary of the



OPERATIONS OF MINERAL FUEL CO. IN KENTUCKY

1—Opening drifts to mine No. 301. 2—Grading for tramway. 3—Laying steel for mine siding. 4—First mine car loaded at Fleming, Ky. The fellow under the derby who looks so pleased is Tom Haymond. 5—Marking location of mine 301. 6—Constructing incline plane and coal chute.

Mineral Fuel Co., and is developing some 25,000 acres in that section.

The Mineral Fuel Co. is spending thousands of dollars in the interests of its employees. In Fleming a Y. M. C. A. has been completed, while Haymond and Hemphill will each have buildings, fitted up for moving-picture shows. A large central hospital will also be built in Fleming at a considerable cost and much attention is being devoted to improving the local highways.

All the houses are neat, comfortable and convenient, having six and eight rooms, and plastered inside. Plastering is used because it is more cleanly and sanitary and makes a warmer, cleaner house than ceiling. There are grates in every room except the kitchen, which is provided with a brick flue.

The towns are laid off with uniform streets, and there are alleys in the rear of all buildings for convenience in removing refuse, delivering coal, etc. All miners' houses are alike and painted the same, while those of the offi-



TOP-CUTTING MACHINE LEAVING ROOM

cials are different. There are electric lights in every room, the cost of which is 25c. a month, each. The company receives its light and power supply from the large central power station of the Consolidation Coal Co., at Jenkins.

The miners are required to keep their yards clean, and the company hauls away all trash and refuse. They also furnish lime for the closets which are well built and will later be connected with a general sewerage system. At present they have a vault which is emptied every day.



PERMANENT TIPPLE AT MINE NO. 301

The company is determined to run its plants on strictly sanitary lines.

The coal is known as the Elkhorn seam and runs on an average from 8 to 9 ft. thick. At Haymond the seam is 8 ft. and 6 in. thick. The same seam but running as much as 10 ft. thick, is being mined around McRoberts and Jenkins. It is a fine splint coal for domestic use.

It is estimated that 100 years, at least, will be required to exhaust the local supply; thus it can be seen why the Mineral Fuel Co. is putting in such permanent works.

In the mines, cross entries are turned at right angles at intervals of about 400 ft. The entries are driven about 13 ft. wide with an 18-ft. pillar. All entries are driven on sights. Rooms are turned from the cross entries on 35-ft. centers, and the coal mined by the room-and-pillar advancing method, with 25-ft. rooms and 10-ft. pillars.

I wish to extend thanks to General Manager Thomas S. Haymond for the many courtesies which have made possible the preparation of this article.

Output of Anthracite Coal Beats All Records

According to the figures reported to the Topographic and Geologic Survey of Pennsylvania, working in coöperation with the United States Geological Survey, the production of anthracite coal in 1913 was 6,395,825 gross tons in excess of the output of 1912, an increase of 8½ per cent. Part of this increase is undoubtedly due to the closing of the mines in 1912, pending the settlement of the mining scale, yet it is almost 1,000,000 gross tons in excess of the production of 1911, which was the previous high record year. This marked increase again brings up the question of the ultimate maximum output of anthracite coal. While it is well known that the output of bituminous coal doubles each decade, yet the increase in the output of Pennsylvania anthracite shows no such change. This is, at least in great part, due to the fact that anthracite is no longer a manufacturing fuel, but essentially a domestic one. It has been thought by some that the present output will not be greatly increased.

The average selling price at the mines for several years is shown by the following table:

Year	Average Price per Gross Ton
1903	$2.28
1908	2.13
1909	2.06
1910	2.12
1911	2.17
1912	2.36
1913	2.38

The average cost of mining anthracite coal in 1909, as reported by the Census Bureau was $1.93 per ton, exclusive of any charges for depreciation, amortization or interest. On the same basis, with the increase in the mining rate as provided in the agreement of May 20, 1912, the cost would be, according to Mr. E. W. Parker of the United States Geological Survey, $2.07 per ton. This would mean in 1913 that the average selling price was 31c. per gross ton above the mining rate, from which must be deducted the items of depreciation, amortization, interest, and the increase in all items of expense not covered by the agreement of May 20, 1912.

The following table gives the total production in each of the several counties for the years 1912 and 1913:

PRODUCTION IN GROSS TONS OF ANTHRACITE COAL IN 1912 AND 1913 BY COUNTIES

County	1912	1913
Carbon	2,568,305	3,066,314
Columbia	1,079,866	1,078,481
Dauphin	843,841	946,670
Lackawanna	19,283,814	20,240,490
Luzerne	28,289,879	31,539,379
Northumberland	6,020,440	6,261,502
Schuylkill	16,038,507	17,328,666
Sullivan	579,673	.....
Susquehanna and Wayne	532,808	1,123,192
River dredges	85,722	133,986
Total	75,322,855	81,718,680
Total value	$177,622,626	$195,181,127

Up to date the observations carried out in the Hatunhuasi coal region of Peru show the existence of from 35,000,000 to 40,000,000 tons of coal.

A Simple Method of Calculating the Resistance of Bonded Rail Joints

By Vincent Rhea*

SYNOPSIS—Formula and tables are given, by the use of which the resistance of any compressed terminal bond may be ascertained in terms of feet of unbroken rail.

Since many of the mining companies have adopted the compressed terminal type of rail bonds, the question, "What is a standard for a properly bonded rail joint?" has frequently arisen. It is impossible to assume an arbitrary value for a bonded joint, as the length of the bond, the size of the terminals and the weight of the rail in which they are installed, must all be taken into consideration.

It is essential, both in making tests of bond installations, and in estimating new work that the resistance of a bonded joint be known. The following tables and formula will show the electrical mining man just what resistance a well bonded joint will have.

To find the resistance of a rail joint bonded with compressed terminal bonds, the following formula is used:

$$\frac{L \times R + 2 \times CR}{RF} = JR$$

in which

L = Length of bond in inches;
R = Resistance of one inch of cable or strands composing the bond;
CR = Contact resistance of bond terminals;
RF = Resistance of one foot of rail;
JR = Resistance of bonded joint expressed in feet of rail.

As most bond-testing instruments show the resistance of the bonded joint, as compared with the equal resistance of a certain number of feet of unbroken rail, it is more convenient to express this value in such terms than in ohms.

RESISTANCE AND CARRYING CAPACITY OF RAILS

Figures Based on Rails Having a Ratio of 12 to 1, as Compared with Copper, and at 70° F.

Weight, Lb. per Yd.	Resistance, Ohms per Ft.	Carrying Capacity in C.M.
16	0.0000622	169,764
20	0.00004923	212,206
25	0.00003935	265,257
30	0.00003321	318,309
35	0.00002844	371,360
40	0.00002489	424,412
45	0.00002212	477,463
50	0.000019355	530,515
60	0.0000166	636,618

RESISTANCE OF SOLID TERMINALS

Figures Based on a Pressure of 15 Tons per Square Inch of Contact Surface

Diameters	Resistance, Ohms
½"	0.0000008
⅝"	0.00000064
¾"	0.00000053
⅞"	0.00000045
1"	0.0000004

RESISTANCE OF BOND CABLES PER INCH OF CONDUCTOR AT 75° F.

Size	Resistance, Ohms per In.	Capacity in Amperes
1/0	0.00000829	210
2/0	0.00000657	265
3/0	0.00000521	335
4/0	0.00000414	425
250,000 C.M.	0.0000035	500
300,000 C.M.	0.00000275	600
350,000 C.M.	0.0000025	700
400,000 C.M.	0.00000219	800

To illustrate the use of the above formula and tables, assume that a 40-lb. T-rail is to be bonded with compressed terminal flexible cable bonds, 4/0 capacity, ¾-in. terminals, 26 in. in length. The resistance of each joint when the bond has been installed is desired. By referring to the tables, the resistance of one inch of 4/0 cable is found to be 0.00000414 ohm, and the resistance of a 26-in. bond is 26 times 0.00000414, or 0.00010764. The resistance of a ¾-in. terminal is 0.00000053 ohm, and of the two terminals is 0.00000106 ohm; adding the cable resistance and the contact resistance the total ohmic resistance of the installed bond is 0.0001087 ohm. To express this in terms of equivalent rail length, divide by the resistance of one foot of 40-lb. rail, and the resistance of the bonded joint will be found to equal that of 4.2 ft. of unbroken 40-lb. rail.

Splice Bars Do Not Help Much

Trials made with standard bond-testing instruments show that when bonds are installed with reasonable care, the resistance of the joint will very closely approximate this calculated resistance. Abutting rail ends and clean tight splice bars may slightly lower the resistance of the joint, but this is quite negligible and should be disregarded.

Numerous tests made of complete haulage roads, installed under usual mining conditions, show that an average will vary but a fraction of a foot from the calculated resistance.

The use of the tables will not only be found of benefit in learning standards to test individual joints for their efficiency, but they can be used to great advantage in figuring voltage drop on proposed work.

In calculating voltage drop on a circuit composed of a trolley and a rail return, a formula is generally used which is correct for the copper loss, but does not take into consideration the weight of the rail and the size and length of the bonds. By calculating the voltage drop on the trolley and feeders only, and then on the rail, when properly bonded, the exact drop for a given load is secured. This method has been found particularly advantageous where a potential of 250 volts is used and the current transmitted over long distances, as is common with bituminous mines.

For instance, taking the example mentioned above, assume that a road 3000 ft. long is to be bonded, and the actual drop on the return side of the circuit is desired. With 30-ft. rail lengths, there will be 100 joints on one rail, having a total resistance of 420 ft. About 10 per cent. should be added to the joint resistance to take care of short rail lengths and bonding at switches.

Then the resistance of one rail will be equal to that of 3460 ft. of unbroken rail, or 0.00836394 ohm, or for the two rails in parallel 0.00418197 ohm. The voltage loss on the return side is the load times the resistance, then by calculating the drop on the trolley side, the exact drop on the circuit is easily ascertained.

In the same manner, these tables can be used to test the efficiency of the bonding of an entire haulage road or a certain section. With voltmeters at both ends of a section and an ammeter on a locomotive, the voltage drop

*Scranton, Penn.

at a certain load can be learned. It is a simple matter to calculate the drop on the positive side of the circuit and on the return side, assuming the bonds are in good condition. Any difference found will be an increased joint resistance, and the individual bonds should be tested with a bond tester and the defective ones replaced.

A number of companies have adopted this method, as an entire mine can be gone over on an idle day or night, and the individual joints need only to be tested in those sections which show defective bonding.

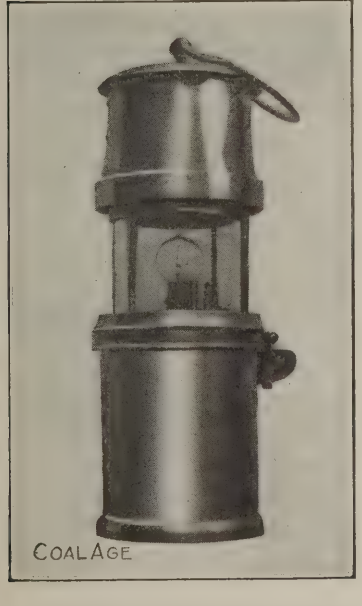
Mine operators who are desirous of obtaining efficient and economical results from electrical mining equipment will find it well worth their while to make such tests following them up with any necessary repairs.

One company recently tested in this manner a newly bonded road. The test showed that the joint resistance was 69 per cent. of the total circuit resistance, where it should have been only 8 per cent. Upon making an examination of the road, it was found that the track men had neglected to install bonds at two of the switches.

As their load was heavy, this unnecessary resistance would have cost a considerable sum in a month's time for power, which in this instance was purchased, even though it had not increased, as it undoubtedly would have done.

Combined Electric Lamp and Gas Tester

An underground electrical engineer, Thomas Heaton, of Wigan, Lancashire, England, has invented a miner's electric lamp, in the base of which is an accumulator. The upper part of the lamp consists of a top plate or cap, which screws onto the base. Both the lamp bulb and the gas detector are protected by inclosing them within a glass tube or cylinder. A turning movement given to the lower portion of the lamp switches either the electric bulb or gas detector out of circuit at will.



A Gas-Testing Electric Lamp

The latter consists of a wick placed near a resistance wire or bridge of platinum or nickel-chrome. This is supplied with an inflammable oil or spirit, which is stored in the top plate of the lamp. When the wire or bridge is heated by the passage of a current, the wick ignites and can be used for testing. The lamp top is fitted internally with double-wire gauze cones, one overlying the other.

Advantages

It will be seen that Mr. Heaton's lamp is intended to provide either an electric light for the use of the miner or an oil flame for use as a gas detector, as may be desired. The claims he makes for his lamp are reproduced as follows:

There is no danger of sparking should the lamp be struck by or come into contact with metals, such as picks or spades, rails, nails, etc. There is no danger should miners tamper with the lamp, as immediately they do so the light goes out, owing to the contact being broken. Should the lamp be unlocked and an attempt be made to unscrew it, the light will go out. There is no danger of a defective lamp getting into the mine, because if defective the lamp will not light.

The lamp will withstand any ordinary usage, and indeed may, without danger, be more harshly treated than the ordinary safety lamp. The lamp can be easily and cheaply maintained in good order and repair by the ordinary lamp-room staff. Used for lighting, the construction of the lamp is such that it will not ignite gas within or without. (To use as a gas tester, it is necessary to switch off the electric bulb and rotate the accumulator onto the contacts of the gas tester, which ignites the wick in the recess adapted and arranged for the gas testing only.)

The lamp battery is so constructed as not to be liable to form a short-circuit or to polarize, and as ordinarily tested, the lamp gives a light of 2 cp. throughout a period of 20 hours. The lamp gives a light all around in a horizontal plane. Its weight is only 4 lb.

The construction of the accumulator is such as to prevent escape of the liquid whatever the position of the lamp, though the gas generated by chemical action is allowed to escape freely. The cost and upkeep of the lamp are neither above the general average. The lamp can be manufactured with or without the gas-testing section, as desired.

It is so arranged that changing over from an electric lamp to a gas tester is readily accomplished by means of a loose collar. All the change needed is to rotate the lower portion of the lamp on its base collar, without removing the lamp top or exposing the light in any way. Used as a gas tester, it will detect a cap so as to meet fully the requirements of the British Coal Mines Act, 1911.

Drawbacks

In connection with the last claim, Mr. Heaton explains that in a simple experiment on the surface in coal gas he he got a cap in as low a percentage as 1.5 per cent. Should the claims he makes be substantiated under severe tests below ground, the problem of efficient light for the miner may possibly be solved. However, the dangers of the safety lamp are accentuated rather than reduced, for evidently the miner is expected to relight his oil detector when he desires to test for gas and he may well do so in a dangerous atmosphere. The light moreover is well below the top of the lamp and so not in a good position for observing the roof, which is not true of electric lamps as now offered for sale.

The right way to discover whether your furnace is giving results is to have a gas analyser or a CO_2 recorder and test for carbon dioxide. This test of the gases in a Babcock and Wilcox or Stirling boiler must be made in its various passes and in an ordinary return-tubular boiler must be made in the front or rear and not in the breeching or stack because it is the efficiency of the furnace as a heating agent which is in question and excess air entering beyond the heating surfaces interferes with the draft and does not affect otherwise the heating qualities of the furnace.

The Calamity Trail

By C. W. Crawford*

SYNOPSIS—A somewhat satirical soliloquy on the design and operation of steam engines with particular attention to those of the genus high speed; also a few remarks on the shortcomings of steam boilers, piping and separators and the ignorance and gullibility of coal operators in general.

More reasons than bad design and bad construction may be assigned for the delinquency of steam engines. When an engine looks well and works quietly it goes without comment that it is doing good service. Fashion has much to do with forming such opinion, but everything is sacrificed to quiet running. It doesn't matter that the engine may have 6 per cent. clearance waste, or that it may be using 40 lb. of steam per horsepower per hour; it runs quietly at high speed and is, therefore, considered economical.

Piston speed is only considered in terms of revolutions per minute, without reference to the number of times during that period that the clearance is incurred. If the machine has a shaft governor, so much the better; it is uptodate. Admirers of this class of engines maintain that high compression is no loss; that compression up to initial pressure is all given back in the next stroke. But where does the compression come from?

It's a funny game. Steam hits the piston a clip, knocking it endways. The flywheel gets the spent blow through the crank, meantime the eccentric takes a hand and shuts the steam off. The steam then tries to expand and in doing so knocks the valve open and gets out. Then the flywheel, having a good start, blocks the game at the other end and sets up a back pressure ahead of the piston, which gets another knockdown blow from the steam on top of the already high back pressure, which latter turns state's evidence just as the crank comes over the center. The governor acting as umpire keeps up the continuous vaudeville.

In this continuous scrap the piston is knocked back and forth between two buffers of back pressure, and the useful effect is derived from a little more than half the stroke, aided by the compression that is *given back*. The rest of the stroke is occupied by expansion of short duration, by the exhaust, and largely by compression and back pressure. The economy is found in the advertising matter of the builder.

It is true that economy is considered worth while in some localities, and some really efficient engines are built, but the majority are quite the reverse. It is believed the old fashioned engine of 50 years ago—the common throttling engine with a flyball governor—was just as economical as the present high-speed automatic, if not more so, when equally well made and run at high piston speed. Hoisting engines in coal mines are a fair example of the disregard of economy. These machines have probably as heavy duty as any class of engines in the country. Hoisting three tons at a trip from mines 300 ft. deep, in 7 to 15 sec., requires a strong pull and very quick handling.

*President Crawford & McCrimmon Co., Brazil, Ind.

Output Not Efficiency Is Prime Requisite

To get coal rapidly and cheaply is the ambition of every coal operator. Coal is cheap—at the mines—and a ton or two more or less per day burned under the boilers doesn't count. It is the large output that tells, and everything is made to lean in that direction. Therefore economy of coal or stream is little thought of. Engines are usually worked full stroke—or nearly so.

The improvements demanded are those that increase the output per day, and those that lighten the work of the engineer so that he may hoist more rapidly. Larger engines are being used every year, while old machines are made to do double duty. Automatic cutoffs are offered by builders, but seldom taken.

The mines are mostly shallow, and since the starting must be done at full stroke, there is little time during a hoist for cutoff and expansion. If lack of expansion were the only calamity attending the more aggravated instances, it might be condoned. But, water passing through the cylinders heated nearly to the temperature of the steam not only entails useless duty on the steam generators, but destroys lubrication, wastes the water after it has deposited its content of scale-forming material in the boiler, and discharges a large percentage of the heat derived from the coal into the atmosphere without its having contributed anything to the work in hand.

Practically all boilers send over more or less water in spray mixed with the steam. It sometimes happens in a set of boilers that the cleaning of fires lays off one or more of them at a time, compelling the others to keep up the quota of steam. It is possible at such periods of unusually hard firing for the violently boiling water to be drawn in a mountain of spray toward the outlet opening, and more or less of it to be forced into the pipe line. It is also even possible for water in considerable quantity to be caught occasionally, and when once started in the pipe, this is compelled to go through the cylinders—in the absence of an efficient separator—with what destructive effect every engineer is aware. It is generally not believed that water is thus carried over, but it goes over just the same.

During the old steamboat days, it was a universal custom to use domes, or drums, on all boilers as a preventive of the entraining of water over into the cylinders. These drums were very large—sometimes double drums were used. There was a supposition in those times that in hard firing, as was universal, the water might be drawn in a solid stream through the pipes and cylinders, exhausting the boilers and causing explosions, hence the use of large steam drums 3 ft. or more in diameter, reaching across the battery of boilers.

In these latter times domes are rated as a nuisance and are not furnished by boiler makers, except with a protest. A header line, more or less insufficient, is used instead to connect the boilers, fitted with a slim pipe connection to each unit. It is reasoned the large domes are conducive to condensation and loss of pressure—and are too expensive anyway.

The outlets of boilers have grown so small in recent years that the steam is forced to travel at the rate of

two miles a minute when boilers are pushed to capacity. The standard nozzle opening of a 72-in. by 18-ft. boiler is 6 in. in diameter. Is it worth while to notice that slugs of water are sometimes carried over and engines wrecked?

The calamity that follows the slugging of water through the cylinders is more far-reaching than the mere matter of economy, which is serious enough. Smash-ups are often attributed to any other cause than the right one, and it is generally disputed that water in the cylinder has anything to do with them. But such accidents do occur when it is known the weakest point in the engine, if any can be called weak, has a factor of ultimate strength of 200 times the greatest pressure in the cylinder of steam, not water.

Why Smash-Ups Occur

From whence comes the terrific pressure that breaks bedplates, cranks, crossheads, pistons, and loosens crankpins, cranks, winding drums, etc.? Not from direct steam pressure, but from solid slugs of water carried over from the boilers. It will be noted that when the exhaust is closed near the end of the stroke, the water is trapped and the piston moving toward it. Followed by the piston, which is impelled by the momentum of the 10- or 15-ton winding drum revolving at a speed of 100 r.p.m., the water's only escape is in tilting the valve and being forced back into the steam chest. This occurs at the toggling point of the crank where its force is practically infinite. It will be noted also that while the water *has* an avenue of egress, the concussion comes so suddenly that it hasn't time to escape. Hence a trail of wreckage involving possibly a new engine.

Yet engineers and operators persist in doing the same thing over again. The prime mover in this train of calamity is the boiler maker, who furnishes the cause. The engineer fails to use a large enough header line, and installs an insufficient separator, or none at all, and the operator who is ignorant of it all pays the bills.

Lack of domes or their equivalent on boilers, attenuated steam pipes and the absence of separators of sufficient and efficient capacity is the cause of it all. A separator is not particularly costly. There is but one principle upon which it can be made efficient and that is rarely used. That is by employing gravity as its chief characteristic. The market is full of splash-board separators, which make the users wise until some accident makes them a little wiser. But why depend upon a separator alone? Why not begin at the boiler and separate by a dome or a dry pipe or otherwise—anyway the water is better to be in the boiler than in the engine.

A Mine at the Panama-Pacific Exposition

At the request of various mine operators and the Exposion, the U. S. Bureau of Mines has undertaken to construct, in coöperation with the mining industry and the manufacturers of mining machinery, a mine beneath the floor of the Palace of Mines and Metallurgy at the Panama-Pacific Exposition, San Francisco, next year.

The financial and operative success of the mine is assured through exhibits promised as shown below, whereby typical metal and coal-mining operations will be reproduced by full-size working places, in which mining machinery will be installed and operated. The walls of the mine will be covered with either ore or coal typical of the mine illustrated. Among others, the Copper Queen Consolidated, of Arizona, Bunker Hill-Sullivan Co., of Idaho, Homestake Mining Co., of South Dakota, Goldfield Consolidated Mines Co., of Nevada, Jones and Laughlin Co., of Michigan, Lehigh Coal & Navigation Co., of the anthracite field of Pennsylvania, Pocahontas Fuel Co., of West Virginia, Consolidation Coal Co., of Kentucky, and Pacific Coast Coal Co., of Washington, have each agreed to reproduce one of their working places or stopes and to contribute the sum necessary to the installation and operation. Tentative promises of similar action have been received from the Rock Island Coal Co., Peabody Coal Co. and Pittsburgh Coal Company.

Various mining machinery and appliances have been promised, including a mine cage and cars by the Joshua Hendy Co., a cage, hoist and motor, by the Denver Engineering Works, locomotives by the Westinghouse Electric & Manufacturing Co., pumps by Byron Jackson, air compressor, drills, drill sharpener and winze hoist, by the Compressed Air Machinery Co., drills and coal cutters by the Ingersoll Rand Co. and the Sullivan Machinery Co., lamps by the Justrite Manufacturing Co. and the Koehler Manufacturing Co., enamel signs by Stonehouse Enamel Sign Co. There is little doubt that other necessary machinery and appliances, such as safety lamps, portable electric lamps, fan, mine telephones, mine rescue apparatus, switches, track, etc., will be received as exhibits.

The entrance to the mine will be through the Bureau of Mines space, and visitors will be attracted to it by being given portable mine lamps, and by being lowered in a very slowly moving cage while a panoramic effect of the strata lining a mine shaft will pass by them so rapidly as to produce the illusion of descending to a considerable depth. In case of crowds, these may enter by a slope. Exit will be by a slope into the radium booths of the Bureau of Mines where actual radium examinations will be shown.

There will be a motion-picture room which visitors will pass in going from mine to mine. In it will be shown such great open workings as are not illustrated by the underground mines, such as those of the Utah Copper Co. and those of the Nevada Consolidated Co., at Ely, the iron diggings at Hibbing, Minn., hydraulic gold mining, and the quarrying of building stone.

Twice each day there will be an imaginary explosion or fire in some portion of the mine announced by telephone to the superintendent's office in the Bureau of Mines space on the surface, and rescue men wearing breathing apparatus will enter the mine and bring out supposed victims who will be given first-aid treatment in the surface emergency hospital.

In the Bureau of Mines space on the floor of the main building, there will be, in addition to the radium booths, exhibits of carnotite, pitchblende and other radium ores, their alloys and concentrates, an emergency mine hospital and smoke room for rescue training, exhibits of fuel efficiency, smoke abatement, explosives, mine-welfare work, etc.

The prime purpose of the mines will be that of educating the investing public, stockholders, members of legislatures and the uniformed antagonists of the industry relative to the importance of the mining industry, its extent, variety and the cost of operation.

The Necessary Training of Mine Officials

By P. J. Brennan*

SYNOPSIS—In the past many ignorant and unscrupulous officials have made a reputation for themselves at the expense of their employers by "hogging." The day is probably coming when only men of integrity, who are fitted for their particular work by education or experience can secure or hold a position of trust or responsibility.

The magnitude and importance of the mining industry of West Virginia is sufficient justification for our pausing to consider the qualifications of those on whose shoulders fall the responsible and sometimes onerous duties of supervision and management.

According to the annual report of the Department of Mines for the year ending June 30, 1912, there was mined in the state 59,581,174 long tons of coal. This production found employment for nearly 70,000 persons, and necessitated the investment of a considerable amount of capital. The tonnage, the number of employees and the capital invested have been steadily increasing from year to year, and the high point has not yet been reached.

New mines are being opened, mostly shafts of various depths, and consequently more difficult to be safely worked than the older drift mines, and many companies are remodeling their old plants, tearing out all obsolete equipment, and replacing it with the most modern and efficient machinery obtainable. And all this with a view to improving in the near future upon the continued progress for which the coal industry of the state is already noted; yet withal, there is one extremely important element in the operation of the mine that is being overlooked, and that is, the training and preparation of the men who are to be the official staff, upon whom will depend, to a considerable extent, the safety of those 70,000 or more employees, also, the success of the operation and the security of the capital invested.

It is unreasonable to expect more than a minimum of efficiency from the efforts of any man who is placed in charge of a mine operation, without having at least an elementary training in the art and science of mining.

Many of the ruined mines, with their consequent high cost of production, are due to the mismanagement of officials who had neither the necessary knowledge nor ability to fulfill the duties to which they were appointed. Sad to relate, some such officials have succeeded in building up for themselves reputations as large tonnage getters by surreptitiously hogging and ruining mine after mine.

One such individual once informed the writer that the most successful officials were those who could hog out the largest tonnage and get away before the evil effects of a squeeze and closed air courses began to show. Such men are a menace to the mining profession, and can only be eliminated by a general raising of the standard of competency for all grades of officials, from the fireboss upward.

The Fireboss and His Duties

The fireboss is an important factor in the safety of a mine where methane (CH_4) is given off in any quantity, but his ability to recognize a blue cap on his lamp, as certainly indicative of firedamp, ought not to be a sufficient reason for intrusting to his care the safety of a mine and those employed therein.

He should be able to read and write sufficiently well to permit of his making out an intelligent report of the conditions he has found existing. He should, also, have a good knowledge of the properties of the different gases given off in a mine. He should have a competent understanding of the barometer, thermometer, water-gage and hygrometer, as used in connection with mining. He should not only have a perfect knowledge of the use of a safety lamp, but should know, also, why it is a safety lamp, and what makes it so. The state mine law says, "He shall have a practical knowledge of the subject of ventilation of mines, and the machinery and appliances used for that purpose." Why should he not know, also, something about the theory of ventilation?

The next official above the fireboss is the mine foreman. The mine law of the state describes his duties, so far as complying with the law goes. A knowledge of the mine statutes, as printed in the book, is, I believe, about all that is necessary in order to secure a certificate.

Now, the foreman is a very important factor in the successful operation of a mine. It is he who, more than any other official, influences the length and weight of the payroll. It is he who may pay out considerable sums of money in a year for which the operator may receive little or no return. It is he who, if not "onto his job," pays for work that is unecessary, and leaves work undone that is important. It is he who is responsible for the protection of the life and limb of every man in the mine (and this is where he has his hands on the purse strings of the state through the Compensation Law). It is he who is also responsible for the drainage and ventilation, and the pumps and machinery appertaining thereto. It is he who, through carelessness or want of knowledge, may be the cause of making widows or orphans. It is he who is responsible for the output. It is he who, in his anxiety to secure a large tonnage at a low cost, may unwittingly hog away 40 per cent. of the coal, and lose the other 60 per cent.

In fact, it is the foreman who is responsible for the prevention of every accident or injury to both person and property. It is he who is in absolute control of everybody and every appliance in the mine, and has the power to hire and fire at will.

Anybody outside the mining profession would conclude that the official having so much authority and carrying such heavy responsibilities, must surely be of more than the average intelligence, and of considerable technical knowledge. But, we who are in the business know that he is in some cases a man with little or no education, and without any technical knowledge whatever.

The Qualifications of a Mine Foreman

In the writer's opinion, a mine foreman should have at least five years' practical experience in the mine, one

*Coketon, W. Va.
Note—Paper read before the West Virginia Mining Institute at Cumberland, Md., June 2, 1914.

year of which should be as assistant foreman. He should also have a fair school education and a reasonable amount of technical knowledge. His examination should consist of the following subjects:

1. Reading and writing.
2. Arithmetic, including square root.
3. The mining laws of the state.
4. A knowledge of permissible explosives and shot-firing.
5. Knowledge of the various systems of working.
6. Use of the barometer, thermometer, anemometer, water-gage and hygrometer.
7. The properties of gases met with in the mine, and the ordinary methods of ventilation.
8. Timbering roadways and working places.
9. A practical knowledge of the machinery used for ventilating, pumping, hauling and coal cutting.
10. A knowledge of first-aid to the injured. The writer's experience is that all these subjects are very interesting studies for the practical miner who is ambitious of joining the official rank.

Between the operator and the mine foreman, an official called the superintendent, is usually appointed. His duties are to see that the foreman gets all the necessary supplies for the proper operating of the mine, to assist the foreman in the proper and economical use of material, and by inspections and consultations, advise and assist in the economical management and safety of the mine. At the same time he must not forget to keep both eyes on the cost sheet.

If the superintendent is to give his employer a maximum of efficiency, he should know the mining business from A to Z. He should have such a knowledge of it as can only be obtained by hard work and study. He it is who should be able to advise and direct the foreman in the many complexities that cross his path from day to day, and should be competent to be a leader and not a follower. Yet, many serious and costly errors are made from time to time by superintendents, who are doing their utmost to do right, but fail through lack of knowledge of the business they are trying to run.

An amusing incident occurred some time ago in this state which proved to my satisfaction that technical training was necessary for a superintendent. The principal actor in the incident was the superintendent of a large number of mines. He had never seen a water-gage, and did not understand how it worked. One day, however, the mystery was explained to him, and fully demonstrated by a borrowed water-gage being placed on the door of one of his fan drifts, where the fan was running exhausting. The water-gage registered 2.8 in.

This difference in the level of the water in the two legs of the gage evidently set the worthy gentleman to thinking, for in a few days afterward a quantity of 2-in. pipe was delivered at one of his mines and promptly put together from the fan race to a swag in the air course where a pool of water lay.

Well, I don't suppose that superintendent knows yet why the fan did not pull that water out of the air course. Of course, he lost nothing, but the company paid the bill, as it no doubt has done with many others, for foolish experiments, performed through want of training and knowledge on the part of officials.

The Superintendent's Training

We may differ as to the necessary training for a mine superintendent. The writer, however, believes he should have the following qualifications:

1. He should be at least 25 years of age.
2. He should have had five years of practical experience in a mine, or three years' practical experience and two years at the mining and mechanical section of the State University (or its equivalent), and should be able to pass an examination in the following subjects:
1. Elementary chemistry in all its practical bearings upon the gases in the mine.
2. The use and various types of safety lamps.
3. Coal dust as an explosive agent.
4. Knowledge of permissible explosives and shot firing.
5. Practical and theoretical ventilation.
6. Underground management.
7. Shaft sinking and drift opening.
8. Geology.
9. Mechanical engineering as applied to mining machinery.
10. Practical knowledge of electricity as applied to mine machinery, and a good knowledge of mathematics and surveying.

Most operations with a number of different plants and superintendents, appoint an official as general superintendent, who has control over all superintendents and operations, and usually the chief executive of the operating end. He should be a man possessed of a good sound education, and an abundance of common sense and good judgment. Otherwise, it would be impossible for him to analyze the results of the different superintendents and plants, and classify them according to the conditions prevailing at the different works, it being a well known fact that no two plants are operated under the same conditions. There are from time to time many difficult propositions that are brought before him for discussion and decision, making it necessary that he should have a technical knowledge equal, if not superior, to that of the superintendents under him.

As a rule, the general superintendent is kept with his nose to the grindstone more hours per day than any other official on the job. It is sometimes said of him that the only pleasure he gets, is that derived from drawing his blue pencil across a bunch of requisitions, and imagining what the other fellow feels like when he finds it out.

He should be an excellent judge of character, and capable of getting the best out of the men under him, and sufficiently broad minded to, at times, bear with the other fellow's weaknesses.

He should not discriminate against those under him who don't happen to belong to the same lodge, or sing in the same church choir, or because Mrs. Smith is not on visiting terms with Mrs. Jones. He is the one man from whom all others, from the trapper to the superintendent, expect to receive a fair and square deal.

Two Objections to Standard Raising

In discussing this question of raising the standard of mine officials with mining men who are interested, among other objections, the following two are the most notable:

1. If you raise the standard of qualification, a movement for increase of salaries will inevitably follow.

2. Technical education is impossible for the man who has not the time and the means to allow of his going to the State University.

The first objection is almost too absurd to be taken notice of, as I am confident that such a movement would never be necessary. There would be created an absolutely new type of official, instead of the class who now hold the offices, because there is no one better to replace them, and whose principal interest in the matter is payday.

We would see a more intelligent and able class, a class imbued with ambition, a just pride and determination to excel in the profession they had undertaken to study.

The employer would find a reduction in his bill for supplies, brought about by a more careful use of material and the prevention of waste. Mines would be better kept up, air courses would be kept open, and such men, themselves disciplined, would maintain better discipline in the mines. Consequently, fewer accidents to person and appliances would occur, all of which would tend toward producing an increased tonnage at less cost. The employer would not be slow to notice such improvements, nor would he be likely to allow such men to go long without proper recognition.

As to the second objection, why should it not be possible for working men to get a technical training, such as would fit them for promotion to official life in their calling? This is within the power of the State of West Virginia. Furthermore, it is the duty of the state to give its workers a fair opportunity to acquire a technical education, and improve their position in life and their usefulness to the commonwealth at large. It is true the state provides a university fairly well equipped for teaching mining, and kindred subjects, but the people who require the teaching most are not in a position to avail themselves of this provision.

The state could and should establish a technical-education board, to be appointed by the governor. Such board should be provided with sufficient funds with which to establish technical schools in suitable centers of the mining and other industries, and provide sufficient capable lecturers for teaching weekly evening classes during the winter months. County or local committees could be appointed to supervise the work under the state board.

I imagine someone asking, but where is the money to come from? The state can always find money for any good purpose, and in the matter of technical education, it would be an investment that would return over 100 per cent. interest. Not all men who studied would be found sufficiently competent to fill the posts of their ambition, but all men who studied would be the better therefor, and the state would be so much the richer.

It is more than probable that if our working miners were given a reasonable opportunity for improvement and advancement, they would settle down in the State of West Virginia and cease to be a migratory element.

In conclusion, I desire not to be misunderstood, as I know full well that many men who have been called upon to manage mines in the past were shrewd, fairly intelligent and capable men. What they lacked in technical education, they were compelled, by the sheer force of circumstances, to supply by observation and practical experience. This they often did and did it well.

Extracts from a Superintendent's Diary

We had some women visitors in camp today; a party of social settlement workers from the city. As usual, most of the sarcasm was aimed at the multi-millionaires' representative, the "super." Ordinarily the sarcastic remarks of outsiders are about as amusing to me as feature stories in Sunday papers, describing canary birds as safety lamps, but today I partially lost my temper and as a result, I fear at least one young woman carried away impressions of the camp's superintendent that quite tallied with her previously formed opinion of such monsters.

The party was at my house being entertained by my wife; they had been tramping for an hour or so about our tenements, when my wife sent them an invitation to come over and rest a while on our shaded porch and enjoy such refreshments as our cook could improvise. Being proud of our tenements and especially of the sanitary condition of our camp, as compared to most other camps in our section, I foolishly journeyed over to the house expecting to hear some pleasing remarks about the result of our efforts.

Just after I arrived on the scene and before my wife had an opportunity for introductions, one young lady looking straight at me, but addressing her remarks to my wife, piped out something that meant: Doesn't your conscience trouble you when you look out over the camp and compare the wretched dwellings of the miners to this comfortable home furnished you by the mine owners?

Just what followed won't be recorded in this diary, I might be tempted to repudiate it some day; but now that I've mentioned my residence, in the diary, I can't resist the temptation to record a few random occurrences.

Whenever I am compelled to discharge a married man, his wife and children (and a few of the neighbor's children) proceed to our mansion's back door and my wife is assured that if the family starve, their souls will be on my head. Once I suggested to my wife that if a certain man were allowed to return to work, the effect on our discipline would endanger a thousand men's lives and the responsibility would be on my head without question; she still recalled the discharged miner's wife so vividly that my picture was wasted.

When the love knots of our younger residents become hopelessly entangled, the victims always follow the trail that lends to our back door. Nothing especially terrifying about that, as it is written, but when we consider that our young people are of many nations and religions with various and sundry ideas of morality, it sounds different.

Some of the stories that my wife repeats to me are almost unbelievable, and I am almost persuaded that she doesn't always tell me the worst.

The widows and the orphans—there are always many of them around coal-mining villages; and until our compensation laws become perfected, many of them must suffer grievous wrongs and, in consequence become rebellious. To them our mansion is only too often the visible connection to the iniquitous corporation which has brought on all of their misfortunes and, in consequence, our charities are judged, not by our ability, but by the capitalization of the corporation. It's hard, indeed, to offer assistance beyond your means and receive in response a malediction. And so it goes; but this is enough for today.

What Shall Be Considered Maximum Recovery?

By A. W. Hesse*

SYNOPSIS—The percentage of recovery varies widely in different fields and frequently in the same locality strongly divergent results are obtained. High figures secured in one field may not necessarily be a criterion for another, even though physical conditions may be similar.

The Bureau of Mines informs us that probably one-third of the bituminous coal now worked is left underground by our present methods. In other words, the average recovery in bituminous fields is only about 67 per cent.

What will the next 10, 20 or 50 years show? Surely, if not better by the end of the latter period, there is little hope toward eliminating these losses.

What are the "most modern and approved methods of mining?" Apparently they are like our warships—modern today and obsolete a year hence.

In order to get an idea of what is being accomplished in other fields, inquiries were sent out to different sections of the United States. The results are shown in a condensed form by the accompanying table.

You will note on this table, the wide variation of percentages given for different districts in various states. All are large producers of coal, with one or two exceptions, and employ what are presumed to be modern methods of mining. It is noticeable that the thin seams usually are overlaid with good roof; and the percentage of recovery is high. Also, that but one operator expects the ultimate recovery to fall below his present percentage.

Southern Colorado Secures 80 to 90 per Cent.

In the southern Colorado field, where the roof and bottom conditions are favorable for pillar drawing, no roof coal is left for protection and the recovery is given as 80 to 90 per cent., working on the room-and-pillar system. It is claimed that in the Cañon City district, where the longwall system is used, that 100 per cent. of the seam is recovered. This is in the thinner seam, which measures about 3 feet.

The coal in this section of the country belongs to the Cretaceous series and the intrusion of dikes should affect pillar drawing considerably, inasmuch as they would make more difficult the breaking of the overlying strata.

Rooms in the southern Colorado district are driven 16 to 18 ft. wide on 45-ft. centers, while in the Walsenburg district, where the coal is harder and has less cover, rooms are driven 35 to 40 ft. wide, leaving the same thickness in pillars which are recovered by machine and pick work. Track is laid on each side of the room and frequently one or two cuts are taken off the side of the pillar with a machine before beginning pick work.

The bottom of the Colorado seams is usually slate of a soft character, which heaves when weight is thrown onto the pillars, making it necessary frequently to drive a skip along the pillar in order to reach the back end before beginning to draw it.

There are districts where both roof and bottom conditions are unfavorable and much difficulty is encountered in breaking the overlying strata. In these sections the recovery is estimated to be 60 to 65 per cent.; 15 or 20 per cent. is lost in roof coal because the strata next overlying the coal cannot be propped.

With the conditions just given, and most of the operations advancing under heavier cover, do you believe the present recoveries will be maintained?

Another company, operating in practically the same field, states its recovery runs 75 to 80 per cent. of the entire seam, while a higher ultimate recovery is expected. This firm is now driving room entries to the boundaries and the last rooms are worked first, thus making it possible to draw the pillars on the retreat.

In the Michigan field, especially in the Saginaw district, the coal is in pockets rather than a continuous seam. The basin lies for the most part in a low, flat country, and shafts about 200 ft. deep are necessary to reach the coal. The bed averages about 3 ft., and is of poorer grade than the Ohio and Pennsylvania fuels, so that its market is somewhat limited.

The top in these mines is usually black slate, while one mine has a fireclay roof, making it necessary to leave top coal. Yet rooms are driven 40 ft. wide with track along each rib. The length of the room is 150 ft., as the miner pushes his cars from the working place to the entry. With the conditions just given, the recovery claimed is between 80 and 90 per cent. The 65 per cent. recovery given in the table (Item 4) represents the result of leaving pillars for surface protection within the city limits.

Adverse Public Sentiment Affects Southern Illinois

Going into central Illinois fields, where the No. 6 seam is operated extensively, we learn of adverse public feelings and unsettled industrial and labor conditions, which materially affect the percentage of recovery. Surface costing $100 to $250 per acre costs the operator two or three times these values in cases of subsidences, if the mining rights do not clearly cover the property. Besides these factors, the companies operating in the Glen Carbon, Mt. Olive and Divernon fields, state that owing to thick, soft clay under the coal or great overburden (300 ft. to 400 ft.) that they do not recover more than 50 per cent. In the southern fields better results are claimed, since the cover is about 110 ft. thick and all soft.

The slightly inferior seams of coal above or below the Nos. 5 and 6 seams are now receiving considerable thought as to future values, and for this reason they are trying to prevent roof movements by leaving sufficient pillars.

In the Sherrard field of Illinois, the recovery is reported at 90 per cent. Here the top and bottom are good and conditions propitious for drawing pillars. The seam of coal is only 3 ft. 8 in. thick, with many clay veins run-

*Assistant engineer, Consolidation Coal Co., Fairmont, W. Va.

Note—Read before the West Virginia Mining Institute, Cumberland, Md., June 3, 1914.

ning through it, which evidently must affect recovery to some extent.

An inquiry sent into the southwest section of Pennsylvania shows a recovery of 72.5 per cent. Here, 10 in. of roof coal is allowed to remain on account of drawslate and the operations for the past three years have been under the plant and town.

The bottom in this mine is fireclay of rather soft character. The rooms are driven from both sides of entries on 60-ft. centers and widened to 21 ft., leaving 39-ft. pillars to be drawn by machine and pick work. By this method, the ultimate recovery is expected to show a material increase over that given.

The company reporting from Westmoreland County, Pennsylvania, where conditions seem favorable, both in the steam- and gas-coal fields, shows a recovery of from 82 to 86 per cent. of the entire seam; and expects the ultimate recovery to fall below these figures.

In Somerset County, Pennsylvania, where coals of the Allegheny series are worked, the recovery is given as 94.75 per cent. of the entire seam. Here, excellent roof and bottom conditions prevail, and I understand that all room headings are driven to the limit before any rooms are driven at all. Then, the rooms are started at the rear and pillars drawn as soon as these are finished.

Practically the same conditions exist in the George's Creek field in the Sewickly seam, only the recovery is reported as 97 per cent. In this same field, the results obtained in the "Big Vein" or Pittsburgh seam, show 88 per cent. Considerable propping is necessary, owing to the drawslate and the wild coal just above it. The systems of mining the coal in this field have changed from time to time until now headings are driven 9 ft. wide, rooms only 13 ft. wide and the distance between room centers maintained at 100 ft., thus providing against squeezes. Under this process, 90 per cent. extraction is expected.

Pillars Are Not Drawn in Ohio

In Ohio, as well as some parts of West Virginia, no attempt is made to draw pillars at all. Rooms are driven 25 ft. wide with 8- to 12-ft. pillars between. In one of the largest mines of Belmont County, rooms were driven from both sides of the headings and it was no infrequent occurrence to have a territory squeeze shut, leaving considerable blocks of coal between the ends of unfinished rooms. In this mine, 50 per cent. would approximate the recovery.

In Harrison County, Ohio, it is nearly as bad. The recovery is reported as 70 to 75 per cent., but the same conditions exist in this section as in Belmont County, excepting perhaps the driving of rooms both ways from the same entry. The Ohio Mining Commission found in its recent investigations that 30, 40 and as high as 50 per cent. of coal is being left underground as pillars in that state.

There are mines in West Virginia which show recovery from 85.6 per cent. to 99.8 per cent., the highest percentage resulting from the fact that all the work was in the solid. These figures were presented by W. A. Grady, of the Pocahontas Coal & Coke Co., at the last meeting of this institute at Charleston, W. Va. The average result of the figures presented for 10 mines showed about 92.6 per cent.

The foregoing figures reveal what is possible, at the

TABLE OF PRINCIPAL FACTORS GOVERNING RECOVERY OF COAL IN DIFFERENT DISTRICTS

Item	Operating District and State	Per Cent. of Recovery of Entire Seam	Ultimate Recovery Compared to Present	Period of Operation, Years	Average Height of Seam	Roof Coal Carried	Nature of Top	Nature of Bottom	System of Mining	Are Pillars Drawn	Clay Veins Encountered	Remarks
1	Southern Colorado	80-90	Same	5 to 30	8′ 6″	0 to 24″	Slate	Soft slate	Room and pillar	Yes	Dikes	
2	Colorado (other Districts)	60-65	Same	5 to 30	8′ 6″	18″ to 24″	Very soft	Soft slate	Room and pillar	Yes	None	
3	Colorado (other Districts)	75-80	Better	10 to 35	3′ to 7′	Few places	Sandstone, poor shale	Same as top	Room and pillar	Yes	None	
4	Saginaw District, Michigan	65. 80-90	Better	15	3′	1 of 10	Black slate	Fire clay	Room and pillar	Where allowed	None	Length of room—150 ft.
5	Central Illinois	50	Same	20	8′	None	Slate, clod and limestone	Fire clay	Panel system	None	None	Advocates retreat mining.
6	Southern Illinois	65-70	Same	20	8′	Yes	Sandy shale	Fire clay	Panel system	To some extent	None	No. 6 seam.
7	Springfield District, Illinois	55-75	Increase*	20 to 25	6′ to 7′	Some places	Hard shale	Fire clay	Room and pillar	Where allowed	None	*Adjustment of labor situation.
8	Franklin, Williamson and Saline Counties, Ill	55-75	Increase*	18	5½′	Some places	Hard shale	Fire clay	Room and pillar	Where allowed	None	
9	Sherrard Field, Ill	90	Same	20	3′ 8″	None	Blue rock and cap rock	Slate & sand rock	Room and pillar	Yes	Yes	
10	Extreme Southwest Section, Penna.	72½	Better	3	7′ 6″	10″	18″ to 3′ 0″ draw slate	Soft fire clay	Room and pillar	Yes	None	
11	Penna.-Westmoreland Co	84	Below	25 to 35	6′ 8″	None	Slate	Fire clay	Room and pillar	Yes	None	
12	Penna.-Somerset Field	95	Same	8	3′ 11″	None	Hard black slate	Limestone	Room and pillar	Yes	Very few	Projected work adhered to.
13	Maryland-Georges Creek Field	97	Same	12	3′ 0″	None	Sand rock	Sand rock	Room and pillar	Yes	Yes	Sewickley seam
14	Maryland-Georges Creek Field	88	Same	94	9′ 0″	18″	Gray shale, coal, dark shale	Hard gray shale	Room and pillar	Yes	None	
15	Ohio, Belmont County	60	Same		5′ 6′	None	Slate and shale	Fire clay	Room and pillar	None	None	
16	Eastern Ohio, Harrison County	70-75	Same		3′ 8″ to 5′ 0″	None	10″ firm slate	Fire clay	Room and pillar	None	None	
17	West Virginia	90	Same	50	8′	Some places	Varies	Fire clay	Room and pillar	Yes	Yes	
18	Alabama											
19	Tennessee											
20	Kentucky	No reply										
21	Kansas											
22	Iowa											

same time showing what is actually, presumably, being accomplished. Shall we assume that because the United States Coal & Coke Co., at Gary, W. Va., is recovering 95 per cent. and more of the coal in which it is operating, that this should be accomplished in the districts of Colorado, showing only 60 to 65 per cent.?

None of us, I am sure, would accept an average of the percentages here given as a fair maximum, nor even an average of the same field. It is unfair to compare ultimate recovery of mines now drawing to a close with those mines at the best of their production. No doubt, the systems under which they were inaugurated were considered modern, but they would not be considered so now.

From reports sent in, it is apparent that there are five factors limiting the possible recovery in these fields; namely,

1. Mining rights and public feeling.
2. Roof and bottom conditions.
3. Weight and character of overburden.
4. Labor conditions.
5. Market value of the coal.

1. Where the mining rights do not allow breaking of surface, the recovery naturally varies inversely in some ratio to the overlying weight.

2. Where roof and bottom conditions make it necessary to recover as quickly as possible, market conditions will affect recovery; for pillar work of this kind will not wait.

3. Weight and character of overburden require systematic mining and competent supervision.

4. It is a matter of what is next best when unions insist on conditions which increase both cost of operating and loss of coal.

5. The market value of the coal dictates how far any of us can go toward its recovery.

Straight Recovery Figures Are Meaningless

These points are mentioned because we are apt to compare straight figures of recovery without taking into consideration the conditions under which they are derived. The Ohio Mining Commission, for instance, uses the mines and operations at Gary for an example of what Ohio should follow. Conditions, however, are so different in these two localities, that to secure the same results in recovery would require several radical changes. Generally the roof in Ohio is poor, union scales require rooms entirely too wide for economic pillar drawing, the general labor situation is always more or less unsettled and the selling qualities of the coal are inferior to those of the Pocahontas seam at Gary.

There are always other conditions which affect good pillar recovery, three of which were given by H. V. Hesse, in his paper read before this institute at Charleston, W. Va., Dec. 1, 1908; namely: (1) Insufficient or incompetent engineering; (2) incompetent management, and (3) impatience of owners for quick returns.

Maximum recovery in any one mine is hardly to be based on what is being done in some other section or state, or on the average of the same region, or even in adjoining mines. The quality of the coal may affect this. For instance, I have in mind an operation in which at least 18 in. of the top coal is so poor that to mix it with the balance of the product would simply throw the coal from that mine off the market, yet right in the adjoining property the coal is taken on the first mining to the full height of seam.

Suppose that a body of coal was such that the market demanded it only during seasons of scarcity, at other times the mine running one-half or one-third of the time. This mine has a fireclay top, which disintegrates by contact with air, thus making it both dangerous and, likewise, expensive. Owing to the inferior conditions, the management placed here, both outside and inside, is not the highest priced and consequently not the most efficient. The system of mining is that generally followed throughout this particular field. What per cent. of recovery could be considered the maximum? Is an operator required to conserve his commodity at prohibitive costs of production? Must he follow the general system of the region, even though his recovery is much lower than the general average, and his cost of production much higher?

Many mines have advanced a considerable distance in their development, but few are provided with sufficiently large barrier pillars along the main headings to give reserves for the final mining. The most of us know that the extraction of heading stumps on one side and a barrier pillar of 100 or 150 ft. on the other side is a slow process with small output, and I have wondered what effect the recovery of these barrier pillars will have on the ultimate recovery in a good many mines. Personally, I feel that the present high recoveries cannot be maintained to the end. Nature does not yield to us without effort on our part, and our exertions are on the increase while the capacities remain practically the same. There will be a period in the life of many mines when operations must move rapidly to keep down costs of production.

To tell what the maximum recovery should be under modern methods of mining appears premature, but certainly there are many factors to be considered when a question, such as that forming the subject of this paper arises.

Explosion at Hillcrest, Canada

A disastrous explosion occurred in Mine No. 20 of the Hillcrest Collieries Co., Ltd., on June 19. Mine officials say that 236 men had entered the mine on the morning of the explosion, and of this number only 37 survive. The explosion was so severe that it shook the countryside for miles around, demolishing many small buildings. Rescue corps arrived at the mine soon after the accident and engaged in a desperate effort to clear the pit and reach some of the entombed miners at the foot of the shaft. Heavy falls of rock in the shaft rendered the work of the rescuers difficult.

Among the dead is Thomas Quigley, superintendent of the mine. Fire broke out soon after the explosion, rendering almost hopeless the work of rescue. The majority of the miners were foreigners, but a large number were English speaking. Cries for help issued from the shaft immediately after the explosion, but these soon ceased, indicating that the men had succumbed to the gases present in the workings.

The latest authentic report indicates that 191 men have been brought out of the mine dead. This leaves but 8 miners unaccounted for. It is possible that some of the remaining victims were buried beneath tons of rock and their bodies may not be recovered at all. The majority of the bodies recovered were burned beyond recognition. The coroner has adjourned the inquest until early in July. The generally accepted theory is that the disaster was due to an explosion of gas in the lower workings.

C. M. I. of A. Summer Meeting

Special Correspondence

SYNOPSIS—The institute held a short meeting at Monongahela, of which perhaps the most interesting features were the address by the mayor, the paper of William Lauder, the address by A. P. Cameron and the question box.

The summer meeting of the Coal Mining Institute commenced promptly at 10 a.m., June 16, in Eagle Hall, Monongahela, Penn., with Jesse K. Johnston, the president of the institute, in the chair. L. C. Isler, the mayor, made the address of welcome. His remarks were largely reminiscent of the early days of mining in the fourth pool of the Monongahela Valley. The mayor's experience was almost wholly from the workingman's point of view, for after a small explosion in the mine where he was propelling a ventilating machine, he left the mines never to return. Later he worked outside.

The Unfortunate Pioneers of the Fourth Pool

What seemed to have impressed him in those early times was the fact that, just as at present, hardly any of



Where the Institute Convened at Monongahela

the operators made any money, and the men were always pleased when a boat sank or a tipple burned down. The losses of the boss were the joys of his employees. Some of the mine owners, when the consolidation of the coal interests took place, saw a little real money for the first time. The exploitation of their properties profited them far more than operation, as has always been true of the coal business.

J. K. Johnston responded to the welcome, and Henry Louttitt and William Seddon spoke on the early history of the fourth pool and on the development of the Coal Mining Institute of America.

Timbering Papers and Discussions

In the afternoon William Lauder read a paper on "Method of Timbering and Quality of Timber." This paper, which was excellent, was unaccompanied by the necessary illustrations. This made it hard to follow, but it was otherwise a clear presentation of a somewhat well worn subject. William Seddon, of Brownsville, Penn., then read a paper on "Method of Timbering with Reference to Overlying Strata and Geological Formation." This was followed by an address by H. I. Smith, assistant mining engineer, U. S. Bureau of Mines, on "Possible Substitutes for Mine Posts." In the discussion of this paper, W. R. Crane, dean of mining at State College, Henry Louttitt and R. D. Hall took part. The remarks, however, were rather supplementary than critical.

In the evening, H. I. Smith exhibited some slides showing mining conditions, and a discussion took place on the possibility of adding such agglutinants to hydraulic filling as would make it less susceptible to reflushing by water should the breaking of the measures subject the flushed material to erosion; the purpose of such agglutinant material being not to give strength to the aggregate, but to prevent its being washed away when not protected by uncrushed supports. Mr. Smith said that sand under high pressure was rendered almost solid and could be pulled apart only with difficulty, but he was unable to give any information relative to the addition of agglutinating matter, such as iron-bearing clays, etc.

The Last Word in Mining Machinery

Later, S. A. Taylor gave his interesting lecture on the "Advancement of Bituminous Coal Mining during the Last Forty Years," with slide pictures on the screen. Mr. Taylor does not look with scepticism on the many attempts to make coal mining a really mechanical operation. He thinks we shall soon reach the period when coal will be not only undermined but displaced and loaded by machinery. The present tendency seems somewhat unfavorable toward face conveyors and favors cutting the coal and loading it directly into cars without the intervention of shovelers.

On the second day, A. P. Cameron, general superintendent, Westmoreland Coal Co., Irwin, Penn., delivered an interesting address on "Accidents Caused by Machine Mining as against Pick Mining." Reference is made to this in an editorial, and the importance of the matter cannot be over-rated, as legislation ruling that machines be excluded from pillar work nearly passed the State House and Senate.

One law has been prepared excluding electric currents from mines, and the legislators are largely pledged to exclude electric mining machines from pillars and from gaseous workings. The arguments put out by the friends of the latter bill allege that the explosion at the Cincinnati mine originated from a mining machine. Everyone knows, however, that the accident in that colliery has been ascribed by all authorities to an open light, and the statement to the contrary has evidently been coined to suit the argument of those who oppose the electric mining machine.

Employment of Foremen by State

Following Mr. Cameron's paper, W. E. Fohl conducted the question box. The first question was:

Would it be of advantage to the coal-mining industry to have the supervision of the operation of mines, as regards safety, in the hands of officials paid by the state, permitting the owners of the mines to place in control of operation, men who do not have state certificates of competency?

George E. Gay, mining engineer of Uniontown, gave a lengthy review of the subject, and from what we were able to discover, he felt that the certificate of competency was an important safeguard and needed by all the men in authority around mines, and was not demanded from the mine foreman solely because he had to enforce the law and take care of the safety of the miners. Consequently, even if the safety and economic duties of the mine foreman were separated and given to two different men, he did not believe it would be justifiable to permit either man to be uncertificated.

William L. Affelder, general manager of the Bessemer Coke Co., Pittsburgh, Penn., thought that the presence of an officer of the state in the mine at all times would probably cause continual friction. He regarded the question almost as a proposition to have the state operate the mines. On the other hand, R. D. Hall suggested that the proposal on the whole had its merits, as it released the foreman from the necessity of keeping the operator in obedience to the law in cases where the latter was not any too well disposed to follow its requirements.

Foreman While Paid by Operator Enforces State Law

The foreman was now both a servant of the state, enforcing the law, and an employee of the operator. He receives all his emoluments, looks for all his advances in position and derives all the honor he secures from the operator, while he is serving the state. He is thus serving two masters, and in a degree the operator might as well pay the legislators as pay the mine foreman, who is really a deputy of the state.

Any operator who had followed the requirements of a resident inspector would be excused in the eyes of the public for many of the accidents which in mines are unavoidable. The provision would also have the advantage that the state would regulate the number of foremen to meet the duties imposed by the law. Some foremen, under the present ruling, are required to do more than can be done in the time allowed and they seriously neglect their safety duties. Mines which obey the law find it difficult to meet their obligations to the state in face of the competition of their more negligent neighbors.

A. P. Cameron declared that the suggestion that the state pay the local inspectors or mine foremen, or whatever they should be called, made it unlikely that the proposal contained in the question would receive popular favor, seeing that the general tendency was to make every industry shoulder its own burdens.

Coal-Land Values

The next question was:

What is a proper basis of coal-land valuation for purposes of taxation?

It was answered by Dr. W. R. Crane. His reply was at some length, full of valuable material, but withal so carefully guarded that it does not lend itself freely to condensation. W. L. Affelder stated that the real objection was to the method of assessment and not to valuation. If the assessors would only try to evaluate all the properties at their true value, all would be well. The millage would drop so that the burden on all would be equitable. But unfortunately the assessment is arbitrary and depends on the will of the assessor. S. B. Smith said that the duty of the assessor was clear, but he usually violated his sworn oath and did not attempt to ascertain what the property was worth. As every property was assessed below value, it was hard for anyone to make complaint, but the burden fell largely on those whose assessments, while too low, were not nearly so low as those of their neighbors.

The Dime Royalty

R. Dawson Hall took exception to the evaluations based on a dime royalty, as if the value of a property could have any direct relation to a unit of coinage chosen at random. On it, however, had been based a most abstruse valuation scheme, with results which were evidently erroneous, as they did not result in large areas of coal land being sold, at least for purposes of coal mining. He thought the price of coal land in neighboring plots of land the best criterion wherever coal land was actually being sold, though in some places the dearth of lots for sale made such an estimate impossible. As a rule such estimates as were made were as clever and as useful as studies of a possible fourth dimension.

George E. Gay countered by quoting the biblical tithe, and W. E. Fohl even referred to Adam Smith, who said that one-tenth of the cost of the product was a fair, and one-fifth a high royalty. In America 10c. was fair for bituminous coal and 20c. was high, thus justifying Adam Smith. Anyone who would venture to confute such authorities as these two would be guilty of atheism and Anglophobia, so no one tried.

The next question was ill-conceived:

What precautions against individual accidents are most frequently overlooked in bituminous mining practice?

James B. Dunmire, of South Fork, Penn., replied by sending a list of nine important sources of accident. As might be expected, no one wished to give such an overdiscussed subject further consideration, especially along enumeratory lines.

The last question came at the point of adjournment and therefore was not answered:

Would it be of advantage to have the drilling and shooting of coal performed by men in company employ? If this were done, what is the best form of drill? How many drillers would be required to each pair of shotfirers, and, approximately, how many tons of coal would be shot down in an 8-hr. shift in a 5-ft. vein by one drilling and shooting crew?

The attendance at the meeting was at all times disappointing. At no time were 50 present and at the opening meeting only 22. The mine inspectors' meeting the week before was partial cause for this small attendance and the selection of Monongahela as the convening point was also partly responsible. But it would be a folly to overlook the fact that institute activity as a whole has fallen on evil days.

Woodward and Pettebone First-Aid Meet

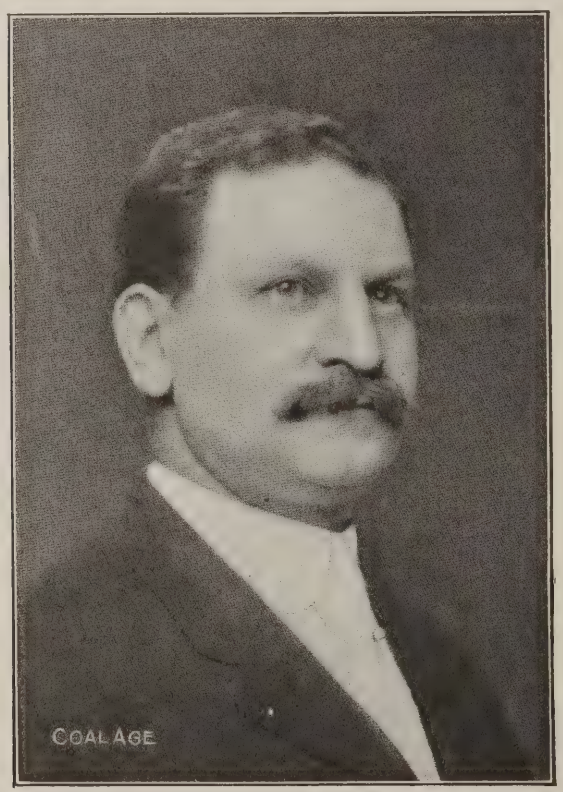
The united first-aid corps of the Woodward and Pettebone collieries, will hold their annual meet on Saturday, Aug. 15, 1914, at Kingston, Penn. The prizes to be distributed are as follows: First adult team, $50; second, $25; third, $15; and fourth, $10. A safety lamp also goes to the captain of each winning team. The prizes for teams under 17 years of age are: First, $15; second, $10; third, $5.

Who's Who in Coal Mining

William H. Taylor

Some of the most successful coal operations in this country are controlled and directed by men whose training has been along commercial rather than mining lines. In fact, the time has arrived when sound business judgment is as necessary to the success of a coal corporation as technical training and experience in engineering. One type of business man who has been successful in the mining fields is represented by William H. Taylor, president of the St. Clair Coal Co., Pottsville, Penn.

Mr. Taylor was born at Paterson, N. J. He spent his early boyhood in Paterson and Allentown, Penn., attending the public schools in both cities. He entered Dickinson Seminary, Carlisle, Penn., but left that institution at the age of 18 and entered upon his business career.



William H. Taylor

He started as a clerk in his father's machinery-supply house, working his way up, so that upon the death of his father he was able to take charge of the business, which is now known as the Scranton Supply & Machinery Co.

Mr. Taylor is also president of the Franklin Coal Co., president of the Goodwin Car Co., of New York, director of the Coal & Iron National Bank, of New York, and a member of the Chamber of Commerce, of New York. He is a member of the Scranton Club and the National Geographical Society.

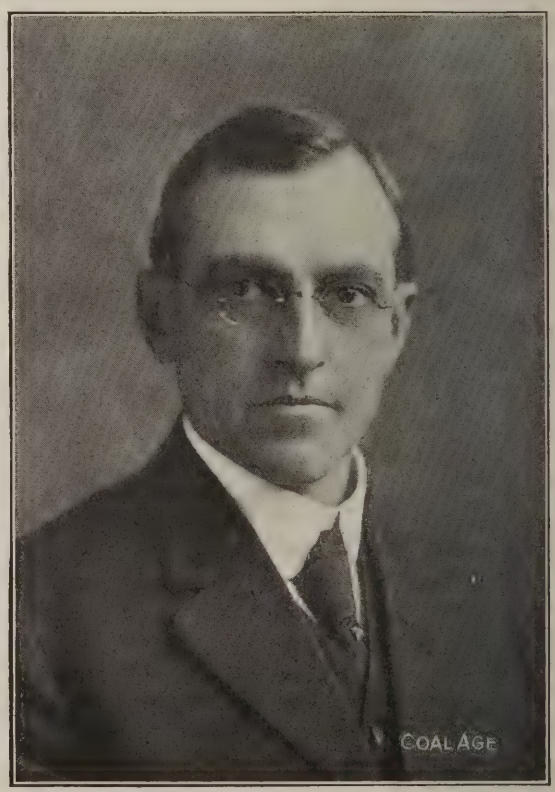
Mr. and Mrs. Taylor have four children—two daughters and two sons. Mrs. Taylor is a daughter of the late Samuel C. Barker.

Jesse S. Cheyney

The Stonegap Colliery Co., of Glamorgan, Va., has a live wire for vice-president and general superintendent in the person of J. S. Cheyney. Born at Rahway, N. J., in 1873, Mr. Cheyney received his early education in Pennsylvania schools, graduating from the "Friends' Boarding School," at Westtown, Penn., in 1889.

Two years after leaving school he identified himself with Williams, Brown & Earle, a Philadelphia concern dealing in engineering supplies. Then for five years he was employed in the Philadelphia offices of the Reading Coal & Iron Co. After this, he served three years on the engineering corps of the Lehigh Valley Coal Co., at Wilkes-Barre, Penn.

Leaving the anthracite field, Mr. Cheyney served for



Jesse S. Cheyney

nearly two years as engineer with the Fairmont Coal Co., at Enterprise, W. Va. His next job was division engineer for the Pennsylvania Coal & Coke Co., at Cresson, Penn., where he remained five years. Leaving the Pennsylvania company, he became superintendent of mines for the Straight Creek Coal & Coke Co., in Kentucky, and 18 months later he accepted a position as division superintendent for the New River Collieries Co., Eccles, W. Va. Since 1909 he has served in his present position.

The Stonegap company is owned by the Sheffield Coal & Iron Co., of New York and Alabama. The furnaces at Sheffield, Ala., receive their supply of coke from the Glamorgan ovens.

Editorials

Methane in Mine Air

Because the estimation of methane is a chemical operation, mine managers think it is necessary to have a chemist and a laboratory if they would analyze its presence in mine air. As a matter of fact, the work has been so simplified of late that no knowledge of chemistry is needed of the sampler or analyst. There is no reason why a mine foreman who has the simple apparatus outlined by G. A. Burrell, of the Bureau of Mines, and who has received an hour's instruction, should not be able to make a correct analysis with precision.

In fact, real chemists around industrial works are getting somewhat scarce. They are being driven out by the practical men who, working by rule-of-thumb methods, will make simple analyses without demanding a salary such as a chemist should receive. But this work of analyzing methane in mine air is even easier than sulphur determinations of coal, and any operator who will buy the apparatus and send an ordinarily bright man to the laboratory of the Bureau of Mines, can have such analyses made at a purely nominal cost.

It is probably true that large numbers of mines have in the return air a percentage of firedamp which would alarm the operator did he but know it. The extent to which the explosion spread in No. 5 Eccles suggests general methanization rather than the presence of an explosive mixture in one split only. The fact that analyses were never taken makes any such suggestion a mere assumption in which we may not be justified. Certain it is, however, that where the return air is likely to have a higher percentage of methane than is safe, the operator should ardently desire to know it and he is unduly negligent if he does not.

Should Electricity Be Debarred from Mines?

There have always been people who feared the introduction of machinery and there will be such timid creatures till the end of time, and indeed there is something wholesome as well as unfortunate in that fear. We should always inquire carefully whether the introduction of advantages balances their dangers, but in sizing up the situation, we must be careful lest romancing creeps in to add imagination to risk.

The remarks of A. P. Cameron, at the Monongahela meeting of the Coal Mining Institute of America were quite relevant, in view of the great desire on the part of the less intelligent union men to shut out machinery from the mines. The miner wears machine-made clothes, lives in a house of machine-made lumber, uses a machine-made pick and carries a machine-made lamp and hardly touches anything from the cradle in which he reposes when he is born to the coffin in which he reclines in death but what is made by machinery and is cheapened by its use—yet he now tries to declare he will have none of it. Others may labor for him with the utmost efficiency; he himself will work in the old-fashioned way. Cheap clothing, housing, picks, lamps, cradles and coffins for him, but dear coal for all others.

He has not been able to put this in the mining agreement, so he will see if he can insert it in the law, and so he has been inquiring in Pennsylvania of those candidates who are ignorant of mining whether they will help him drive the electric mining machine and even the electric current from the mines. And some have so pledged themselves, for the vote of the miner is the hope of the would-be representative.

Dangerous machinery is to be avoided, but we cannot admit that as a whole, electrical machinery, properly safeguarded, can be so classed. We don't believe Pennsylvania by any means a leader in proper precautions against trolley-wire accidents. We have seen more care in the West and there has been more agitation, at least, in Ohio, and probably the legislation in that state has had beneficial effect. Yet in the bituminous mines of Pennsylvania in 1912 only 5 men in 182,000 were killed by electricity on entries.

Nineteen machine runners and scrapers were killed in the bituminous mines of the state in 1912. Of these only one was removing pillars when killed, yet we are threatened with legislation prohibiting the removing of pillars by machinery. Of course, more machine coal is mined in rooms than in pillars, but nevertheless it remains significant that in 1912, only one man in the bituminous mines of the whole state of Pennsylvania, which produced over 30 per cent. of whole bituminous product of the United States in that year, was killed in the mining of ribs with a machine. On the other hand, 75 men were killed while removing pillars by hand and one man was killed at the deadly operation of going to work.

Four men were killed by the machines themselves. This was due either to carelessness or to inefficiently guarded machines and could well have been avoided. Two were killed by electricity at the face and one by electricity on the entry. Eleven were killed by falls at the face of the workings, showing that pillar drawing is possibly not as risky as work at the face. Until we know just how much coal is mined from pillars and how much from the solid face, the relative danger of face and pillar working will not be known.

At present, statistics as they stand show the face as 11 times more dangerous than the rib, but no one contends that such a calculation is fair, for it is obtained only by overlooking the greater amount of work done by machines at the face, and by disregarding the fact that more careful men usually work on the ribs, that bad ribs are usually withdrawn by hand and that the shortwall machine is largely used in such pillar recovery. However, with such a proportion against the agitators who would legislate to forbid the use of machines in rooms, it is a wonder that such propagandists do not withdraw their case with apologies to the public.

Thomas K. Adams' contention at the banquet of the Coal Mining Institute of America in 1912 was that the increased death rate in the last decade in the Pittsburgh district was due to the introduction of machinery, and this he considered proved by the fact that the mines in 17 counties around central Pennsylvania, which were somewhat backward in their machine development, did not show at the same time nearly such a fatality ratio. As a matter of fact, this was a conclusion which was not justified. Central Pennsylvania has a lower death rate than the Pittsburgh district, not because of her pick mining, but because the mine roof is not so dangerous. The mines in that section are safer now than before for the Kittanning coal with its unexcelled roof is replacing the Freeport coal with its pot holes, kettles, slips, general weakness and vegetal impurities. Besides both sections mine coal largely by machines, though statistics are not available to prove this fact.

The argument and question therefore simmers down to the following: One man was killed in the bituminous mines of Pennsylvania drawing ribs by machinery during 1912. Shall we or shall we not, because of this one fatality, make such rib drawing prohibitory?

The Cause of the Colorado Strike

Repeatedly we have been told that the strike in the southern districts of Colorado was a natural outcome of wrongs which could not be endured and even that war seemed less fearsome to these men than peace under such humiliating conditions.

But the origin of the trouble was not so simple. The strike arose from two causes—the pressure of rival states for the unionization of mines which were seizing their markets, and the need for action to galvanize a fast-dying local labor organization into life. At no time for years had the union been so weak in Colorado as before the strike, nor had it at any time been stronger elsewhere. and so far from the Colorado miners being goaded into rebellion, they had been rendered indifferent to the union and its aims by the considerate action of the operators. Welfare work had led the men to a realization that the companies were better friends of the miner than the labor organization, and the union was losing adherents year by year.

Something had to be done and done soon, or Colorado would soon be nonunion. The only way was to declare a strike at once, for otherwise the number of those who would stand by the union would soon be too small for them to make a successful appeal to those men who prefer peace, but who, being moral cowards, cannot refuse the call even to a quarrel in which they have no faith if an appeal is made to them by any large number of fellow-workers.

So the strike was called much as the Franco-Prussian War was declared. That war occurred only because the Emperor of the French, Napoleon III, knew that his dynasty was threatened by peace, and thought his authority would be strengthened by war. Napoleon and France were ultimately defeated, and so probably the union will be in Colorado. The relative strength of the forces was then and is now being miscalculated. The advocates of discord in Colorado, as in France, will find that unsuccessful war, such as they wage, is disrupting rather than strengthening to their organization. However, we have always felt kindly toward France despite its aggression, nor in this struggle are we opposed to the union as a union, much as we must deplore its actions.

In fact, we doubt whether for many years it will be possible to say a good word for a union in Colorado, because of the large admixture of unnaturalized, unregenerate elements, it must necessarily contain. Even if we overlook the moral weaknesses of the Italian, Balkan and Greek peoples and of the Mexicans in Colorado, we cannot forget that the difficulties involved in instructing them in the proper action will always be insuperable so long as they do not acquire a knowledge of English. Ill-informed men are always irrational and employ unreasonable agents.

The Foreigner

The problem of immigration and its regulation should never be allowed to be forgotten. We are receiving for our "melting pot" such a mass of material that we sometimes wonder whether that vessel is refractory enough to do, without injury, the refining which is demanded of it. In fact, we believe that in places there are many signs of a loss of shape and color where the pot and its contents have slagged into an undesirable compound.

We are not strongly in favor of excluding the immigrant, because we believe that every man has an inherent right to seek work where it can best be obtained and to seek enlightenment and freedom wherever it may be found. This sentiment may appear academic rather than patriotic, but after all we have cast off local pride till our cities and states no longer have walls and tariffs to defend them and perhaps nations will soon be as open to the world at large.

What we do think we have a right to disapprove is the entrance into America of a large body of citizens who never learn the facts of our national life, and who never obtain the power to express themselves in our language.

No man should receive papers as a citizen till he can read, write and talk in English with fluency, far better than can, today, the average non-English foreigner, who has been here 20 years. No foreigner should be allowed to stay here more than 5 years unless he has, in no small measure, made progress in the use of our language, and every alien should be required to spend an hour every week day in attendance at an approved school. With due respect to our courts, we regard this as a more pertinent matter than an inquiry into the political faith of the applicant. We have as little right to demand that a man shall not be a socialist or individualist, as we have to require that he shall not be a Buddhist or a Mohammedan.

For the education suggested, these foreigners should themselves pay, and we are not prepared to think they would be unwilling. Where there are twenty or thirty foreigners in a village, the cost would not be prohibitive, and if any objected, their deportation would be a blessing to the country. We believe that if they were compelled to learn our language, they would be less likely to return to their native lands after we have spent weary years in their remaking.

The foreigner in this country should be able to read our newspapers and books, and to understand orders. He may vote and "raise Columbia" without these qualifications, but he will never make a citizen.

Discussion By Readers

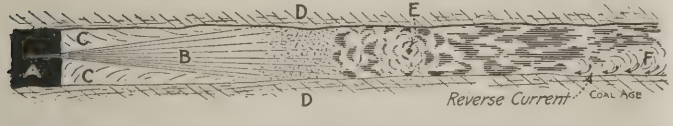
The Air Factor in Mine Explosions

I read with some interest James Ashworth's comments on Mr. Verner's theory relating to the cumulative effects of a coal-dust explosion, COAL AGE, May 2, p. 741; and Mr. Verner's reply to his queries, May 16, p. 818. I do not regard the conditions submitted by Mr. Ashworth as the basis of his interrogations, as in any way detracting from the plausibility of Mr. Verner's theory.

In regard to this theory, if I fully comprehend Mr. Verner's meaning, he advances the idea that the cumulative features of a coal-dust explosion or the ultimate range of its expansive effect is dependent on the presence of sufficient supplies of combustible material at the points where the highest temperatures prevail immediately after the explosive blast that is responsible for the ignition of the dust. I understand that Mr. Verner suggests that these supplies of combustible material are provided largely through the operation of what he has termed very properly "reverse air currents" induced by an alternate compression and expansion of the mine atmosphere.

In contemplating this condition in a mine entry, I have arrived at a fair conception of what might take place as the result of a blown-out shot discharging into the mine atmosphere, in the presence of accumulations of fine coal dust. The following graphic illustration may prove of interest and assist to a better understanding of the action of such reverse currents, setting back toward the center of the disturbance.

In the accompanying figure, the charge exploded is located at *A*. The divergent lines *B* are the projected lines



IDEAL SKETCH, ILLUSTRATING THE INITIATION OF A MINE EXPLOSION

of force resulting from the explosion of the charge. There is produced at once a zone of compression immediately in front of the discharge; and this compressive wave is driven forward at a high velocity, until its expansive force is exhausted or equalized by some opposing force. Where the diverging lines of force strike the sides, roof and floor of the entry, as at *DD*, the accumulated dust is thrown into the atmosphere. At this point, also, the diverging lines are deflected and become more or less parallel to the center line of the entry.

It is important to note, here, that there is a large space at the coal face, marked *CC* in the figure, which does not receive the direct force of the discharge of the exploding shot. The air in this space is naturally drawn into and swept away by the explosive blast, thereby producing more or less of a depression or vacuous condition behind the explosive wave. The reaction that is bound to take place between the zone of compression in front and the zone of depression behind this wave forms an important feature and eventually gives rise to the "reverse current" described by Mr. Verner. I will refer to this again.

What we must consider now are the high temperature and velocity of the expanding gases thus projected into the entry. Under this high temperature, the fine coal dust distills much gas, which at once forms an explosive mixture with the air; and, as a result, there is developed an explosive center at some point marked *E* in the figure, which becomes the initial point of the mine explosion. More heat is developed, and the explosive effects become cumulative as the explosive wave extends more or less throughout the mine, depending on the supply of combustible matter and available oxygen to support the combustion.

I may now refer to the reaction that sets in at some point *F*, where the advance of the explosive wave from *E* becomes more or less exhausted or is equalized by the inflow of air from other parts of the mine. Owing to the difference of temperature between this air and the hot gases, the former flows in toward the center of the disturbance along the floor of the entry, while the expanding gases escape along the roof, as indicated in the figure. This reaction is assisted by the effect of the zone of depression that exists in the rear of the explosive wave and to which I have referred.

I believe the point to be emphasized is that this reverse current sets up a rotation of the air in the entry with the result that more dust is thrown into the atmosphere and burned. Other explosive centers, similar to that at *E*, are formed at different points, as the explosion proceeds throughout the mine. The effect is cumulative, depending on the conditions. An important point to note, in this connection, is that the explosive force at any center, while radiating in all directions from that center, is propagated to a greater distance outby, owing to the confined space inby from this point forming a *cul de sac*.

In my opinion, the reverse current traveling along the floor is determined, in position and intensity, by three factors: (1) the relative gravity of the air and expanding gases; (2) the formation of a zone of depression in the rear of the explosion; (3) the expansive effect and high pressure accompanying the advance of the explosive wave. It is worthy of note that the reverse current will necessarily contain both combustible material and available oxygen, which makes it the important air factor to which Mr. Verner has drawn attention. Such is what I conceive to be his theory, and its plausibility is based upon the fact that it is consistent with known laws.

In reference to Mr. Ashworth's statement that "the speed of the explosive wave (in the cases mentioned) must have been far too great to allow of the operation of a reverse impulse such as Mr. Verner suggests," I believe it is generally conceded that the rapidity of any reaction is in proportion to that of the force acting. I have heard it suggested that the jagged appearance of a

bolt of lightning may be ascribed to the alternate expansion and contraction incident to the electric discharge in the atmosphere. Most miners who have worked with safety lamps have observed the rapid expansion and contraction of the flame of the lamp when a near-by heavy shot was fired. Is it not possible that these observed effects are similar or at least analogous to what takes place in a mine explosion.

I would like to see Mr. Verner's theory fully tried out or tested by the experiments, which he has suggested should be made by the Federal Bureau of Mines. I would also like to see a further study and demonstration to prove or disprove Mr. Ashworth's theory of "detonation," in its relation to mine explosions. I feel convinced that these lines of study would prove valuable.

I. C. PARFITT.

Jerome, Penn.

The "Safety-First" Call

Letter No. 2—I have been much interested in the numerous references made to the "safety-first" idea, in COAL AGE and elsewhere. Some very good suggestions have been offered; but, judging from experience, I feel that we should try and educate all employees in the mine to coöperate with the mine officials in every effort to reduce the number of accidents occurring daily. The sooner we can induce mine employees to take an active part in striving to reduce the number of accidents, the sooner results will be obtained.

We have listened to valuable papers on this subject, at mining-institute meetings and smokers; we have read many articles on the same subject in the leading mining journals. We learn from these that the majority of mine accidents are due to the carelessness of the person himself or that of others.

Granting, as is commonly believed, that our mining laws are second to none, we are driven to the conclusion that these laws are not enforced as they should be. Greater discipline is required in the mine, and the coöperation of every mine worker, in this regard, is necessary in order to reduce the accident list.

Some employees regard it as an imposition by the mine officials when they are asked to take certain precautions to guard against possible danger. Some have even gone so far as to send the mine committee to the foreman to protest against the discipline of a man who has failed to comply with the mine regulations and thereby endangered the lives of his fellow workers.

On the other hand, some mine foremen seem to think that when they have told a man to take the necessary precautions for safety, they have done all that is required of them. They forget that the law commands the mine foreman to direct and see that its several provisions are strictly observed and carried out. Every mine foreman should realize that he is personally responsible for the enforcement of the law in its relation to the mine. The suggestion of patrolling the mine with safety bosses who shall have charge of 20 or 30 men is good; but to get results, discipline must prevail throughout the mine and all employees must coöperate with the officials in charge.

It is necessary that every man in the mine should feel his individual responsibility.

READER.

Punxsutawney, Penn.

Effect of Short-Circuiting Air on Speed of Fan

It is amusing to observe how many men, today, who are intelligent on most mining matters and hold certificates of competency to act as mine foremen, etc., have not seemingly observed or learned the fact that when the air current in a mine is short-circuited by opening the main or division doors at the bottom of the shaft, between the intake and return airways, the fan runs slower as a result. The greater number of these men, if asked this question, would answer unhesitatingly that the fan would increase its speed when the door was set open. It only goes to prove how we are all prone to jump at conclusions.

However, a wonderful advance is being made in this direction; and none appreciate it more than the readers of COAL AGE. In reading the article on this subject, in the issue of May 23, p. 862, and the answer there given, it occurred to me to ask, if there is not still another factor that enters into the case and causes the slowing down of the fan; or, in other words, makes the engine or motor, as the case may be, display that "tired feeling," notwithstanding the power remains constant.

Assuming the fan is exhausting the air from the mine, and the main doors are set open, so that the mine resistance is cut out, there is a rise of pressure in the fan drift and, as a result, the air enters the fan heavier, bulk for bulk, than when the doors are closed and the air circulates throughout the mine. This is in harmony with the law of the compression of air and gases, owing to an increase of pressure. It seems to me that the fan would naturally run slower when handling heavier air, at least when exhausting.

STRAWBOSS.

Farmington, Ill.

[While the reasoning suggested by correspondent, in reference to the slowing down of the fan when the air is short-circuited and the mine resistance is cut out, seems plausible, it must be remembered that the same conditions do not obtain in the *blowing* as in the *exhausting* system. In the exhaust system of ventilation, it cannot be denied that the air entering the fan is slightly heavier, bulk for bulk, when the air current is short-circuited. In the blowing system, however, the effect of cutting out the mine resistance is to relieve the pressure against which the fan is operating; and, as a result, there would be an expansion of the air, which effect would extend, to some extent, within the fan; and, by the same reasoning, the fan would then be operating upon lighter air and would thus be expected to run faster, if this reasoning were correct.

When it is remembered that the atmospheric pressure (14.7 lb. per sq.in. or 2116.8 lb. per sq.ft., sea level), is very great compared with the usual mine pressure of, say 5 or 10 lb. per sq.ft., and that the increase in density claimed when the fan is exhausting and the air is short-circuited would probably be less than one-half of one per cent., it is evident that this is an inappreciable factor, in the slowing down of the fan. The effective factor, as we previously stated, is found in the great increase in the frictional resistance within the fan, owing to the increased quantity and velocity of air passing. The effect is greatly magnified by the fact that the friction increases with the square of the velocity.—ED.]

The Mine Foreman

Referring to the recent interesting discussion of the many difficulties and discouragements that beset the work of the mine foreman, it occurs to me that these are, for the most part, the lot of every industrial worker. Many an ambitious mine foreman, perhaps possessing greater zeal than knowledge, has been permanently discouraged by the frigid reception accorded his proposed plan or scheme, by a thoughtless superior. To this foreman, the plan presented may appear as the pearl of his intellect; and he suggests its adoption with ardor and in the spirit of loyalty, believing that he has discovered what will revolutionize the work in his charge and double the production of coal or cut in half the cost of operation.

Much to the foreman's chagrin, this child of his brain is ruthlessly murdered by a few brutally frank words from his superior, accompanying the rejection of the plan. Is it any wonder that the foreman's interest wanes and that he sinks back to the level of a mediocre employee, instead of an ambitious striving foreman?

A word of encouragement or explanation, in the rejection of a plan, is seldom a bad investment of one's valuable time. To profitably handle the situation requires both tact and skill on the part of the superior. It is necessary for him to discern the foreman's particular viewpoint; or to discover the angle at which he approached the proposition. In many cases, it will be found that, viewed at that angle, the plan was feasible, and this fact should be conceded; while, at the same time, he should be shown that from another angle, the proposed plan is impracticable.

By such a conference, the foreman's ambition is stimulated. He feels that he was not mistaken, but realizes that he failed to take a large enough view of the matter in question. The result is that his next suggestion will be more carefully considered and will probably contain real worth. By thus training the man to think there is developed a more expert and successful workman.

No one likes to be mistaken in his conclusions. On the other hand, when one is shown that there are conditions that he has not taken into account, his self-confidence is not weakened; and he applies himself with greater vigor to work out a better plan and reach the right solution. We all recognize the fact that, in any complex situation, it is not always possible to consider every condition affecting the solution of a problem. One of the most important elements, in the training of efficient foremen by their superior officers, is to endeavor to view the proposition from their standpoint.

ANONYMOUS.

Crumpler, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Water gage, $w.g. = \frac{p}{5.2}$ $\quad w.g. = \frac{12}{5.2} = 2.3+$ *in.*

Power on air, $u = ksv^3$ $\quad u = 0.00000002 \times 120{,}000 \times 500^3 = 300{,}000$ *ft.-lb. per min.*

$u = \frac{k\,s\,q^3}{a^3}$ $\quad u = \frac{0.00000002 \times 120{,}000 \times 25{,}000^3}{50^3} = 300{,}000$ *ft.-lb. per min.*

$u = q\,p$ $\quad u = 25{,}000 \times 12 = 300{,}000$ *ft.-lb. per min.*

$u = \left(\frac{q}{X_u}\right)^3$ $\quad u = \left(\frac{25{,}000}{373.4}\right)^3 = 300{,}000$ *ft.-lb. per min.*

$u = p\,a\,v$ $\quad u = 12 \times 50 \times 500 = 300{,}000$ *ft.-lb. per min.*

Horsepower, $H = \frac{u}{33{,}000}$ $\quad u = \frac{300{,}000}{33{,}000} = 9.09$ *hp.*

The square of the pressure potential can always be used instead of the cube of the power potential since these are equal, as expressed by the formula

$$X_p^2 = X_u^3$$

Thus, $X_p = X_u \sqrt{X_u} = 373.45 \sqrt{373.45} = 7217$, *nearly*

Or the pressure potential can be calculated directly, by the following formulas:

Pressure potential, $X_p = q\sqrt{\frac{q}{u}}$ $\quad X_p = 25{,}000\sqrt{\frac{25{,}000}{300{,}000}} = 7217$, *nearly*

$X_p = \frac{q}{\sqrt{p}}$ $\quad X_p = \frac{25{,}000}{\sqrt{12}} = 7217$, *nearly*

TANDEM CIRCULATIONS

To illustrate the formulas that apply to a tandem circulation where a single air current is carried continuously through shafts and airways of different size or cross-section, assume the following mine is passing 30,000 cu.ft. of air in a single undivided current:

1. Downcast shaft,	8 × 12 *ft.*, 600 *ft. deep*
2. Main road,	6 × 10 *ft.*, 1200 *ft. long*
3. Cross-tunnel,	6 × 8 *ft.*, 200 *ft. long*
4. Upper seam,	5 × 14 *ft.*, 2000 *ft. long*
5. Upcast shaft,	10 × 10 *ft.*, 900 *ft. deep*

The sectional areas are 96, 60, 48, 70 and 100 sq.ft.; and the rubbing surfaces, 24,000, 76,800, 11,200, 152,000 and 90,000 sq.ft., respectively.

Part potential values, $\frac{1}{X_u^3} = \frac{s}{a^3}$ $\quad \frac{1}{X_1^3} = \frac{24{,}000}{96^3} = 0.0271$

$\frac{1}{X_2^3} = \frac{76{,}800}{60^3} = 0.3556$

$\frac{1}{X_3^3} = \frac{11{,}200}{48^3} = 0.1013$

The Coal Age Pocket Book

Part potential values, *(Continued)* $\quad \frac{1}{X_4^3} = \frac{152{,}000}{70^3} = 0.4430$

$\frac{1}{X_5^3} = \frac{90{,}000}{100^3} = 0.0900$

Value for entire mine, $\Sigma\left(\frac{1}{X_u^3}\right) = 1.0170$

Mine part potentials, $X_{uo} = \frac{1}{\sqrt[3]{\Sigma\,(1/X_u^3)}} = \frac{1}{\sqrt[3]{1.0170}} = 0.9944$

$X_{po} = \frac{1}{\sqrt{\Sigma\,(1/X_p^2)}} = \frac{1}{\sqrt{1.0170}} = 0.9916$

Pressure, $p = \frac{kQ^2}{X^3_{uo}} = \frac{0.00000002 \times 30{,}000^2}{0.9944^3} = 18.3$ *lb. per sq.ft.*

Water gage, $w.g. = p/5.2 = 18.3 \div 5.2 = 3.5$ *in.*

Power on the air, $U = \frac{kQ^3}{X^3_{uo}} = \frac{0.00000002 \times 30{,}000^3}{0.9944^3} = 549{,}000$ *ft.-lb. per min.*

Horsepower, $H = \frac{U}{33{,}000} = \frac{549{,}000}{33{,}000} = 16.6$ *hp.*

SPLIT CIRCULATIONS

(Natural Division)

Equal Splits—When an air current divides naturally between two or more equal splits, the calculation of the mine potentials, velocity, pressure, power, etc., is the same as for a single undivided current, except that the sectional area (a) of the airways must be multiplied by the number of splits (n) to obtain the total **area of passage** (na).

To illustrate the application of the formulas in this case, assume an air current of 60,000 cu.ft. of air is circulated in three equal splits, the size and total length of the airways, including the returns, being 5x8 ft. and 10,000 ft. long.

Velocity, $v = \frac{Q}{na} = \frac{60{,}000}{3\,(5 \times 8)} = 500$ *ft. per min.*

Mine part potentials, $X_u = \frac{na}{\sqrt[3]{s}} = \frac{3\,(5 \times 8)}{\sqrt[3]{260{,}000}} = 1.880$

$X_p = na\sqrt{\frac{na}{s}} = 120\sqrt{\frac{120}{260{,}000}} = 2.578$

Pressure, $p = \frac{kQ^2}{X_p^3} = \frac{0.00000002 \times 60{,}000^2}{2.578^3} = 10.83$ *lb. per sq.ft.*

Water gage, $w.g. = p/5.2 = 10.83 \div 5.2 = 2.08$ *in.*

Power on the air, $U = \frac{kQ^3}{X_u^3} = \frac{0.00000002 \times 60{,}000^3}{1.88^3} = 650{,}000$ *ft.-lb. per min.*

Horsepower, $H = \frac{U}{33{,}000} = \frac{650{,}000}{33{,}000} = 19.7$ *hp.*

Inquiries of General Interest

Problems in Rescue Apparatus

For some time past, I have been studying several problems that have presented themselves during a course of training with rescue apparatus. While some of these have been solved by a longer and more intimate acquaintance with the apparatus and a better knowledge of the subject, there are some that still remain unexplained. I believe that many members of rescue corps have been or are confronted with the same problems, and, for the benefit of such as well as myself, I desire to present the following question for solution. I know of no better medium for doing this than the columns of COAL AGE.

In the description of many types of breathing apparatus used in mine-rescue work, it is stated that 2 liters of oxygen per min., or 120 liters per hour, are supplied to the wearer, by the oxygen cylinder of the apparatus. It is further stated that the capacity of the machine to absorb carbon dioxide (CO_2) is 50 liters per hr.

Now, the reaction that takes place in the formation of carbon dioxide by the combustion of carbon in oxygen is represented by the following simple equation. It is not necessary, in this case, to consider the nitrogen of the air, for the reason that little if any nitrogen enters the lungs while the breathing apparatus is being worn, assuming the oxygen contained in the cylinder is pure and there are no air leaks in the apparatus; although some assert that there is generally a small percentage of nitrogen mixed with the oxygen in the tanks supplied by many manufacturers of this gas. The reaction in oxygen is as follows:

$$C + O_2 = CO_2$$

This equation shows that for every volume of oxygen consumed there is a corresponding volume of carbon dioxide produced. If, as stated above, the capacity of the apparatus is sufficient to absorb only 50 liters of carbon dioxide per hour, and this represents a consumption of an equal volume (50 liters) of oxygen, there are still 120 — 50 = 70 liters of oxygen unaccounted for.

It is true that moisture or water (H_2O) is absorbed by the caustic potash, supplied with each apparatus for this purpose. But, I would like to ask, is it possible that the water formed in breathing absorbs so large a portion of the oxygen? In other words, is it possible that 70 liters of the oxygen go to form water, while only 50 liters per hr. are concerned in the combustion of carbon, to form carbon dioxide?

I understand that whenever the excess valve is working on the apparatus, both oxygen and nitrogen are given off at the valve; and, as the source of nitrogen, in the working of the apparatus, is extremely limited, the use of the excess valve can hardly be supposed to be necessary to eliminate this nitrogen from the apparatus. Is it a fact, then, that there is a loss of oxygen through the excess valve; or is practically all of the oxygen supplied by the oxygen cylinder consumed in the reactions due to breathing? What proportion of the oxygen in the oxygen cylinder goes to form carbon dioxide and how much of it is consumed in forming the moisture produced in breathing; and are there other compounds formed?

I would like to see an answer to these questions in COAL AGE. Perhaps some of our readers with a knowledge of physiology can explain this matter, by stating exactly what takes place. The subject of mine-rescue apparatus is too serious a one to be left wholly to the manufacturers of any particular type of apparatus.

W. H. MOORE.

Nanaimo, B. C., Canada.

It is well nigh impossible to state exactly the reactions that take place between the hydrocarbons, in the building up of the tissues of the body through the supply of oxygen to the lungs. Correspondent is quite right in the suggestion he makes that other compounds take part in the reaction.

It is well to note that in the formation of water vapor (H_2O), each volume of oxygen consumed takes up twice its volume of hydrogen, and there are formed two volumes of water vapor. Assuming, then, that of the 120 liters of oxygen per hr. supplied by the apparatus, 50 liters go to form the 50 liters of carbon dioxide that are absorbed by the caustic potash per hr., the remaining 70 liters of oxygen per hr. must combine with the hydrogen of the hydrocarbons of the body. These hydrocarbons are numerous and their constitution is often very complex. The fatty substances of the body are ethereal salts formed by the action of acids upon an alcohol (glycerin). The principal acids taking part in this reaction are three in number: Palmitic, stearic and oleic acid. Their formulas are very complex, as will be seen from the following:

Glycerin, $C_3H_8O_2$
Palmitic acid, $C_{16}H_{32}O_2$
Stearic acid, $C_{18}H_{36}O_2$
Oleic acid, $C_{18}H_{34}O_2$

It is evident, from the complexity of these formulas, that it would be practically impossible to forecast the reactions that take place and which result in the formation of carbon dioxide and water vapor. It is evident that a large amount of oxygen is derived from the hydrocarbon acids; and, in the breaking down of these complex molecules, much of the water vapor is formed directly from the hydrogen and oxygen in the molecule.

We are glad to have these questions brought up by correspondents, as they not only show that the subject is being carefully studied by those who are training for rescue work, but the questions stimulate further study on the part of those whose duty it is to investigate closely all the conditions surrounding the use of the apparatus and the reactions taking place therein. By this means only, is it possible to arrive at an intelligent solution of the problems presented, and to obtain the highest efficiency and safety in the use of the means employed. We shall be glad to have our readers take up this matter further, telling of the difficulties they have experienced in the use of breathing apparatus and the means and methods they have adopted to avoid them.

Examination Questions

Miscellaneous Questions

(*Answered by Request*)

Ques.—Where a seam cuts a fault, the vertical rise is found to be 60 ft.; and the seam beyond the fault is discovered to have a dip of 4 in. to the yard. It is desired to calculate the length of a drift rising 1½ in. to the yard that will cut the seam beyond the fault.

Ans.—Since the seam dips 4 in. per yd., and the drift rises 1½ in. per yd., beyond the fault, the two will approach each other at the rate of 4 + 1.5 = 5.5 in. per yd. The total vertical rise at the fault being 60 × 12 = 720 in., the length of the drift from the fault to its intersection with the seam is 3(720 ÷ 5.5) = 392.7 ft.

Ques.—The estimated volume of gas filling the head of an entry is 25,073 cu.ft. It is desired to know how this volume of gas will be affected when the barometer falls from 30.7 to 29.9 in.

Ans.—Assuming that the temperature remains constant, the volume of air or gas expands in proportion to the fall of pressure. In other words, the volume ratio is equal to the inverse-pressure ratio or the inverse-barometer ratio. Therefore, calling the expanded volume of the gas, due to the fall of the barometer, x,

$$\frac{x}{25{,}073} = \frac{30.7}{29.9}$$

$$x = \frac{30.7}{29.9} \times 25{,}073 = 25{,}743 \text{ cu.ft.}$$

The quantity of gas given off or expanded on the entry, in this case, is 25,743 — 25,073 = 670 cu.ft.

Ques.—A careful test made in the upcast shaft shows the air current to be a 2.5 per cent. mixture of air and marsh gas (CH_4); if the quantity of air passing into the mine is 50,000 cu.ft. per min., how many cubic feet of marsh gas does the upcast current contain?

Ans.—If the volume of gas in the upcast current is 2.5 per cent., the percentage of air in the current is 100 — 2.5 = 97.5 per cent. Therefore, if 50,000 cu.ft. is 97.5 per cent., the total volume of the return current (air and gas) is 50,000 ÷ 0.975 = 51,282+ cu.ft., and the volume of gas present is, then, 51,282 — 50,000 = 1282 cu.ft. per min.

Ques.—If 20,000 cu.ft. of air is passing through a mine per minute, what amount of marsh gas (CH_4) must be taken up by the air current, in order to produce a 3-per-cent. mixture in the return airway?

Ans.—The air in the return current, in this case, forms 100 — 3 = 97 per cent. of the mixture. Therefore, if 20,000 cu.ft. is 97 per cent., the entire volume of the mixture is 20,000 ÷ 0.97 = 20,618+ cu.ft. per min. The volume of gas absorbed by the air current is, then, 20,618 — 20,000 = 618 cu.ft. per min.

Ques.—State how you would develop, arrange, equip, officer and manage a gaseous and dusty mine, to insure freedom from accumulations of gas and dust and the dangers incident thereto, keeping in view safety and economy.

Ans.—The development, arrangement and equipment of any mine must depend on a large number of conditions, which it is impracticable to assume. In a gaseous and dusty mine, the mine foreman must employ a sufficient number of competent assistants to enable the thorough inspection of every working place at frequent intervals throughout each working day. The men making this inspection must be competent to give the necessary instructions to the miners and to supervise their work in such a manner as to avoid the occurrence of accidents due to unsafe conditions existing in the mine, with respect to timbering, mining, blasting and loading coal, and the proper ventilation of the entire working face. To insure the thorough inspection of each place and to reduce the number of accidents, each assistant to the mine foreman should have charge of only such extent of territory as will enable him to thoroughly supervise every detail of the work and to see that the mining law and the mine regulations are strictly carried out. The largest economy is is insured by the greatest safety in mine operations. All fine coal and slack produced in mining must be loaded out and dust-tight cars must be used.

Ques.—What conditions are required for the successful operation of a siphon?

Ans.—1. All joints in the pipe line must be air-tight. 2. The suction end of the pipe must be sufficiently submerged in the basin to prevent the entry of air into the pipe. In most cases, it is necessary, also, for the discharge end of the pipe to be submerged, although when the pipe is running full, this is not essential. 3. The vertical lift on the suction end of the siphon should not much exceed 75 or 80 per cent. of the height of water column the atmosphere will support. 4. Where the fall of the discharge end of the siphon exceeds the height of water column supported by atmospheric pressure, it is necessary to so proportion the diameters of the discharge and suction ends, that the flow of water from the summit to the discharge under gravity, will not exceed the flow from the supply basin to the summit under atmospheric pressure. When these conditions are fulfilled, it is unnecessary to throttle the discharge of the siphon to prevent the pipe from emptying itself. 5. There is frequently a tendency of the air contained in the water to accumulate at the summit of the pipe, especially if the pipe is not running full. It is then necessary to arrange an air-trap at the summit to draw off this air as it accumulates.

Ques.—How much greater load will a crossbar 8 in. wide and 12 in. in depth, 8 ft. long, sustain than one of the same width and length but 10 in. in depth?

Ans.—For rectangular beams, the maximum possible load varies as the square of the depth of the beam; in other words, the ratio of the load supported varies as the square of the depth ratio. Therefore, for the same width of beam and length of span, a beam 10 in. in depth will support $(\frac{10}{8})^2 = (\frac{5}{4})^2 = \frac{25}{16} = 1\frac{9}{16}$ times the load that a beam 8 in. in depth will support.

Coal and Coke News

Washington, D. C.

Independent coal mine operators in Colorado have made it known that they would issue from time to time statements concerning the situation in the coal mining section of that state in order that there may be no misunderstanding on the part of the public, and no tendency to regard the issue as confined entirely to the Colorado Fuel & Iron Co. In their first official statement the independent operators including about a dozen in all, take sharp issue with the statements that have been disseminated by the United Mine Workers and assert that the only issue at stake is the question of law and order and the right of individuals to work as they find opportunity therefor. In summarizing their position the independent mine owners say:

There are today employed by the owners of coal mines in this state more than 10,000 men. They and their wives and children live in villages many of which have sustained the rifle fire of about 1500 members of the United Mine Workers of America.

We cannot remove our mines to other places, and we will not, unless forced to do so, close them at the behest of a comparatively few members of a lawless organization and set adrift the loyal employees now upon our payrolls.

If the 2000 members of the organization now militant in this state do not care to work in our mines, it is their privilege to decline to do so and go elsewhere into fields where there are conditions more to their liking; and the officers of the organization to which they belong will once and for all settle the unrest which prevails here if they will expend some small portion of their funds to remove their dissatisfied members from this field instead of further increasing their lavish expenditure in the promotion of strife and bloodshed.

The issue in Colorado has ceased to be, if it ever was, one between capital and labor. In our judgment no question of the rights of organized labor is now involved.

By the use of the vicious checkoff system, the leaders of the United Mine Workers of America have coerced thousands of industrious and law-abiding citizens into joining their organization, and these leaders, by precept and example, have converted these men into enemies of organized government.

This organization, by force of numbers, by its control of labor, and by virtue of the millions of dollars forcibly collected from its members, has become so powerful that its leaders are now defying organized society to thwart its plan, to rule or ruin.

By their criminal acts the leaders of the United Mine Workers of America have forfeited any claim that organization may ever have had to be considered a labor union, and have foreclosed any right it may ever have possessed as a pretended labor union, to demand that we have business dealings with it.

There has been great misunderstanding in Congress with reference to the actual position assumed by the operators as well as with reference to the Colorado situation in general, and it is believed that the statements which the operators are planning to issue will prove of considerable service in clarifying the minds of many legislators.

Oil Land Controversy Settled

The long contested issue between the transcontinental railroads and the government with reference to oil lands was settled by the Supreme Court in a decision handed down on June 22 in which the view was taken that patents held by the transcontinental railroads could not be set aside by other claimants merely because of their mineral value but could only be altered through a direct attack by the government if at all while the view was taken that the limitation of the time at which the government could take exception to the patent was in the 1900 or 1901.

In handing down a decision in the case, Justice Vandervanter expressed the opinion that in all previous cases of the same kind the Court had held that where law requires that only mineral or homestead lands are to be granted by the land officials such officials must do their full duty by ascertaining whether the land granted came within the law at the time and could not do it by inserting the provision that if the land should later prove not to be within the law the title should not be transferred.

This was practically the attitude taken by the attorneys for the roads, they having urged that it was too late now to introduce testimony as to the character of the lands when as a matter of fact that character was passed upon at the time when the grants were actually made.

The decision is expected to dispose of the controversy with reference to the large volume of oil lands said to be worth $700,000,000 which have been held by the roads but whose title has been contested by various persons on the ground that the finding of oil made the lands mineral in their nature, and hence not properly patented at the time the railroads took title to them. The roads have claimed that the oil deposits did not constitute the lands "mineral" lands and further alleged that in any event the title that they had acquired could not be attacked. In a statement immediately given out on behalf of the Southern Pacific Ry. as soon as the decision was rendered the following assertions were made:

The suit decided by the Supreme Court, today, involved the validity of patents issued to the Southern Pacific under a certain land grant or grants from the United States Government. It was claimed that the discovery of oil on the lands covered by the patents voided such patents and put an end to the Southern Pacific's title to the lands. The main grounds for this contention were:

1. That oil was a mineral;
2. That the patents contained a reservation that they should not cover mineral lands;
3. That by accepting patents with such mineral reservation clause therein the Southern Pacific was stopped from questioning the validity or effect of such reservation.

The Supreme Court has decided that the mineral reservations of our patents are void; that the Secretary of the Interior had no right to insert the same; and that the railroad company was not responsible for the presence of such reservations in the patents, and was, therefore, not bound by them. The Court further declared that it was the duty of the Secretary of the Interior to investigate and come to a conclusion as to whether the lands to which patents were applied for were mineral, and that, having reached a conclusion, it was the duty of the Government to issue a patent or to refuse to issue a patent.

Having issued the patent in question, the Court held that, in the absence of fraud, the patents did not become void by reason of the subsequent discovery of minerals on the lands.

HARRISBURG, PENN.

A decision of far-reaching importance in the anthracite coal regions was made by Judge P. A. O'Boyle of Luzerne County, on June 18, when he announced that he would grant the preliminary injunction asked for by the residents of Plymouth against the Plymouth Coal Co. to restrain that corporation from continuing operations under the streets of the town. The question of granting this injunction has been up before the court for over three weeks and there have been arguments on the matter continually for this time.

The decision of the Court is along the lines of the provisions contained in the Davis mine cave bill passed by the last legislature which made it unlawful for any coal corporation to remove the support of a public thoroughfare. Actions similar to the one that has been heard during the past several weeks have been started by property owners in Lackawanna and other counties in the hard-coal regions.

The preliminary injunction will become effective as soon as the borough has filed a bond in the sum of $10,000. The injunction will be argued before the court sitting en banc on June 29. The bond to be furnished by the borough of Plymouth is to protect the coal company from damages. An area of virgin coal in the Lance vein is practically the only portion of the mine in which operations will be possible in the event that the final decree is granted.

This question is one of great importance to every anthracite community. If the coal company can be prohibited from mining under the highways and public buildings because of the danger of surface settling, a great deal of adjoining property will also be protected because of the danger of lateral sliding from under the streets and public buildings.

If the rights of the mining companies are paramount to the welfare of the public, because of the money they have paid for the coal and the contracts they have entered into then the public can have no relief. If the safety of the thoroughfare and the public buildings and the pipes of public service corporations can be secured notwithstanding the losses which the coal companies would incur by a suspension of operations, then the public interests can be safeguarded in part at least. The final decision will have a most important bearing upon the whole mine-cave problem.

PENNSYLVANIA

Anthracite

Wilkes-Barre—Five hundred employees at the Maxwell colliery of the Lehigh & Wilkes Barre Coal Co. went on strike recently, because a driver boy was discharged for killing a mine mule. The company officials claim the boy was negligent.

Deductions granted the Pennsylvania, Delaware & Hudson and the Hillside Coal & Iron companies for coal mined during the year, 1913, have made a total decrease in the county valuation for 1914 of over one million dollars. Next year all municipalities underlaid with coal will suffer great reductions as many large companies will be allowed for the coal mined during two years. While the values of surface property and buildings are constantly increasing, that of coal will decrease from year to year. This will soon be keenly felt in many municipalities.

The Board of Examiners for mine inspectors in Luzerne and Carbon Counties have announced that they will hold examinations for certificates as mine inspectors in the high-school building at Wilkes-Barre on July 6, 7 and 8, 1914.

There has been some question as to whether or not an examination would be held this year. Chief James E. Roderick, of the State Department of Mines, is of the opinion that no examination is necessary on account of the fact that there is no vacancy occurring this year in the office of inspector in the counties named. The court and the examiners, however, believe that an examination should be held in order to qualify candidates for any vacancy that may happen, and it has been decided to hold an examination at the time and place stated above.

Port Griffith—Walking into a pocket of gas with a naked lamp in the old workings of the Red Ash vein of the Hoyt shaft, Pennsylvania Coal Co., George Bradley, fireboss, and William Jefferey, mine foreman, were seriously burned on June 19. The accident happened as the two men were descending a pitch about 1000 ft. from the foot of the shaft. Bradley was walking ahead and caught the force of the explosion of the unexpected pocket of gas.

Scranton—With the leasing from the Scranton Coal Co. by the East Mountain Coal Co. of a tract of land on the East Mountain near No. 5, where the old Quinn breaker was located, plans for the erection of a modern breaker which will give employment to between 75 and 100 men are now complete.

The officers of the East Mountain Coal Co. are J. W. Sandercock, of Lake Ariel; W. Y. Moffatt, of Dunmore, and Alfred Harven, of Scranton.

Archbald—The Archbald Coal Co., on June 16, posted signs at the pay office stating that any man who did not report for work the next day would be discharged instantly. Every man was back on the job. As a result of the order hundreds of dollars have been kept from the saloons, it is said. For years it has been customary for miners and others employed around the collieries who drank intoxicants to take a day or two off to "sober up" after pay day. There will be no more "sobering" sessions at this colliery, they say.

Mt. Carmel—The Susquehanna Coal Co. following an inquiry into several accidents at the mines between here and Shamokin, discharged six employees on June 18, whe were held responsible. It was said they were under the influence of liquor. Notice was served that hereafter all men found intoxicated in and around the workings would be discharged.

Mahanoy City—Joseph Witamanski, John Montsavage and Jenkin Jarlavis, of this place, on June 16, pleaded guilty to perjury in efforts to fraudulently obtain miners' certificates and were sent to jail for nine months.

Bituminous

Johnstown—Two men were killed and eight injured as the result of a cave-in in the Quemahoning mine on June 20. All of the injured were Hungarians. The Quemahoning Coal Co. mined a special grade of bituminous coal used largely in the United States Navy.

Kittanning—The location of at least one of the several new mines, which the Shawmut R.R. will open between Kittanning and Freeport has been selected. This will be at Logansport where several openings will be made. Other openings have been decided upon, but the exact place where these will be made has not been fixed. It is said that the new Shawmut extension will be completed to Freeport, and coal will be shipped from several of the proposed new mines by the time snow flies.

WEST VIRGINIA

Charleston—The recommendations of the Conciliation Board appointed by the Secretary of Labor of the United States were accepted and approved at a meeting of operators on June 20. It is assumed that, under the terms of the recommendations, the miners will resume work at once while the terms of settlement have been submitted to a referendum vote to be taken not later than June 25.

The Hickory Ash Coal Co., employing 200 men on Coal River and the Standard Kanawha Coal Co., on Elk River, both independent of the operators' association, have signed contracts with the miners' organization granting the check-off.

The West Virginia Federation of Labor has asked by a resolution adopted unanimously that Governor H. D. Hatfield appoint a commission to revise the mining laws of West Virginia and to report a bill for enactment by the General Assembly.

Fayetteville—The annual report of the New River Co., which has just been made to the stockholders, shows a deficit of $57,421 for the operations ending March 31. The deficit for the preceding year was $211,914. Labor troubles and uncertainty of market conditions prevented the company from earning a profit on the year's business.

ALABAMA

Birmingham—Coal operators and officials of railroads operating into Birmingham will hold a conference within the next few weeks to discuss the question of freight rates. This question has been up for consideration several times, but no satisfactory settlement has ever been made. The matter will be fully discussed at the meeting, and it is expected that some agreement will be reached.

Bessemer—News from the coal mining districts shows more activity than for some months. The mines of the Woodward Iron Co., at Dolomite, are reported to be working five days per week, getting out coal for the new furnace that is expected to be blown in shortly. Reports from Blue Creek also, and further down the Mineral R.R. show mines active, working good forces and getting out more coal than for some time. Optimism prevails among coal men so far as the last half of the year is concerned.

KENTUCKY

Hemphill—The first train over the Yount's Fork branch of the Louisville & Nashville R.R. was run last week, from Neon into Hemphill, a new city in the Letcher County coal field of the Elkhorn Mining Corporation. The Potter's fork branch of the railroad, which will run into Haymond, another new city of the same mining company, is practically completed and trains will start running over it very shortly.

Louisville—Business conditions are expected to respond in a measure in Kentucky to the settlement of the differences between the state authorities and the foreign fire-insurance companies, which withdrew from the state after the passage of the Green-Glenn law by the last legislature. Negotiations had been deadlocked for some months until the business interests of the state led by the Manufacturers' & Shippers' Association, took a hand in working for a settlement. The Green-Glenn bill will not be enforced and concessions were made by both sides, while a committee will attempt between now and the sitting of the next legislature to frame an adequate insurance law which will be acceptable to all interests.

OHIO

Martins Ferry—The third fire to occur at the Barton Coal Co.'s mine in two months destroyed the fan house on June 18. The origin of the fire is unknown, but it is believed that an electric spark may have started it. Work of reconstruction was immediately started, so that the mine could be kept ventilated and ready for use in case a wage scale agreement is signed. It is expected that a new fan will be installed.

Columbus—Nothing of consequence was accomplished at the three days' conference of operators and miners in Columbus last week. Both sides appeared firm in their original demands, and as a consequence, no disposition to compromise was shown. After the vain wrangling of three days the conference adjourned Friday, June 19, to meet again Tuesday, June 23.

Wadsworth—The James Coal Co., which was recently organized has started to open a mine on the Harpley farm, located near Wadsworth in Medina County. The leases on the land has been held for six years by George C. White and Perry Winkleman.

INDIANA

Terre Haute—A strike of the 2500 miners employed in the strip pits in this vicinity was called by the United Mine Workers to take effect Saturday evening, June 20. This is the result of the break in negotiation for a new scale which recently took place at the joint meeting of the miners and operators.

When the Sugar Valley Coal Co. refused to reinstate B. J. Hixson, an engineer at the National mine, 100 miners quit work.

Linton—The Froschner Coal Co. has opened a stripping plant at Vicksburg in this field.

ILLINOIS

Herrin—One of the largest coal sales in mining properties recorded in recent years is that of the purchase by the Taylor Coal Co., of this place of the properties of the Southern Illinois Coal & Coke Co. The properties consist of three mines: Possum Ridge on the Williamson-Franklin County line, Oak Ridge, between Herrin and Johnston City, and Hemlock mine south of Herrin, approximating 2000 acres of coal rights. The Southern Illinois Coal & Coke Co. has had a somewhat checkered career, it being organized several years ago by T. R. Trundle, who succeeded in interesting Eastern capital. There have been many changes since that time in the management, but in the past few years Wm. M. Wood and W. J. Jepson, of Boston, have been active in its control. During the past winter squeezes at the Oak Ridge mine put it out of commission, and then the general depression of the coal trade brought about a feeling on the part of Eastern capitalists to dispose of the property. This will make five mines controlled by the Taylor Coal Co., all in and around Herrin.

Seatonville—It is stated that the Seatonville mine which has lain idle for ten months is soon to be reopened and operations commenced upon a considerable scale. Much cleaning up and preparation will be necessary, as a considerable amount of rock has fallen in, and the roadways have gotten into bad shape.

MISSOURI

Kansas City—Little headway had been made by the scale committees of the Southwestern Interstate Coal Operators' Association and Districts Nos. 14, 21 and 25 of the United Mine Workers of America, up to June 20. The stumbling block to negotiations was Section 1, covering arbitration. Each side eventually appointed a subcommittee of three men to reach an agreement on this question.

Appleton City—W. H. Fox and associates, who recently began an operation on the Charles Hunt farm near Appleton City, have begun selling coal in that section. About 25 tons is being mined daily. This output is being absorbed by threshermen.

Columbia—W. P. Moore and James Hudson have purchased the Ballenger farm for $9500, and will sink an operation.

KANSAS

Pittsburg—Eight hundred miners who had been on strike at the mines of the Crowe Coal Co., returned to work recently, a satisfactory settlement of the differences between the miners and operators having been reached.

Leavenworth—Neyle Fish, one of the receivers for the Home mine, recently destroyed by fire, announced that Eastern capitalists who recently inspected the mine were favorably impressed and probably will rebuild the plant at a cost of $100,000. Concrete buildings and electrical equipment throughout is proposed.

Columbus—A vein of coal was discovered on the George Hood farm near Columbus on June 17. Drilling will continue to determine the extent of the field.

ARKANSAS

Fort Smith—Peter Stewart, of McAlester, Okla., president of that district of the U. M. W. of A., with five others, has been cited to appear in the United States Court July 1 to show cause why he should not be prosecuted for contempt of court. The citation grows out of an alleged violation of an injunction granted the Mammoth Vein Coal Co. for its mine at Prairie Creek as a resnlt of the recent strike there. The defendants are charged with attacking and intimidating non-union miners.

OKLAHOMA

Gowen—The Kala-Inla mine at Gowen, Okla., has been sold by the Bache-Denman Coal Co. to A. G. Lunt. of New York, who is said to represent Eastern financiers. This operation was opened 10 years ago and has a capacity of 600 tons. It is electrically operated, and was the only mine owned by the Bache-Denman company in the Oklahoma district.

WYOMING

Centennial—Alleging fraud in obtaining title, the government recently instituted suit against the Northern Colorado Coal Co. for the possession of coal lands in North Park valued at $1,500,000. Illegality and the use of dummy entrymen will be charged by the government. Seven hundred acres of the company's holdings are not affected by this litigation.

Cumberland—The boiler house at Cumberland No. 1 was recently burned together with all the machinery contained therein. It is believed that this fire originated through spontaneous combustion, and although the fire department did good work, it had all it could do to save the tipple and engine house which were close by.

FOREIGN NEWS

Berlin, Germany—It is alleged that the coal syndicate, with the government as one of the partners, has not yet been renewed, and may not be. Its members include also iron and steel firms, and it is in the finished steel industry that dissension has appeared.

Swansea, Wales—After a night of panic above ground during which men and women prayed fervently and sang hymns, 200 miners entombed in the North Hamman colliery, near Tawdor, were liberated June 16. The men were caught by a cave-in, but all were safely rescued.

Christiania, Norway—An international conference, unique in history, was recently convened at Christiana with delegates from the United States and Russia, Norway, and other European countries in order to frame a government for the Spitzbergen Islands. Although these islands have been known to the rest of the world for centuries, it was not until within recent years that the coal deposits upon them were discovered and have started to be worked. The American interests now controlled by a Boston corporation are said to have about $750,000 there invested. There appears to be no precedent in history for the assembly of an international congress to formulate a government for a land over which no nation claims sovereignty.

PERSONALS

J. O. MacIntosh has been admitted to the firm of Renshaw & Co., coal shippers in the Land Title Building, Philadelphia.

Robert McCune on June 17 at Colorado Springs. Colo. was married to Mary Bateman Bothwell. The couple will make their home in Dawson, N. Mexico.

H. C. Hamilton, a banker of Girard, Ill., has been appointed receiver for the Farmersville Coal Co. The liabilities of this firm are placed at $30,000, while the assets are undetermined.

Hugh Ike Shott and Edward Cooper, both of Mercer County have announced their candidacy for congress from the Fifth District of West Virginia. Shott is the editor of the Bluefield Daily Telegraph, while Cooper is a coal operator of Bramwell. The primary will be held on Saturday, July 18.

William Watts, superintendent of the Banning-Connellsville Coke Co., has designed a new head for the covington coke extractor which is said to be more efficient in cleaning the oven and prevents breakage. He is now working on a device to prevent breakage in the passage of the coke from the conveyor to the car.

Thomas O'Brien, who has held the position of inside foreman at the Twin Shaft of the Lehigh Valley Coal Co.'s Seneca colliery, for the past nine years, has tendered his resignation to take effect June 30. His successor has not yet been appointed, but will probably be announced in a few days. Other changes in the inside officials of the Twin Shaft are said to be pending.

OBITUARY

Jesse Hilles, at one time head of the coal firm of Hilles, Boyd & Co., for many years sole representatives of the coal interests of the Pennsylvania R.R., died at Govans, near Baltimore, recently. He retired from business when his firm was absorbed by the coal department of the Pennsylvania in 1904.

George D. Whitcomb, the founder of the Geo. D. Whitcomb Co., died in California on Sunday, June 21. Mr. Whitcomb has been retired for a number of years and has lived at his home at Glendora, Los Angeles County, California. He was born in 1834, therefore, was in his eightieth year. He developed the "Harrison mining machine," which was the first successful mining machine of the puncher type put on the market and has been more or less identified with the mining trade, first as an operator, afterward as manufacturer of mining machines, for a great many years and has many friends among the older operators.

TRADE CATALOGS

H. K. Porter Co., Pittsburgh, Penn. "Modern Compressed-Air Locomotives." Pamphlet of 80 pp., 6x9 in., with many illustrations, tables, etc.

Schaum & Uhlinger, Philadelphia, Penn. "Centrifugal Extraction." Pamphlet of 44 pp., 6x9 in., illustrating and describing centrifugal extractors for various industries.

The Hazard Manufacturing Co., Wilkes-Barre, Penn. Price List No. 54 "Hazard Rubber Covered Wires and Cables." Twenty Seven pages, 3½x6¼ in. unillustrated. Sent free on request.

The Laidlow-Dunn-Gordon Co., Cincinnati, Ohio. Bulletin L-523-A "Cincinnati Gear Duplex Corliss Steam Driven Air Compressors." Twenty-three pages, 6x9 in., illustrating and describing class W A and X A compressors.

The Streeter-Armet Weighing & Recording Co., Chicago, Ill. Bulletin No. 2-A. "Descriptive Circular of Automatic Weight Recorders." Seven pages 8½x11 in. illustrating and describing "the application of automatic weight recording devices as applied to weighing miners coal, low grade ores or other commodities in pit cars or in trolley or stationary weigh hoppers, etc."

CONSTRUCTION NEWS

Mater, Ky.—It is announced that the Elkhorn Coal Co. here will be ready to begin shipping coal on July 15. The building operations of the company are getting well under way.

Scottdale, Penn.—The Scottdale Machine & Mfg. Co. recently secured a contract from the Conemaugh Smokeless Coal Co. for tipple, cages, head sheaves, etc., to be erected on its property at Seward Station, Penn.

Whitesburg, Ky.—A new mining town is being laid off and constructed about midway between Jenkins and Burdine, in the Elkhorn Creek coal fields. The name of the new settlement is Keithly. A considerable number of buildings is under construction.

Birmingham, Ala.—Orders have been placed and the material is now on the way with which to rebuild the coal benches in the gas plant of the Birmingham Railway, Light & Power Co. The rebuilding of these coal benches is the initial step in the complete remodeling of the gas plant.

Superior, Wis.—It has been officially announced that the Northwestern Fuel Co. will rebuild its big coal unloading rig on Dock No. 1, the work of construction to begin within two weeks. The new work will be in charge of the Heyl & Patterson Co. and will cost somewhat over $100,000. The new bridge will be ready for operation within three months.

Youngstown, Ohio—George W. Caldwell, president of the Caldwell Construction Co., who has the contract for the building of the line of the Lake Erie & Youngstown R.R., announces that the road will be constructed despite protests of financial interests. The construction of the line will mean an outlay of $4,500,000, of which two-thirds has been underwritten.

Birmingham, Ala.—In order to encourage water traffic in Alabama and to adequately serve its patrons in Mobile, it has been announced that the Pratt Consolidated Coal Co. will open some mines on the Warrior River, 8 miles from Tuscaloosa. Investigations are now being made to ascertain the best location for development on the river, which development will be started soon.

NEW INCORPORATIONS

Columbus, Ohio—Papers have been filed by the Pomeroy Coal Co., of Columbus, reducing the authorized capital from $50,000 to $5000.

Little Rock, Ark.—The Arkansas Coal & Mining Co., with Jesse Edwards as president, has increased its capital stock from $1000 to $10,000.

Boonville, Ind.—The Crow Creek Coal & Mining Co. has been incorporated here, with $15,000 capital stock. The directors are William Gough, O. M. Baldwin and L. Gough.

Columbus, O.—The Maple Hill Coal Co. has been organized for the purpose of mining coal. The capitalization is $25,000, and the incorporators are M. L. Phelps, T. C. Collins, H. G. Morse, G. I. Rose, and B. S. Morten.

Akron, Ohio—The Kimbolton Coal Mining Co. has been incorporated with a capital stock of $600,000, for the purpose of dealing in coal lands and similar properties. The incorporators are W. M. Graham, Harley J. Mots, Frank Schreider, T. C. Woodward and C. F. Schnee.

Somerset, Penn.—The Arrow Coal Mining Co. capitalized at $50,000, has been organized with William Gahagen as president, and Harry Gahagen as vice-president. The town of Arrow now consists of 57 dwelling houses, a church and a school house, but it is planned to erect possibly 100 more dwellings.

INDUSTRIAL NEWS

Nevada, Kan.—Throgmartin & Gardner, drilling five miles southwest of Nevada, struck a 4-ft. vein of coal at a depth of 400 ft. The property will be developed.

Columbus, Ohio—Permission has been granted by the Ohio Utilities Commission for the Kanawha & Michigan R.R. Co., to issue trust certificates in the sum of $1,200,000 to purchase 1160 steel Gondola cars.

Roundup, Mont.—J. H. Price & Sons, of Pittsburg, Kan., on July 1, expects to begin sinking a 200-ft. shaft for the Roundup Coal & Mining Co., a subsidiary of the Sheridan Coal Co. Several Kansas operators wish to inspect the Montana field.

Toledo, Ohio—The first cargo, a large freighter loaded with 2000 tons of coal, cleared from the new Hocking Valley docks at Toledo last week. These docks are of concrete and were erected at a cost of $2,000,000, being equipped with loading machinery of the latest approved pattern.

Baltimore, Md.—The Interstate Commerce Commission, acting on protest, has changed the date of operation of the 7c. increase on coal shipments inside the Capes from June 20 to Oct. 18. A hearing will be held to give both sides a chance to present the case before the latter date.

Harrisburg, Penn.—Complaint has been filed with the Public Service Commission, by the Eddystone Manufacturing Co., against the New York Central and the Reading railways contending discrimination in a tariff which became effective on June 20. The tariff increased the rate on bituminous coal to Port Richmond for harbor delivery.

Knoxville, Tenn.—Coal operators of eastern Tennessee and Kentucky await with interest the action of the Interstate Commerce Commission on the question of eliminating and reducing differentials on coal from the southwest Virginia mines to points in the Carolinas and Georgia. Officials of the Clinchfield, Carolina & Ohio R.R. have asked that certain differentials be eliminated.

Sellersville, Penn.—A vein of anthracite was struck by Elmer Stear, a farmer in Blooming Glen, near Sellersville, while plowing his land. A specimen was taken to J. G. Moyer's Sons Co., at Perkasie, who pronounced the discovery a fine grade of anthracite. A mining expert examined the coal and gave as his opinion that the lower stratum is richer still.

Chicago, Ill.—The interest on the Chicago & Indiana Coal Ry.'s 5 per cent. bonds due in 1936, has been defaulted. This railway is part of the Chicago & Eastern Illinois, the receivers of which have declared in a petition to the court that they have no money with which to pay the interest, and that a default would have to be made resulting in foreclosure of the mortgage, as well as a technical separation of the two properties.

Monongahela, Penn.—Coal men in the Monongahela Valley are prepared for a good coal trade during the coming month. The first shipment of Monongahela Valley coal to Panama is on its way south by way of the Ohio and Mississippi Rivers to New Orleans. For months, coal men of western Pennsylvania, Ohio and West Virginia, have been preparing for the opening of the Panama coal trade.

Columbus, Ohio—For the burning of its Perry County mine in June, 1912, the Rock Run Coal Co. recently secured an $8000 damage verdict against the Chartiers Oil Co. in Judge Kinkheads court. The coal company sought $50,000. It was alleged that oil from the Chartiers wells had percolated into the mine of the Rock Run company, making it inflammable, that when miners blasted the coal was ignited and the entire mine consumed.

Coal Trade Reviews

General Review

Anthracite rounds out the month in better form than anticipated. Eastern bituminous market at the lowest point for a long time. Situation at interior points picking up under the influence of the large crops and the long suspension in Ohio.

The anthracite movement for the month has been heavier than anticipated. The business carried over from May developed to unexpected proportions and the market is rounding out the current month in good form with some orders going over into July. The large companies, holding rigidly to their circular quotations, are, of course, experiencing difficulty in moving certain sizes which are in long supply. The heavier movement in the Lake trade is tending to relieve the pressure to a certain extent. While the customary summer lethargy is anticipated during the next two months, there is a generally hopeful feeling in the trade, and the opinions are freely advanced that the fall activity will set in earlier than usual.

On the Atlantic Seaboard, the various distributing centers are still flooded with bituminous coal, while even the scattering orders of a few weeks ago have disapeared. Further recessions and discouraging reversals have been the rule during the week, leaving the market in the poorest shape for a long time. With an excessive amount of coal on hand at Hampton Roads, the demand slack and the movement confined almost entirely to contract business, the outlook is not encouraging at the moment. Nominal prices are still asked, but concessions are readily obtainable. The most encouraging feature in the situation is the absence of demurrage coal, indicating that tonnages are closely held.

The manufacturing demand in the Pittsburgh district is on the increase, while a continued heavy movement into the Lake trade is keeping operations relatively active and on about 75% the nominal capacity; prices are weak in the spot market, heavy cuts being reported in some instances, but on contracts the full circular quotations are generally obtained. The complete deadlock at the wage-scale conference in Ohio last week has again thrown the trade there into a general uncertainty. Even though an agreement is reached shortly, it will require so much time to reconstruct the tipples in order to comply with the requirements of the new screen law, that it is clear the Ohio mines will not be much of a factor in the Lake trade this season. The elimination of the three million tons per month produced in the Ohio fields is undoubtedly creating a shortage in those markets, by which the adjoining districts are materially benefited.

In the Southern markets the poorer qualities are in excess supply and rather difficult to move, but the better grades are showing an improved undertone, even occasionally being reported in short supply. Restriction in mining operations is still the rule, although shipments to the gulf ports are showing up well.

The crop movement and the long suspension in Ohio are beginning to have their effects on the Middle Western situation where a gratifying improvement is noted. The opinion is general that the low point of the trade has been turned, and, although mining operations are still irregular, sacrifice prices are by no means so much in evidence.

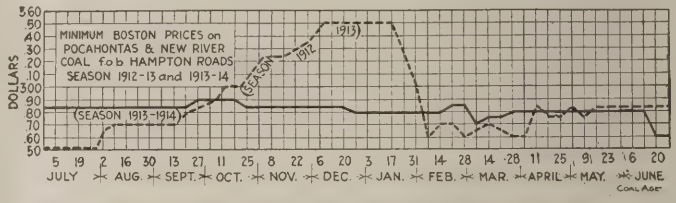
ATLANTIC SEABOARD

BOSTON

Market listless with almost no redeeming features. Prices weak and coal still accumulating at every port. Pennsylvania operators shade quotations under pressure, but Georges Creek remains steady. Anthracite deliveries slowing up.

Bituminous—The trade is at low ebb. The Pocahontas and New River situation continues weak and while fairly strong prices were submitted to the Government for deliveries extending through the season, it is recognized that the spot market is still soft and in control of the buyers. The various New England tidewater distributing points are still glutted with consignment coal and sales are extremely hard to make. More steam colliers and sailing vessels have been laid up the past week because of the slack conditions; coal is standing in as large volume as at any time thus far, at practically all the loading piers. Where a fortnight ago there were scattering orders coming in, the market now is at a standstill and almost no sales are reported.

In addition to the already accumulated tonnage to be moved from Hampton Roads there develops an extra supply of slack coal, due to a slightly better demand from the West for prepared sizes. The market price of run-of-mine, however, is so frankly at a basis well down to $2.60 f.o.b. that a small differential less will hardly induce orders for slack. It would be hard to imagine a duller market than we are now going through.



On the Pennsylvania grades there is little that is new. A few orders dribble through to the different operators, but the movement to this territory is very light. Water freights on anthracite transportation, ordinarily diverted at this time to bituminous, are kept at so high a range from Philadelphia to Boston that consumers are either chartering transportation outside at market rates or are accepting deliveries only as they are absolutely required.

Georges Creek continues to come forward with the usual regularity, but the movement of this grade is confined almost exclusively to contract business. The shippers are still able to hold their season f.o.b. price on this grade, the only steam coal in the market of which such a statement could be made.

Anthracite—Domestic sizes are not coming forward as freely as was expected. The orders that held over into June were understood to be light, but at this writing most of the companies are a week or two behind on deliveries. Stove is still in shortest supply. June was expected to be a dull month, but now there is a good chance that there will be some business to carry over for July shipment.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$0.90@1.40	$1.10@1.55	$1.67@1.77	
Philadelphia*	2.15@2.65	2.35@2.80	2.92@3.02	
New York*	2.45@2.95	2.65@3.15	3.22@3.32	
Baltimore*	.....	.....	2.85@2.95	
Hampton Roads*	.....	.....	.....	$2.60@2.85
Boston†	.....	.....	.....	3.35@3.63
Providence†	.....	.....	.....	3.25@3.63

* F.o.b. †On cars.

NEW YORK

Tidewater situation duller than for a long time. Further price recession on the lower grades. Anthracite companies wind up the month with a heavier production than anticipated. General restriction expected in July.

Bituminous—The soft-coal trade during the past week has been the poorest for a long time. It has been a series of further recessions and discouraging reversals with the operators. Production in the Pennsylvania regions shipping this market was down to 40% capacity or even less. The Berwind-White Co. continues working under curtailed operations, and conditions in the bunkering and steamer trade generally have seldom been duller many vessels having been laying here for two and three months awaiting cargo.

Perhaps one of the most encouraging features in the market is the fact that there appears to be little or no coal on demurrage. This indicates a determination on the part of the operators to hold tonnage closely and close down when consumers refuse to meet their figures. A moderate increase in West Virginia gas-coal prices is also noted; this is due to a combination of causes, such as the exhaustion of surplus stocks in the hands of the consumers, a better demand in the West and Northwest, and to an incipient car shortage, which,

although not affecting operations as yet, is nevertheless causing serious apprehension over outlook this fall when the movement becomes heavy.

The better grade coals are still being firmly held at the regular circular, but the off qualities are suffering some recessions, and the market is now quotable on the following basis: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.55@2.65; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—About normal conditions prevail in the hard-coal trade. If anything the market seems to have held somewhat steadier than was anticipated early in the month, and it is now evident that all but a very few of the large companies will conclude the month under full-time operations. However, the outlook for next month is dubious. Even now prompt shipment can be obtained on practically any order placed, and it is clear that the current business is coming rapidly to a finish. So far, the Reading and the Susquehanna companies have been the only large operations to materially restrict production.

Stove coal, of course, still continues the leader, and there is little prospect that the mines will be able to completely satisfy the demand for this grade. Isolated cases are also reported of shortages in buckwheat, Nos. 1 and 2, but these are the exception rather than the rule. Chestnut is in long supply with considerable going into storage, and the same applies to the steam grades in general with the possible exception of the different sizes of buckwheat as already noted.

We quote the New York hard-coal market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$4.80	$4.60@4.80	$4.75	$4.55@4.75
Egg	5.05	4.95@5.05	5.00	5.00
Stove	5.05	5.05	5.00	4.85@5.00
Chestnut	5.30	5.15@5.30	5.25	5.00@5.25
Pea	3.55@3.60	3.30@3.55	3.45@3.50	3.25@3.50
Buckwheat	2.80	2.60@2.80	2.50@2.75	2.00@2.75
Rice	2.30	2.20@2.30	2.00@2.25	1.50@2.25
Barley	1.80	1.60@1.80	1.70@1.75	1.25@1.70

Water Freights—The "Journal of Commerce and Commercial Bulletin" reports the situation in water freight as follows: The full cargo steamer market was steady and unchanged, and a fair amount of business was reported in chartering, including two large carriers for government coal from the Atlantic range to Cavite, P. I., one for July loading, the other for September. South America and long voyage freights continue to offer sparingly. Rates hold fairly well in all trades, with owners asking an advance in some instances. The sail tonnage market shows no signs of improvement, the demand being exceptionally light.

PHILADELPHIA

Practically no change in the anthracite situation. Production still continues fairly large. Better feeling in bituminous.. Demand improving but prices on about parity with last week.

Anthracite—The close of this week finds the anthracite trade rapidly approaching mid-summer dullness. Notwithstanding the curtailment of mining, however, there is a very appreciable tonnage moving. Shipments to the Lakes are comparatively heavy, although not as great as the corresponding period of last year. The line and local trade is very dull, with demand centering mostly on stove size. Of course, this is applicable to the large companies; individuals are having no trouble in moving their output, but at greatly reduced figures.

All sizes, with the possible exception of stove, are quoted at considerably less than the circular and it is not expected that there will be any tone to the market during the succeeding two months, a situation not at all unusual at this season of the year. But there does appear to be a feeling that activity may be looked for earlier this year than usual. As a rule, the market remains in a depressed condition until well along into September, but many of the operators look for the latter part of August to show up well. New England business at Tidewater still continues in sufficient volume to keep the large fleets sailing from this port, well occupied, but it is understood that there is very little waiting to have requisitions filled.

Bituminous—There seems to be a slightly better feeling in bituminous. Stocks of coal at industrial establishments are slowly but surely dwindling, notwithstanding the fact that many of them are operating short time, and these concerns are now looking the market over. Solicitations to contract, however, are not met with any degree of warmth, the purchasing agents apparently feeling that they can do better on the open market, at the present time, than by tying themselves up to any specific figure.

BALTIMORE

Signs of activity to the Westward offer encouragement in spite of the slow local conditions. From time to time there is a little spurt. Anthracite men plug away on a fairly active call for household fuel.

While the soft coal market is generally dull there are indications of an awakening in the West that are encouraging to the trade as a whole. From spots in the Middle West as well as from points along the Lakes come inquiries for fuel in comparatively small amounts. There are no big closings and it is rather difficult to put a finger on the improvement as a whole, but there is apparently a somewhat more hopeful spirit.

Mine production is averaging not more than three or four days a week. The Northwest is being supplied largely by the Fairmont district of West Virginia and this has added a little strength there. Slack, that sold down to 50c. recently, was commanding as high as 60c. in some cases. Three-quarter gas remains steady at 85c. Little or no change is noted in the Pennsylvania market, prices holding about the same as for the past three weeks; the cheapest fuels are obtainable around 95c., medium grades at from $1.05 to $1.15 and best qualities at from $1.25 to $1.35.

Anthracite men keep plugging away locally apparently with fair success. The household trade for storage purposed is now about up to the June mark.

HAMPTON ROADS

Movements during week about normal. Government taking coal for stations on Pacific Coast and vessels in Mexican waters.

Dumpings for the past week average up well, although there have been days when little work was done at any of the piers. The demand still continues slack and it is believed that practically all coal moving has been on contract business. As is usually the case the heaviest shipments have been to New England with foreign cargoes to Naples, Venice, Brindisi, Vera Cruz, Havana, St. Lucia, Canal Zone, Montevideo, Port of Spain, Gibraltar and Santiago.

Coal has been loaded by the government for the naval stations at Mare Island and San Diego and, in addition to the coal for the Pacific Coast, two colliers have been loaded to supply vessels now stationed at Vera Cruz. Steamers for bunkers have arrived in fair numbers and it is believed that the movement so far this month is already in excess of the total for May.

Although the amount of coal on cars in the railway yards is still somewhat above normal, circular prices are still being quoted and so far as can be learned there is no prospect of any reduction being made. Present indications are that unless there is an extra-heavy arrival of vessels for cargoes this week the dumpings for the month of June will fall considerably behind the May figures.

LAKE MARKETS

PITTSBURGH

Mining operations unchanged. Lake movement fairly heavy. Manufacturing demand picking up slightly. Contracts being closed slowly. Prices somewhat irregular, particularly on prompt.

Coal production in the Pittsburgh district is at an estimated rate of about 75% of nominal capacity, though it is probably not two-thirds of what the district could mine and ship under pressure. The chief demand continues to be for the Lake trade, to which market the state of Ohio is contributing hardly anything since practically all the Ohio mines are still closed awaiting more light as to what can be done under the new Green law which provides for a mine-run basis of payment. Some lawyers express the opinion that operators could make individual contracts with miners providing for a screened-coal basis of payment. The state of Ohio is certainly suffering from the law, and it seems fairly safe to assert that Pennsylvania will never enact such a law.

Manufacturing demand for coal is picking up somewhat as the steel mills are running slightly better and stocks are now nearly exhausted. Many season contracts with manufacturers are not yet closed and negotiations are proceeding somewhat slowly. On contracts, regular open prices are shaded but little if at all, while on spot lots there are frequently large concessions, particularly for slack, which has sold down to 55c. at some points. Regular prices are: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

BUFFALO

The bituminous market is steady, but quiet. Mines running with much caution. Canadian market more quiet. Much complaint of West Virginia competition. Anthracite doing very little.

Bituminous—There is a slight stir in the trade among small consumers, who appear to be about out of coal, but the larger concerns are buying sparingly and will not come into the market for some weeks yet, as it is hard to say just what their running needs are. The sellers do not dare to allow any coal to accumulate on their hands as they are likely to have to dispose of it at a sacrifice. All reports from the Canadian market agree that the industrial situation there is still more quiet than it is here. Iron furnaces are doing little and other factories are by no means active. Money is scarce there, so that collections are difficult to make.

There is complaint that some of the West Virginia operators had much to do with spoiling the bituminous market of this district. There was an effort there to keep the mines running, so that the men would not scatter, and the coal had to be distributed over a wide territory and sold for what it would bring. The railroads are beginning to buy cars and will probably go into repair work, very extensively next month while the large crops are bound to stimulate business. If a fair percentage of the advance in freight rates is granted it will all contribute toward greater activity. The bituminous market is fairly steady, but only the best coal can be sold at quoted prices, which are: $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.15 for slack, with Allegheny Valley sizes from 15 to 25c. lower.

Anthracite—The demand for anthracite is down to the mid-summer level, so that the movement is confined to storage for the winter. City demand is normal, but they did not get an average amount of business early and that means a big rush next fall. Shipments by Lake continue to increase. One leading company is loading at full capacity and most of the others are active. The amount reported for the week was 171,000 tons. Some members of the trade think there will be more Lake coal shipped this month than there was last June.

TOLEDO

Market still flat but a few more inquiries are noted and a more optimistic feeling prevails. Active business anticipated when the crop movement gets under way. Lake shipping still relatively light as yet.

Despite the continued featureless condition of the local market, Toledo dealers continue optimistic. It is generally believed that despite the depression evident among business concerns of all kinds, the coal trade is bound to pick up shortly. Orders are already beginning to come in better than for some little time and inquiries denote a more healthy tone. The large crops will make an unusually heavy demand for threshing coal and it is believed that most of the factories will resume regular operations within a short time.

The railroads, of course, are not using their normal quota as many trains have been laid off altogether. The idle cars on all roads are said to be greatly in excess of last year due, in part, to the fact that the Lake shipments are much less. It is no uncommon thing to see large freighters tied up at the Toledo docks idly awaiting a cargo, while last year every boat that could be secured was pressed into the service. A few of the railroads have placed orders for freight cars, including a large number of coal cars, but it is not believed by coal men here that the roads can begin to handle the traffic when the crop movement starts. There are some who anticipate a car shortage as bad as anything in past history a little later in the season when rush orders for Up-Lake coal begin to come in. Steam and domestic coal will also be in good demand a little later in the season.

COLUMBUS

Another adjournment of the wage-scale conferences without any agreement. Increased demand and prices showing a strong rising tendency. Lake trade improving slightly.

The wage-scale conferences, under the auspices of Governor Cox proved a total failure and the meeting adjourned with the deadlock as complete as ever. Both sides refuse to make any concessions whatever and the outlook for a settlement is discouraging in the extreme.

An increase in the demand for coal was reported during the week. Steam users are now buying from West Virginia and prices, which were formerly extremely low, are advancing. West Virginia lump is quoted at about $1.35@1.45, while ¾-in. is sold at $1.20. Mine-run is selling around 85@90c. Slack and nut, and pea and slack are still quite low. Railroads are also buying considerable fuel, and in some cases they are confiscating cargoes on their lines.

There is also an increased demand for domestic grades and prices are ruling firm. Considerable West Virginia coal is being received. Dealers stocks appear to be sufficient for current orders.

The Lake Trade is showing more activity, although there are many drawbacks. Considerable West Virginia coal is being shipped through Ohio to the Northwest.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.50@$1.40		$1.50@$1.40	$1.50@$1.40
¾-inch	1.35@ 1.30	$1.20@$1.15	1.35@ 1.30	1.30@ 1.25
Nut	1.30@ 1.25		1.25@ 1.20	1.25@ 1.20
Mine-run	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.05
Nut, pea and slack	0.85@ 0.80		0.85@ 0.80	0.80@ 0.75
Coarse slack	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.65

CLEVELAND

Quotations for August delivery at low figures, even for current business. The Lake trade is showing signs of curtailment.

Youghiogheny operators have sold slack as low as 55c. for delivery during August making the price here $1.55 which is the same as current quotations. This competition has compelled Fairmount operators to quote slack at 40c. As the freight rate from the Fairmount field to Cleveland is $1.15, the West Virginia gas coal comes into this market at $1.55 delivered.

Although another meeting of Ohio operators and miners will be held this week, the outlook is far from promising for an immediate settlement. The Ohio operators would have to meet the competition of the two states now fighting for the local business.

The Lakes are not offering an outlet of any consequence. The Upper Lake docks are loaded down with coal that is not being moved. The demand in the harvest fields has not started and until it does the Upper Lake docks will not be relieved. With the shipping of grain Lakeward, railroads will take coal West and will also increase their own consumption. The indications are for the largest crop in years and a big demand is expected from this source within thirty days. This northwestern trade is all the Upper Lake dock companies have to look forward to. The iron ore mines are working only part time or with reduced crews and are using less than half their normal amount of coal.

The vessel situation is so easy, boats are waiting at loading ports from three to five days. The congestion is serious, from the boat owners view, at Sandusky, Toledo and Lorain. At Toledo, Monday, the Hocking Valley loaded the first cargo over its new dock. It will use the dock the rest of the season which will relieve the congestion at that port to a certain extent.

Prices quoted this week for shipment are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump	$3.05		
Lump, 1¼-in.		$2.35	
Lump, ¾-in.		2.25	$2.00
Mine run	2.60	2.15	1.90
Egg	3.05		
Nut		2.20	
Slack	2.20@2.35	1.55	1.55

CINCINNATI

Conditions not improved, but the feeling is slightly better, due to the belief that there will be a serious shortage later. Indications are that buying in all quarters will soon improve.

Manufacturers still refrain from taking any large amount of steam fuel and operators find the same difficulty in disposing of their screenings; although the demand for the prepared grades is not what it should be, the total lack of a market for nut and slack is one of the worst features just now. The improved Lake Movement and an ample car supply have encouraged the trade considerably, and it is hoped that the Northern markets will have stored their usual supply before this immediate section begins to demand coal.

In fact, many large consumers and dealers alike are beginning to realize that the prolonged strike in the Ohio field and the curtailed production in West Virginia, is going to bring about a heavy shortage on the year's production. This feeling is already evident from the increased willingness to contract at good prices for deliveries later in the summer. The prospects for an early resumption of work in the Kanawha field have not altered this tendency, the general impression being that the production there will hardly be able to keep pace with the late summer demand. The caution with which operators are contracting for July and August deliveries is one of the best possible indications of a coming improvement.

DETROIT

Market steadier with a generally better undertone. Large crops expected to stimulate more business. Full circular prices the rule.

Bituminous—It is apparent that there are a number of influences now tending to strengthen the local market. These have not progressed sufficiently to have any material ef-

fect as yet, but there is a generally more optimistic feeling. One of the most important factors in the situation is the prospective improvement in railroad circles. In the event that the roads secure the advanced rates asked for, it is expected that a general improvement will result all along the line, together with a large increase in the fuel consumption.

UPPER LAKE PORTS

Duluth-Superior docks glutted with coal and little moving out. Beneficial effects of the large crops wiped out by the general pessimism in iron circles.

The coal docks at Duluth-Superior are loaded down. There is not a dock with any space and very little coal is going out. The iron country is pessimistic because the ore mines are practically at a standstill. Many of the open pits are not being worked and shaft mines are doing nothing except on special orders, which are few and small.

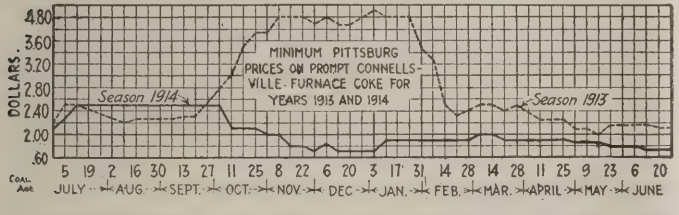
There is going to be good fall interior trade because the grain crop is abnormally large. The light demand for mining purposes is the principal drawback. Away from the iron country the feeling is much better. The crops look so good that people are quite hopeful and are not particularly worried over the future. This is true only among the farmers, the cities being pessimistic as a rule.

COKE

CONNELLSVILLE

Optimistic reports in the steel trade create a better undertone in coke. Prices steadier except on foundry coke.

A firmer attitude as to furnace coke prices is noted on the part of some operators, who seem to have become convinced within the past week that decidedly better times are in store for the iron and steel trade in the near future. There is less disposition than there was to shade $2 on furnace coke contracts, but prompt coke is as cheap as ever, being usually offered at $1.75 in limited quantities. An Eastern consumer is rumored to have purchased about 10,000 tons a month over second half at $2, purchasing a smaller tonnage of medium grade coke at a lower figure. As a rule negotiations on contracts proceed very slowly, and the majority of consumers not already covered will probably buy from hand to mouth after the close of this month.



Foundry coke prices have been sliding off. While two or three large operators still have an asking price of $2.65 there is hardly any prospect of their securing this figure, since at least one large interest making one of the most highly regarded cokes in the region has sold at $2.35 if not lower. Some indifferent brands are offered down to $2. The market is quotable as follows: Prompt furnace, $1.75@1.85; contract furnace, $1.85@2; prompt and contract foundry, $2.30@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ending June 13 at 259,615 tons, an increase of 16,006 tons, and shipments at 253,352 tons, a decrease of 1479 tons.

BUFFALO

There is a light movement of coke and a general dissatisfaction expressed with the trade. So much fault has been found with coke in recent years that the bituminous jobbers have quite often gone out of it. The seller found, as a rule, that he could dispose of two cars of coal while selling one of coke and the complaint would be less. Shippers hold that the difficulty is more often with the consumer than with the product of the ovens; one shipper states that he almost invariably had difficulty every time a customer changed foremen. The market is bound to be quiet till iron is more active, though the ovens are looking for something better in the fall. Quotations are fairly steady at $4.25 for best Connellsville foundry and $3.25 for stock coke. Domestic sizes are hardly quotable.

COLUMBUS

The coke trade is holding its own, despite the general business depression. The demand is not so heavy and shipments are not up to the usual figure.

BIRMINGHAM

Furnace and foundry coke remain quiet with scarsely anything doing. There are a number of small sales of pig iron and while the aggregate tonnage is not large, it is far ahead of the May business, with prices about the same.

CHICAGO

While dull conditions prevail in the hard-coke market, an improvement is hoped for after July 1. It is expected that prices will remain steady for several months. In anticipation of the fall rush there is more buying of byproduct cokes. The market is quotable as follows: Connellsville and Wise County, $5@5.25; byproduct egg, stove and nut, $4.65; gashouse, $4.25.

ST. LOUIS

There is some demand for coke, but it is purely in the local market. The market is quotable as follows: Gashouse, $4; byproduct, $4.75, both f.o.b. St. Louis.

SOUTHERN

LOUISVILLE

High-grade fuels much improved and occasionally in short supply. Off qualities heavy and difficult to move. Curtailed operations still general.

The local market has improved in the last week, so far as the high-grade steam coals are concerned, the supply not being equal to the demand. A recent search for two cars failed to produce that much of the quality required on the track anywhere in Kentucky. The demand for domestic sizes continues brisk in the Eastern field with the bulk of the shipments going to Northern and Northwestern points. Low-grade steam sizes go begging on the market and stocks are increasing rapidly at the mines and in the various yards. The railroads are not taking as much coal as could be wished and general industrial conditions have not improved to any appreciable extent.

BIRMINGHAM

Market on lump coal slightly off and steam coal quiet.

The market on lump coal is not quite as active as last week, the tonnage being lower due, probably to the extremely hot weather. Steam coal is moving slower this past week also, though shipments to the gulf ports is showing up well. Blacksmith coal is experiencing its usual summer depression.

MIDDLE WESTERN

INDIANAPOLIS

About normal June conditions prevail. No domestic coal moving, except shipments for threshers. Railroads the heaviest buyers of steam grades. Industrial demand not more than normal, if that. Indianapolis retailers have advanced prices 25c.

Conditions are not far from normal for this period. The demand for steam coal is not large. Several factories are closed as this is the season for overhauling machinery. The railroads seem to be taking as much coal as usual at this date and the crop moving season is at hand when their buying must increase. Working schedules at the mines are irregular, some companies doing better time than others. One of the largest has four of its seven mines on full time and the others on about half time. However, some mines belonging to all companies are running.

The fact that there is little or no market for Indiana domestic coals during the warm months naturally tends to restrict operations. It is no trouble to sell screenings, although premiums for this grade are scarce, due to competition from Pennsylvania and Virginia mines, which are working strong on domestic grades and have to find a market for screenings. These are reaching practically all parts of Indiana, but the freight rates makes it impossible to sell below Indiana prices. Were it not that over 50 per cent. of the railroads use 1¼-in. lump, the supply of Indiana slack would be much less than the demand.

CHICAGO

Improvement evident in the Chicago market. Quiet conditions prevail in anthracite, but the smokeless trade is strengthening. Hard-coke market dull. Slight improvement in byproduct coke.

It is generally agreed that the low point of the depression has arrived and that conditions will begin to improve shortly. Prospects for the future are better in every line and the coal market naturally must benefit from the general improvement. Sacrifice prices are not so much in evidence as during the previous weeks and the disposal of the tonnage is much easier.

Various reports concerning anthracite conditions and the volume of business are in circulation. Some companies report an increase while others are just the opposite. This might be explained by the fact that June is seldom a good anthracite month.

A cleaning up of demurrage coal in the splint market has effected an improvement. Conditions also are aided somewhat by the curtailment at the mines and the general market is firm. Until recently several Franklin County operators have been naming one price for all lump coal, but within the last week a change has become effective. Sales are made to retail dealers only and the circular price, in some cases $1.25, and in others $1.50 is obtained.

Screenings form the principal feature of the Springfield district, with the demand exceeding the supply. There is only fresh-mined coal to satisfy the demand, prices being about 90c. a ton for the ordinary qualities and $1 for the better grades.

Prevaling prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump	$2.07	$2.30@2.40	$2.12	
Steam lump	1.97		1.97	
Egg		2.30@2.40		$3.95
Mine-run	1.87	2.15@2.25	1.87	3.05@3.30
Screenings	1.62@1.67	1.95	1.62@1.67	

KANSAS CITY, MO.

Threshing on in full blast and the situation materially improved. Some competition developing with oil and gasoline.

Further improvement has been shown in the situation in Kansas City. The Kansas harvest is on in full force, and is responsible for a heavy movement of coal to the wheat fields. On the basis of one ton of coal to 50 acres of wheat, it is estimated that 175,000 tons will be required in Kansas alone. Missouri will take less than half of that amount. The railroads are handling the situation in good shape, though the crisis has not yet arrived. Coal seems to be holding its own in the harvest field, though in a few instances threshermen are utilizing oil and gasoline.

ST. LOUIS

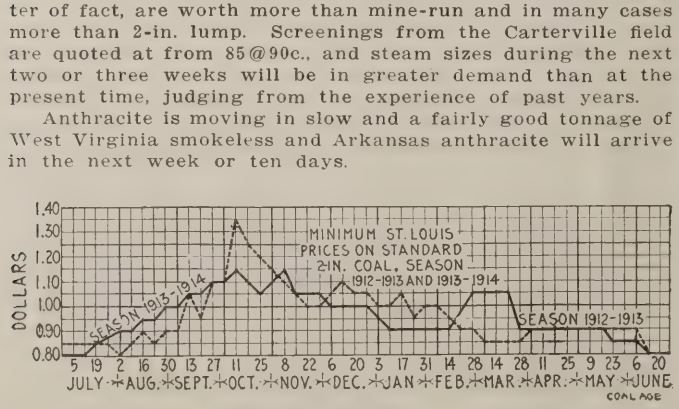
Generally better tone than for some time, although low prices still prevail in sections. Coöperative mines continue to be a leading feature in the situation.

There has been a better tone to the local market during the past week than for a long time. There seems to be a good demand for high-grade coal in the threshing fields, and this has affected to some extent the washed-coal market, which has been holdnig its own until the past week or ten days, when it went to pieces. The movement of high-grade has also been affected to some extent by the local demand.

The condition in the fifth and ninth district is still the same as it has been with coal going below cost. Conflicting opinions in this district as to the proper way to eliminate the present low prices is perhaps the principal reason for these. It is felt in some quarters that concerted action by the operators against the United Mine Workers giving permission to their men to engage in the operation of coal mines, would have the desired effect.

Standard screenings are holding their own, and, as a matter of fact, are worth more than mine-run and in many cases more than 2-in. lump. Screenings from the Carterville field are quoted at from 85@90c., and steam sizes during the next two or three weeks will be in greater demand than at the present time, judging from the experience of past years.

Anthracite is moving in slow and a fairly good tonnage of West Virginia smokeless and Arkansas anthracite will arrive in the next week or ten days.



PORTLAND, ORE.

Mines on Vancouver Island are again in operation and Washington properties resume work in a small way. Demand light, owing to mild weather.

In the Puget Sound country the lignite mines are preparing to work at least a couple of days a week. Some of these mines have been closed down for a time because of the fact that the mild winter weather left consumers pretty well stocked up and the opinion is that coal for next season will be put in rather late this year.

The demand here is very light for the present.

PRODUCTION AND TRANSPORTATION STATISTICS

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for April and the ten months ending Apr. 30, 1912 and 13, in short tons:

	April				Ten Months			
Destination	1914	%	1913	%	1914	%	1913	%
Tidewater	352,414	22	273,623	30	2,940,162	19	2,993,645	23
East	213,990	13	169,265	18	2,201,691	15	2,201,364	17
West	972,771	59	435,898	47	9,136,656	60	7,245,245	55
Total	1,539,175		878,786		14,278,510		12,440,254	
From Connections								
Bituminous	98,039	6	41,571	4	923,990	6	536,270	4
Anthracite	1,903		2,176	1	13,324		11,314	1
Total	1,639,117	100	922,533	100	15,215,824	100	12,987,838	100
Coke	36,215		28,471		328,320		256,021	

FOREIGN MARKETS

GREAT BRITAIN

June 12—Conditions in the steam coal trade are apparently as strong as ever so far as very best Admiralty descriptions are concerned. Prices of second-class coals are, however, inclined to weaken, and the same may be said of Monmouthshire large descriptions. Smalls are more plentiful and prices slightly easier. Quotations are approximately as follows:

Best Welsh steam	$4.80@5.04	Best Monmouthshires	$4.08
Best seconds	4.62	Seconds	3.84
Seconds	4.32	Best Cardiff smalls	2.58
Best dry coals	4.41	Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

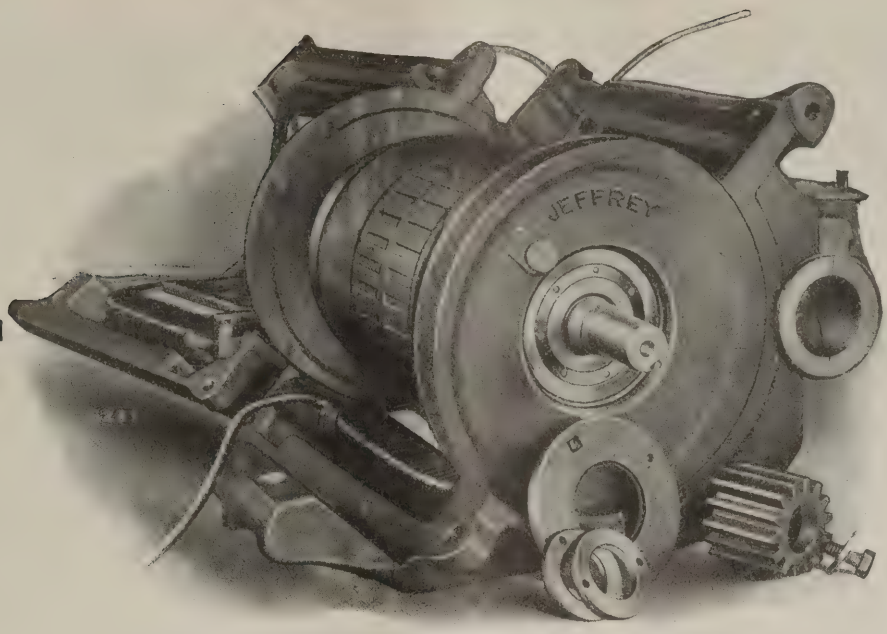
Coke is quoted at: Special foundry, $6.24; good foundry, $4.80@5.52; furnace, $4.08@4.56.

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending June 20:

	Week's Range			Year's Range	
Stocks	High	Low	Last	High	Low
American Coal Products	....	....	85½	96¼	82
American Coal Products Pref	....	....	105	106	102
Colorado Fuel & Iron	27½	27½	27½	34½	24
Colorado Fuel & Iron Pref	....	....	140	140	140
Consolidation Coal of Maryland	....	....	102½	....	....
Island Creek Coal Com	50	49½	50	....	....
Island Creek Coal Pref	89½	89	89½	....	....
Lehigh Valley Coal Sales	170	150	165	....	....
Pittsburgh Coal	20¼	20¼	20¼	23½	17⅞
Pittsburgh Coal Pref	....	....	89	93½	84
Pond Creek	17¾	17½	17½	....	....
Reading	165⅛	163⅝	164⅞	172½	158
Reading 1st Pref	..	..	89⅛	89⅜	87½
Reading 2nd Pref	..	..	88¼	93	87½
Virginia Iron, Coal & Coke	..	..	45	52	40½

	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Bonds						
Colo. F. & I. gen. s f.g. 5s	35	92½	92½	92¾	91½	99
Colo. F. & I. gen. 6s	105	..	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	..	71	74	74	73	82
Cons. Ind. Coal Me. 1st 5s	..	70¾	73	Mar. '14	73	79
Cons. Coal 1st and ref. 5s	89	91½	90½	May '14	89	90½
Gr. Riv. Coal & C. 1st g 6s	89	..	99½	Feb. '14	99⅛	99⅛
K. & H. C. & C. 1st s f g 5s	..	98½	102⅝	Apr. '06	..	..
Pocah. Con. Coll. 1st s f 5s	93	..	93	Mar. '14	93	93½
St. L. Rky. Mt. & Pac. 1st 5s	86¾	87½	86½	June '14	84	88¼
Tenn. Coal gen. 5s	76	80	77	Apr. '14	77	82
Birm. Div. 1st consol. 6s	102½	..	102½	102½	97⅜	103⅜
Tenn. Div. 1st g 6s	101⅝	103½	101¾	101⅞	101⅛	103
Cah. C. M. Co. 1st g 6s	101⅞	Sale	101⅞	101⅞	101	102½
Utah Fuel 1st g 5s	101	..	101¼	Mar. '14	101¼	101¼
Victor Fuel 1st s f 5s	..	84	73	Apr. '14	73	73
Va. I. Coal & Coke 1st g 5s	90	93	91¼	91¼	90	95



A 40 H. P. Ball Bearing Motor used on 8-Ton Jeffrey Mine Locomotives showing the ball bearing in place on the armature shaft.

90% of Locomotive Motor Troubles are Eliminated by the use of

Jeffrey Heavy Capacity Ball Bearing Motors

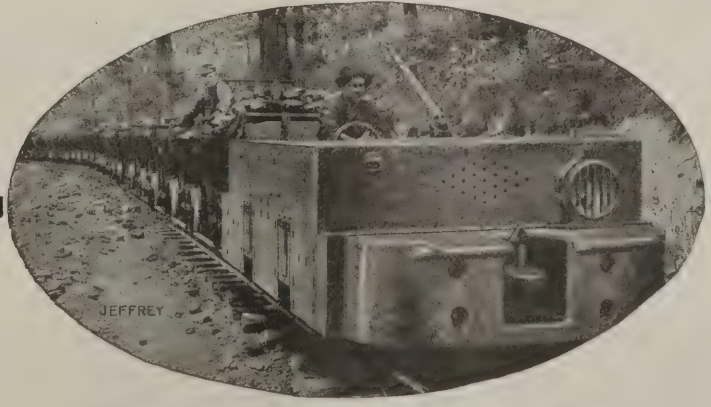
Consider these advantages over all other Motors for Mine Service:

Armature Never on Pole Pieces.
Continuous Service.
No Maintenance Charge for Bearings.
No Perceptible Wear.
Least Maintenance on Armature.
Better Commutation.
Less Lubrication Necessary.
Less Wear on Gears.
Motors are of ample power to slip the wheels continuously without overload to any part.

Send for Mine Locomotive Bulletin No. 117, also complete catalogs on Jeffrey Coal Cutters, Drills, Coal Crushers, Car Hauls, Dumps, Screens, Picking Tables and Loading Booms, Mine Fans, etc. Free upon request.

Jeffrey Manufacturing Co., Columbus, Ohio

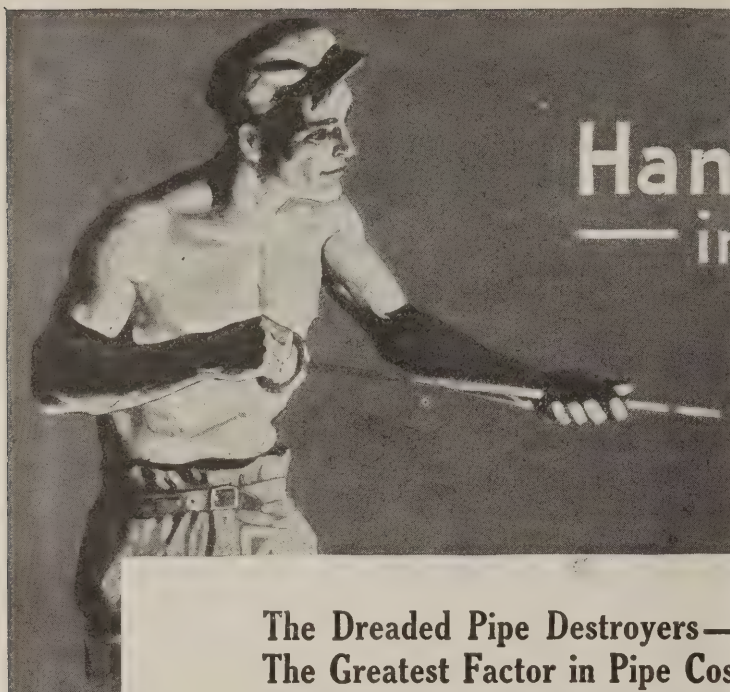
New York
Boston
Philadelphia
Pittsburgh
Birmingham



Chicago
Denver
Cleveland
Montreal
Charleston, W. Va

6-27-14

Jeffrey 13-Ton ARMORPLATE Type Locomotive equipped with two Heavy Duty Ball Bearing Motors.



Hand Puddled
— in small heats

The Dreaded Pipe Destroyers—Corrosion and Electrolysis
The Greatest Factor in Pipe Cost—Constant Repairs
The Frequent Cause of Pipe Failure—Flaws

These—and many other pipe problems—overcome by

BYERS GENUINE WROUGHT IRON PIPE
FULL WEIGHT GUARANTEED

BYERS Pipe offers greatest resistance to the attacks of corrosive agents, and to the disintegrating action of electrolysis. It possesses the highest known factor of safety in these important phases of pipe service.

Byers Pipe gives uniform, dependable, continuous service. It is remarkable for its freedom from sudden failures, and for its ability to meet the most excessive demands of emergency. This reliability is due to its absolute genuineness, full weight, and the absence of flaws. Byers Pipe is made from the best grade of pig iron, by careful, hand-controlled processes. It is tough, fibrous, ductile—capable of withstanding great torsional, tensile and pressure stresses, incessant vibration, and the fracture forces exerted by sudden changes of temperature.

Byers Pipe represents the highest degree of pipe economy. Its lasting, low-cost service is in marked contrast with the expensive repairs and replacements that must constantly be made on inferior pipe installations.

These qualities of Byers Pipe have been completely demonstrated by actual service. They have been proved real—not merely theoretical—by the continuously recorded experience of fifty years.

The year 1914 marks the Fiftieth Anniversary of Byers. Since 1864 the Byers reputation for careful, hand-controlled methods, highest quality of material, and manufacturing independence has been consistently maintained.

Send for the Byers Book—"The Control of Quality in Every Process." It contains valuable information for every pipe user.

A·M·BYERS COMPANY
ESTABLISHED 1864
PITTSBURGH, PA.

DISTRICT AGENTS AT

New York City	Cincinnati	St. Louis	Corpus Christi
Boston	Kansas City	Indianapolis	New Orleans
Philadelphia	Canton	San Antonio	Chattanooga
Chicago	Columbus	Denver	Birmingham
Dunkirk	Milwaukee	San Francisco	Savannah
Buffalo	Dayton	Los Angeles	Tampa
Cleveland	Toledo	Portland, Ore.	Jacksonville
Detroit	Louisville	Wheeling	

Look for the Byers Mark on every length and coupling



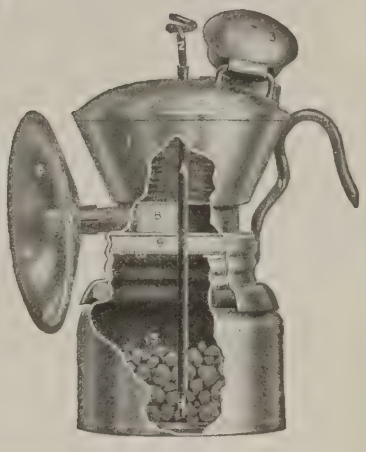
1906 1914

THE BALDWIN

The Miner's Lighting Bug



Still Satisfactory After Eight Years of Service Without Any Radical Changes



Does this mean anything to you? If you have kept in touch with the various lighting devices that have been put on the market in this space of time, it proves that what we have claimed for the Baldwin is true, it operates under the only known method for accurately controlling the generation of gas in a carbide pit lamp.

The valve lamp has been offered in a dozen different forms in the past five years. Why? Simply because a valve feed lamp is not practical and it has been found necessary to make continual changes to overcome difficulties that have cropped up when the lamps have been put in use.

Compare the Baldwin No. 32 lamp of to-day with that of 1906. There has been a gradual, steady development of the Baldwin Lamp, those two illustrations do not tell the history of the Baldwin—simply show the advance in appearance. The advance in strength—serviceability and efficiency cannot be shown in a picture but it's well told in the lamp. Many of these changes were made at the suggestions of practical men who used the lamps daily in their work. We are always on the lookout for improvements that will add to the efficiency of the Baldwin Lamp, but unless a change will stand up under the rigid tests we put it to, it is not put in a stock lamp. We do not sell experimental lamps. That is why the Baldwin Automatic Water Feed has stood unequaled for over eight years.

In the Baldwin, the water flow is determined by the gas pressure itself, which checks or holds the water in reserve until it is required thus insuring a steady, even flame at all times, whether the miner is standing still or swinging a pick. The only attention a Baldwin Automatic Feed lamp needs is a turn of the raking wire a few times a day.

More lamps of this feed are in use than all others combined and further proof of the value of the Baldwin Automatic Feed is found in the number of valve feed lamps from which the valve has been removed and a Baldwin water tube and raking wire inserted.

These are facts, but we invite you to investigate the Baldwin Lamp—find out what it can do—has done—and will do.

Our Proof Is the Lamp Itself

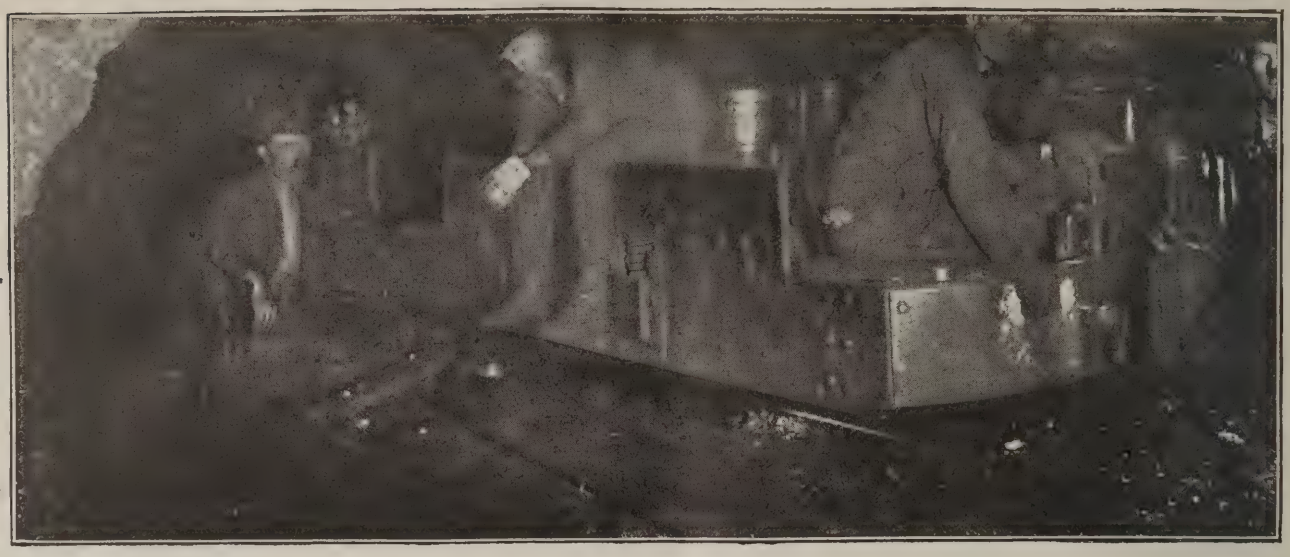
Equipped With or Without Sparker Lighters

Lamps are guaranteed satisfactory to user—get one at your dealer's today. If you don't find it just as represented, take it back and your money will be refunded.

John Simmons Company

96 Centre Street New York

BRANCHES: 268A Market St., San Francisco, Cal. 140 Bleury St., Montreal, Can.



G-E Storage Battery Locomotive, Abrams Creek Coal & Coke Co., Oakmont, W. Va.

"Your Motor Gives Wonderful Satisfaction Doing More than You Claim for It."

This statement was made by Mr. James Christopher, Supt. Abrams Creek Coal & Coke Co., Oakmont, W. Va. We invite your attention to his report of work done by G-E Storage Battery Locomotive for ten successive days commencing March 3, 1914, which follows:

"March	3	105	Loads	210	Ampere	Hours.
"	4	79	"	185	"	"
"	5	67	"	170	"	"
"	6	105	"	210	"	"
"	7	106	"	200	"	"
"	8	109	"	200	"	"
"	10	101	"	185	"	"
"	11	110	"	175	"	"
"	12	94	"	160	"	"
"	13	105	"	200	"	"

"We are pleased to state that motor replaced 4 mules each day and if we had a sufficient number of men on this haul to produce the coal it would have delivered at least one-third more coal without exhausting all the power stored. The longest time required to recharge motor any one of these days was $3\frac{1}{2}$ hours. We find it does not require any more oil than any other haulage motor and the more familiar the motorman becomes with it the less sand is required."

General Electric Company

Largest Electrical Manufacturer in the World

General Office: Schenectady, N. Y.

ADDRESS NEAREST OFFICE

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boise, Idaho
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W.Va.
Charlotte, N. C.
Chattanooga, Tenn
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
(Office of Agent)
Elmira, N.Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N.Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
Salt Lake City, Utah
San Francisco, Cal.
St. Louis, Mo.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.

5069

HB Hess-Bright D.W.F.

HESS-BRIGHT

HB DWF

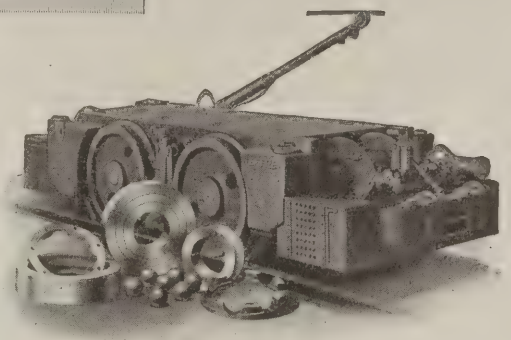
BALL BEARINGS

Superior because of Superior Manufacture

A high grade ball bearing demands that all of its parts, namely, the races, the cage and the balls, shall be composed of the finest material and made with the utmost precision and accuracy.

In other words, the value of a ball bearing is in direct ratio to the accuracy attained in the manufacture of its component parts, and the suitability of the material entering into them.

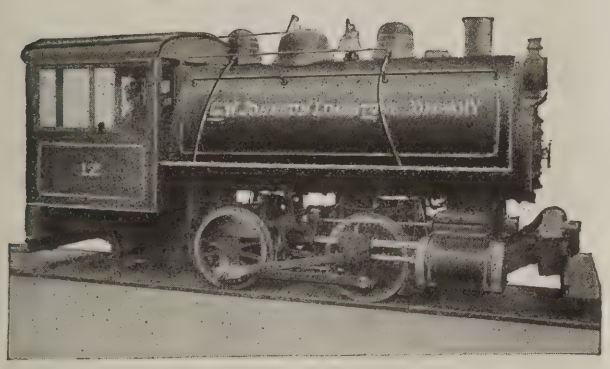
EVERY PART OF A HESS-BRIGHT (HB-DWF) BALL BEARING IS MANUFACTURED IN OUR OWN FACTORIES.



Write us for full details.

The Hess-Bright Manufacturing Co.
Front Street and Erie Ave. Philadelphia, Pa.

LOW MAINTENANCE COST LOCOMOTIVES



The life of a locomotive depends upon the care taken in manufacturing. Care in manufacturing increases profits by decreasing cost of maintenance and repairs.

From their long experience in locomotive building, our engineers have learned what is necessary to increase the life and usefulness of this class of equipment. They are qualified to co-operate with you in selecting the locomotive best suited for your work. Let them help you.

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET, NEW YORK

McCormick Building, Chicago, Ill.
Dominion Express Building, Montreal, Canada.
Carl G. Borchert, Pioneer Bldg., St. Paul, Minn.
A. Baldwin & Co., New Orleans, La.
N. B. Livermore & Company, Los Angeles and San Francisco, California.
Northwestern Equipment Company, Seattle, Wash., and Portland, Oregon.



When the largest manufacturers of excavating machinery in the world focus an organization of 30 years' experience and a factory covering 75 acres on the building of a steam shovel the result is

A MARION

Is there any wonder that shovels made in this way can show you a cheaper cost per yard of excavation ata lower upkeep?

Take our special revolving shovels for stripping overburden from coal. These shovels eliminate rehandling—their special design gives wide cuts, great width and height of dump. They mean lower stripping costs.

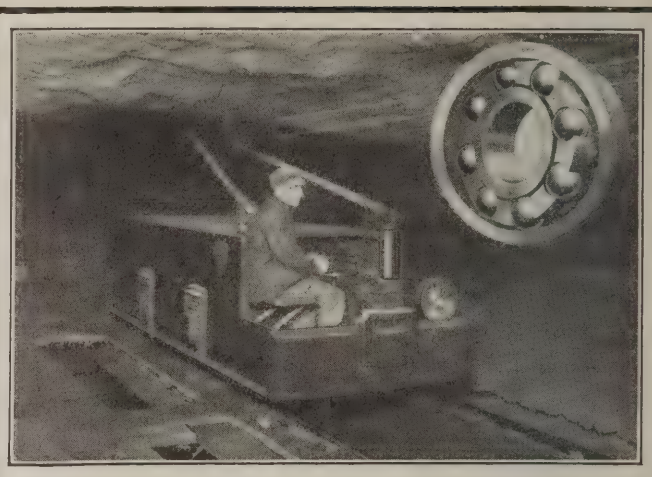
Why not get in touch with us on your problem. Our experience is placed at your disposal—expert advice on **your** problem.

Won't it pay you to take up this offer? Send for Catalog 91, TO-DAY.

MARION ESTABLISHED 1884 **Steam Shovel Co.**

Station K **Marion, Ohio**





SKF Self-Aligning Ball Bearings Lengthen the Locomotive's Life

Durability is obtained because by the use of S K F Self-Aligning Ball Bearings rolling is substituted for rubbing friction.

Further—the balls and races of S K F Ball Bearings are made of Swedish Crucible Steel, which eliminates the uncertain wearing quality of plain bearings.

Specify S K F Self-Aligning Ball Bearings on your mine locomotive motor.

SKF BALL BEARING CO.

50 Church Street, **New York City**

WATERBURY
FOUNDED 1816

THAT numbers of users of Waterbury Ropes have bought of us season after season for many years past speaks for itself. We make ropes for every coal mine service. **Write for prices.**

WATERBURY COMPANY

80 SOUTH STREET, NEW YORK

Branch Offices:

Chicago.....365 East Illinois St.
Dallas, Texas.....
Powell & Elliott Co., 911 Southwestern Life Bldg.
San Francisco.....113 Davis Street.
Boston.....220 Franklin St.
New Orleans....810 Canal-Louisiana Bank Bldg.



THE LEADER

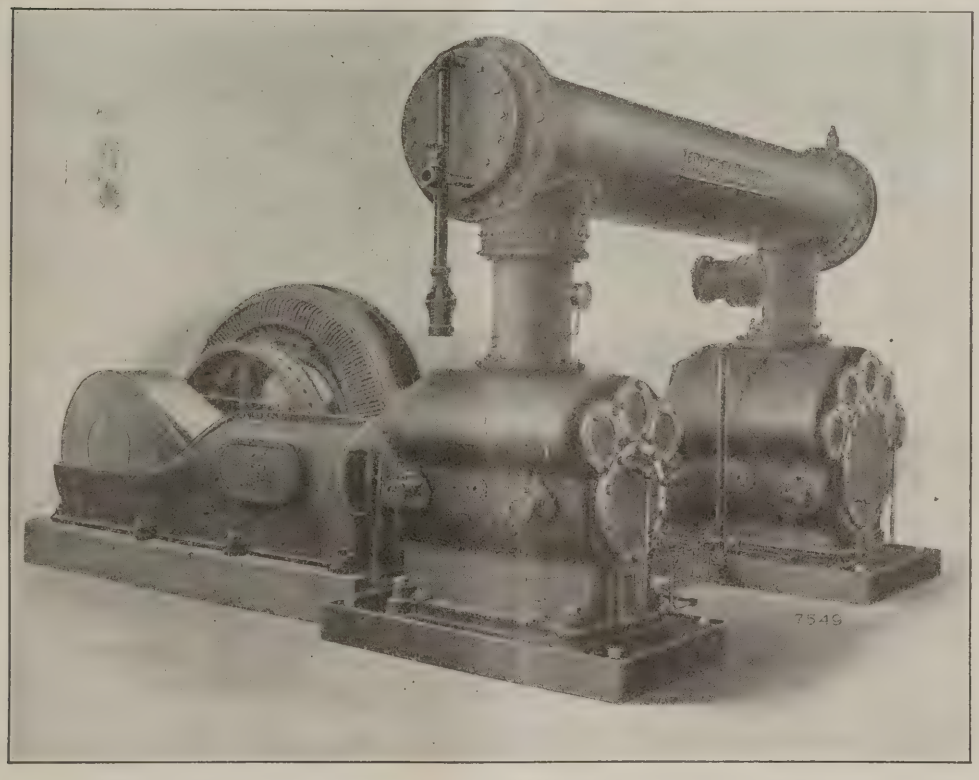
AMONG AIR COMPRESSORS

SIMPLICITY EFFICIENCY INGERSOLL ROGLER ACCESSIBILITY DURABILITY

To the CLASS "PRE" INGERSOLL-ROGLER Air Compressor has been accorded this distinction by users of compressed air.

It is a direct-connected electrically driven compressor of the highest refinement of design, pre-eminent for large permanent or semi-permanent plants where the highest attainable economy is essential.

Every detail of this machine will satisfy the most exacting demands. No better design of air compressor can be purchased—No better workmanship is known.



It is the one machine to deliver compressed air at the minimum cost, combining the best all-around compressor practice, assuring years of high duty performance.

"Ingersoll-Rogler" Valves, automatic flood lubrication, enclosed dirtproof construction and automatic clearance controller are features you cannot afford to overlook.

Full information upon request.

INGERSOLL-RAND COMPANY

NEW YORK Offices the World Over LONDON

AIR COMPRESSORS COAL CUTTERS JACKHAMERS

17-C PRE



Installing Form D Compressed Terminal Bonds

Compressed Bonding Pays

G-E Compressed Terminal Railbonds stay on for years and during all their life save trouble and money. Read this comparison of compressed terminal and channel pin bonding based on service tests. Table shows energy-loss in track (40-pound rails) per 100 amperes load per year of 240 nine-hour days—power figured at 1c. per Kw. hr.

Energy-loss per mile of track with no joints would be	$15.78
" " " with joints and channel pin bonding is	37.80
" " " with joints and compressed terminal bonds is	17.99
Annual saving per mile with compressed terminal bonds	$19.81

Put your railbond problem up to our engineers.

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boise, Idaho
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio
Denver, Colo.
Des Moines, Iowa
Detroit, Mich.
(Office of Agent)
Elmira, N. Y.
Erie, Pa.
Fort Wayne, Ind.
Hartford, Conn.
Indianapolis, Ind.

Largest Electrical Manufacturer in the World
General Office: Schenectady, N. Y.
ADDRESS NEAREST OFFICE

Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.
Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee Wis.
Minneapolis, Minn.
Nashville, Tenn.
New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
Salt Lake City, Utah
San Francisco, Cal.
St. Louis, Mo.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio.
Washington, D. C.
Youngstown, Ohio

For Texas, Oklahoma and Arizona business refer to Southwest General Electric Co., (formerly Hobson Electric Co.)—Dallas, Houston, El Paso and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont. 4709



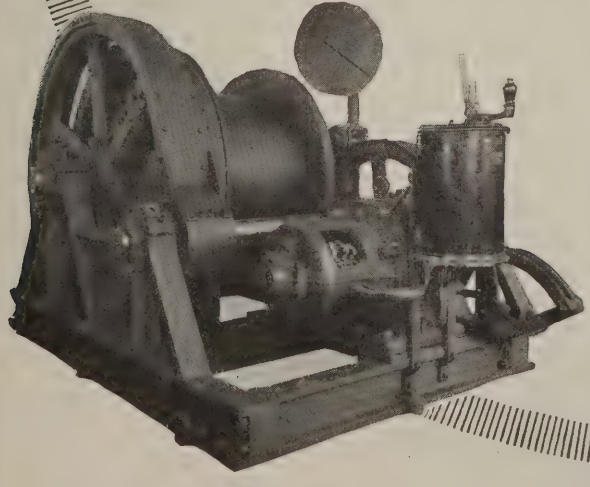
VULCAN Hoists

No. 5—Drums

Winning Features of

Vulcan Hoist Design

THE DIAMETER and width of Vulcan drums is calculated from rope diameter, number of feet to be wound and the loads and speeds that will be encountered. The heavy cast iron shells in Vulcan drums, with their end flanges, are fitted with stiff cast iron spiders. These distribute the winding strains along the shaft, and are accurately bored and key-seated if tight, and brass-bushed if driven through a friction clutch. The arms in the spiders have generous cross-section and are placed so as to equalize rope pressure on the shell. The spiders—cast separately—are joined by fitted bolts in reamed holes to the end flanges. A study of the illustration reveals the sturdiness of Vulcan drums and other hoist parts, that together make possible the uniformly high-grade and reliable service for which Vulcan Hoists are noted. **Let us assist you with your hoist problems.**



VULCAN IRON WORKS

1730 Main St., Wilkes-Barre, Pa.

New York—50 Church Street. Chicago—913 McCormick Bldg.

Classified Ads

Positions Wanted, 3 cents a word, minimum charge 50c. an insertion, in advance.

Positions Open, (Civil Service Examinations), Employment Agencies (Labor Bureaus), Business Opportunities, Wanted (Agents and Salesmen—Contract Work) and For Sale, 5 cents a word, minimum charge, $1.00 an insertion.

Miscellaneous (Educational—Books) 10 cents a word, minimum charge $1.50.

Count four words for keyed address care of New York; five for Chicago. Abbreviated words or symbols count as full words.

Copy should reach us not later than Saturday for ensuing week's issue. Answers addressed to our care, 505 Pearl St., New York or 1144 Monadnock Block, Chicago will be forwarded (excepting circulars or similar literature.)

No information given by us regarding keyed advertiser's name or address.

Original letters of recommendation or other papers of value should not be inclosed to unknown correspondents. Send copies.

Advertisements calling for bids, $3.60 an inch per insertion.

c a

POSITION OPEN

SALESMAN (MINERS' SAFETY LAMPS): Wanted by large corporation, a first-class active salesman to work Pennsylvania, West Virginia, Ohio and Illinois; applicants please state age, whether married or single, wage and rate of expenses, also experience and enclose photograph. P. 266, Coal Age.

POSITIONS WANTED

A YOUNG MAN desires position as superintendent, assistant superintendent or inspector of mines, opening new mines, or reopening old mines; expert on gaseous mines; can pass any examination in mining; will go anywhere, West, or South America; best of references furnished on request. P. W. 262, Coal Age.

AS MINE FOREMAN in nongaseous mines; prefer West Virginia, Virginia or Maryland; 15 years experience; best of references from past and present employers; hold certificate for West Virginia. P. W. 267, Coal Age.

SUPERINTENDENT, age 36, technical institute graduate; 16 years' experience, 11 years mine foreman, assistant and superintendent of large mines; bituminous first-grade foreman certificate, Pennsylvania; thoroughly experienced in all branches of mining; best of references covering ability and character. P. W. 268, Coal Age.

ENERGETIC AND RESOURCEFUL technical graduate desires sales position; three years in field and office with leading mining machinery manufacturer, design, production and construction divisions, engineering and sales departments; four years other engineering experience with railroad and manufacturing companies; one year electrical sales experience; highest reference. P. W. 269 Coal Age, Chicago.

SUPERINTENDENT OR MINE FOREMAN, first-class Pennsylvania papers bituminous mines; familiar with all kinds machinery and construction work; 30 years' experience in gaseous mines and outside; age 47; married; can give reference. P. W. 270, Coal Age.

BITUMINOUS MINE SUPERINTENDENT, at present employed, desires to make a change; have good, practical mining experience; 36 years old and married; will give reference. P. W. 271, Coal Age.

FOR SALE

FOUR 100-H.P. FIRE-BOX RETURN TUBULAR BOILERS, Tico type, never been used; guaranteed by Bond and Hartford papers. F. S. 272, Coal Age.

Virginia Polytechnic Institute
(State Agricultural and Mechanical College)
SCHOOL OF MINING ENGINEERING

OFFERS a four years' course leading to the degree of Bachelor of Science in Mining Engineering. Full teaching force, well equipped shops and laboratories. Adjacent to celebrated Pocahontas coal fields. Total cost per year, including board, room, light, heat, laundry and medical attendance, $281; to State students, $231.

J. D. EGGLESTON, Pres., Blacksburg, Va.

Mine Contract Work

I am engaged in contracting for all kinds of Bituminous Mine Work, including Shaft Sinking, Steel, Wood and Concrete Construction and Erecting Machinery. My terms are reasonable. Full details on request.

Write me today.

F. D. Buffum
Jenkins Arcade Pittsburgh, Pa.



You Can't Look into the Earth

but we can get you a large clean core of all strata under your land to be examined in broad daylight. No guess work.

The J. A. Brennan Drilling Co.
Home Office—Scranton, Pa. Field Office—30 Carson St., Pittsburgh, Pa.
Contractors for Diamond Drilling.

Read Our Book On Permissible Powders

Everyone interested in efficiency in coal mining will appreciate the information given in our free book on Keystone Permissible Powders.

Send in your request early for your copy.

Keystone National Powder Co.
Emporium, Pa.

5,000 New Little Giant Power Hammers in Successful Operation



Used everywhere—but their greatest success has been in mine blacksmith shops. Equipped with an Edmonson Patent Electric Bit-Die 2000 new bits or 2500 old ones re-sharpened are easy for a blacksmith and one helper.

We have some details and proofs which will interest you. Write for them today.

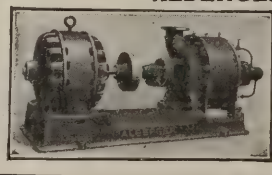
Mayer Bros. Co.
Mankato Minn.

ORVIS C. HOFFMAN LEON H. HOFFMAN
HOFFMAN BROS.
CONTRACTORS
DIAMOND CORE DRILLING
PUNXSUTAWNEY, PA.
(Our specialty—Testing Bituminous Coal Lands)
UP-TO-DATE EQUIPMENTS EXPERT DRILL RUNNERS
YOUR INQUIRIES SOLICITED

HANS OLSON, Pres. JNO. A. FISHER, Sec'y.
Punxsutawney Drilling and Contracting Company
DIAMOND DRILL CONTRACTORS
Testing Bituminous Coal Lands a Specialty.
Weber Bldg. PUNXSUTAWNEY, PA.

A Safe Valve Investment
NELSON VALVES
Nelson Valve Co. Chestnut Hill, Phila.

ALBERGER MINE PUMPS



With Centrifugal Pumps, whether of the Turbine or Volute Type, the name of Alberger is a guarantee of maximum service and minimum operating expense. **Write for Bulletins.**

Alberger Pump and Condenser Company
140 Cedar Street, New York
Atlanta Boston Chicago St. Louis
Pittsburgh San Francisco New Orleans

Horizontal—Vertical—In Any Position This Goulds Pump Will Unwater Mine Sumps

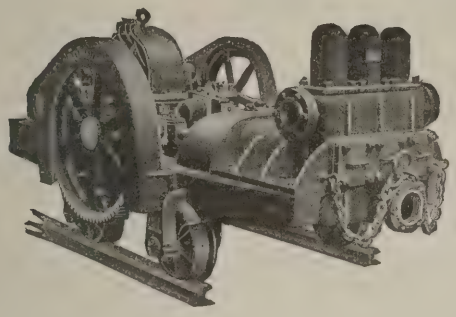


Figure 966. Portable Electric Triplex Mine Pump.

While built for horizontal operation, where conditions have made it desirable it has been used in a vertical position and gives equally good service. It is made for any gauge track—requires very little head room.

Just what you want for unwatering your mines—all working parts protected from falling material and obstructions—highly efficient—easily moved. You will find it a time and money saver.

Bulletin 109 gives all data on this and other mine pumps. Send for a copy NOW.

THE GOULDS MFG. CO.

LARGEST MFR. OF PUMPS FOR EVERY SERVICE

123 West Fall Street Seneca Falls, N. Y.

Branches and Agencies in Principal Cities.

GOULDS PUMPS

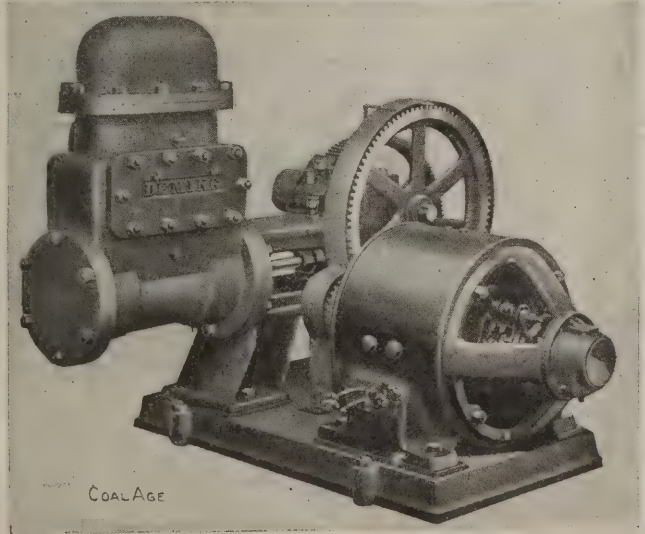
DEMING Gathering PUMPS

Several Different Types. Guarded Gears. Accessible Valves.

Large Stocks of Mine Pumps Carried in Pittsburgh, Chicago and Denver.

The Deming Company, Salem, Ohio

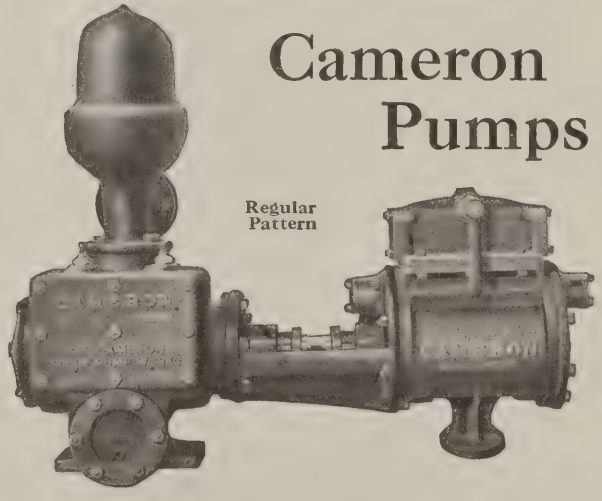
Harris Pump & Supply Co., Pittsburgh
Henion & Hubbell, Chicago. Hendrie & Bolthoff Mfg. and Supply Co., Denver



The "Ajax" 6x6, with Motor Drive, capacity 75 gallons per minute.

The Slogan of the Cameron—"Character: The Grandest Thing."

Cameron Pumps



Maximum Service

Maximum service at the lowest cost. That's what you want in a pump. Initial cost is incidental. In the Cameron Pump you get maximum service at minimum cost because of the Cameron Design. Different from other pumps. Fewer parts. Less wear. Longer service. Over 70,000 in use today all over the world.

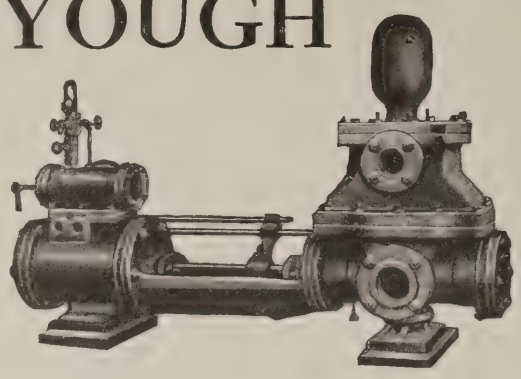
All the details in Bulletin No. 102.

A. S. Cameron Steam Pump Works

11 Broadway, New York. **Offices the World Over.**

6-27-14

YOUGH



Economical Mine Pumping

Whether you need a pump for small or large duty, there's a **Yough Pump** ready to give you the **best** service possible.

Look at this **Yough Piston Pattern Mine Pump** fitted with a round valve chamber with steam driven quick acting valve. There are 36 sizes of this one type alone.

Yough Pumps are made for every class of service.

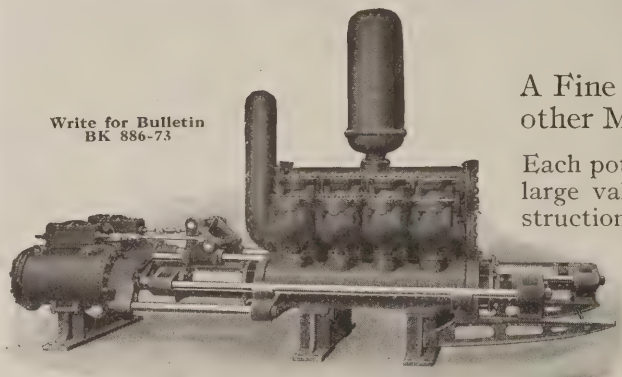
Write for our complete Catalogue.

Boyts, Porter & Co.

Connellsville **Pennsylvania**

The Blake-Knowles Horizontal Duplex Pot Valve Plunger Pump

Write for Bulletin BK 886-73



A Fine Machine for Unwatering, Boiler Feeding and other Mine Work. Strong, Heavy, Simple, Dependable.

Each pot carries a number of small valves, aggregating unusually large valve area; this insures quiet action. Note tie rod construction and exceptional stuffing box accessibility.

The Blake & Knowles Steam Pump Works

Works: East Cambridge, Mass. **New York Office: 115 Broadway**

Branch Offices in all Principal Cities

B216.2

WHAT PRESIDENT TALLEY SAID—

"We are not using the Smith Hand Mixer at this time for any purpose, having finished up last summer the construction of the *boiler and engine house and heater foundations.* These were made of concrete and *we were well pleased with your Hand Mixer.*"

That's what Mr. H. B. Talley, President of the Clovelly Coal Co., of Terre Haute, Ind., wrote us.

Mr. Talley's work shows up only one of the many concrete jobs about the coal mine which can be handled quickly, easily and economically with the Smith Hand Mixer. It will pay you to fill out the coupon and learn more about this inexpensive, labor-saving machine.

THE T. L. SMITH CO.

1147 B—32nd STREET **MILWAUKEE, WIS.**

MAIL THIS COUPON FOR CATALOG NO. 20-B.

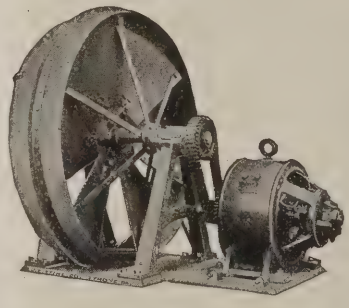
COAL MINE COUPON for CATALOG No. 20-B

Name.....

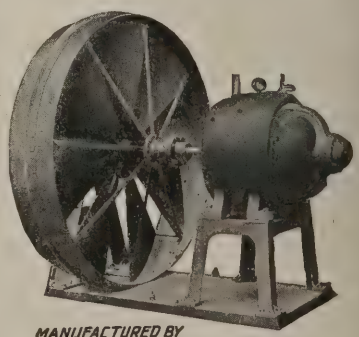
Address.....



J. C. STINE Patented Disc Fans



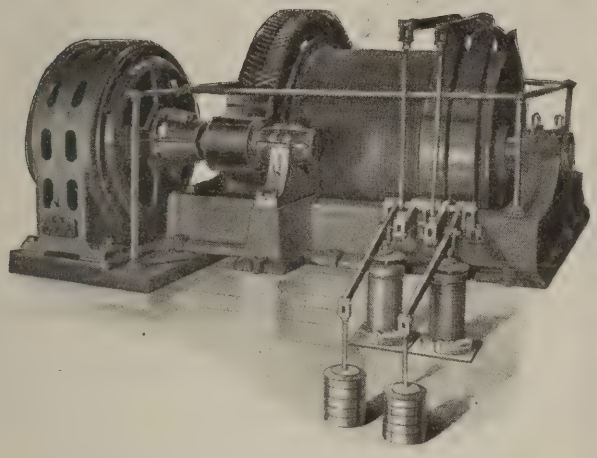
are made by people who know how. Actual tests show 85% mechanical efficiency, the highest efficiency of any fan made regardless of cost. Being equipped with specially designed self-starting, interpoled motor with fan and motor on the same bed-plate no attention is required beyond an occasional oiling. Ten sizes—3 ft. to 8 ft. in diam. Capacities 20,000 to 120,000 cu. ft. per minute. Prices surprisingly low. We guarantee highest efficiency, lowest upkeep and greatest durability.



MANUFACTURED BY THE J.C.STINE CO. TYRONE,PA.U.S.A.

The J. C. Stine Company, Tyrone, Penna.

Hoist Your Coal at a Lower Cost



Single Rigid Drum, Single Gear Reduction Ottumwa Hoists with helical tooth gearing and double post brakes.

Why not write us today for full particulars and Catalog No. 30?

Large savings in hoisting can be realized by the installation of

OTTUMWA HOISTS

Every detail of this modern hoisting equipment has been given careful attention in order to make the chance of breakdown as remote as possible. All friction losses are reduced to the minimum by accurately cut helical gearing and splendid alignment.

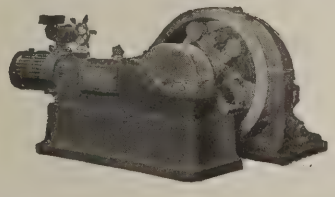
There are **two independent** brakes—one being used for regular service and the other for emergency duty only. Instantaneous action is assured by the automatic electric limit switch control.

Our engineers will gladly help you to secure better and more economical hoisting.

Ottumwa Iron Works, **Ottumwa, Iowa**

Established 1867 Complete Mine Equipment

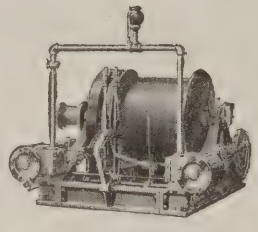
For Haulage Work



The Ridgway engine has no equal. For close regulation it is all you can desire.

Ridgway Dynamo & Engine Co.

North Broad St., Ridgway Pa.



Mead-Morrison Mine Hoists

are all equipped, with Patent Twin Thrust Screws, the most efficient method of operating Cone Friction Drums.

Patent Twin Thrust Screws demonstrate one feature of an advance in construction that characterizes the entire M-M line of coal handling machinery.

Ask for our Mining Catalog.

Mead-Morrison Mfg. Co., 106-07 West Park, N. S. PITTSBURGH, PA.

Works and Executive Offices—Boston, Mass.

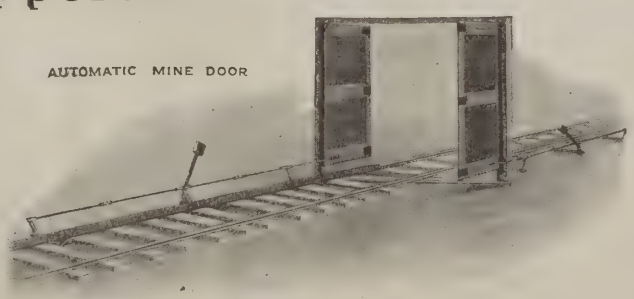
2.68% of All Trappers Are Killed

in the anthracite region alone.

The AMERICAN Automatic Mine Door Prevents 100% of Such Accidents

by eliminating the trapper or door boy altogether. These doors **always** work—they never go to sleep and they never take chances—no matter what the speed of the trip.

Of interest to every mine operator who has to use doors is our special trial installation offer. In justice to yourself and your men—write for full details. Ask for the **catalog.**



The American Mine Door Company, Canton, Ohio

Provides an Even Draft

You can burn the cheapest grades of coal under your boilers if you equip them with



The Coppus Turbo-Blower

*It's Noiseless

These economical under grate blowers provide an even draft under the full grate area with a steam consumption amounting to only ½ to ¾ of that required by any other similar equipment.

The **Coppus** has replaced many other blowers. No other blower has ever replaced a **Coppus**. Write.

Coppus Engineering & Equipment Company
168 Union Street Worcester, Mass.

* Noiseless in operation by comparison with other blowers and absolutely noiseless under certain conditions.



This Coal Tipple is an example of our construction. We also design and build Coal Pockets, Washeries and Storage Plants.

Write us about your requirements.

Fairbanks, Morse & Co., Chicago

Increased Efficiency—Greater Economy

Results obtained from use of:

"FULLER QUALITY"

Sprocket and Traction Wheels. Wire Rope Sheave Wheels.
Bearing Surfaces Hardened. Specially Treated to Resist Wear.

All kinds of Wearing Parts to Resist Abrasion.
Unequalled for Severe Duty and Long Life.
All kinds of Car Wheels.

Write for more information and prices.

Lehigh Car, Wheel and Axle Works
Catasauqua, Pa.

THE CHRISTY LOADER

saves you much in time, labor and money! It loads the most coal in best condition at lowest cost for operation and maintenance!

Do you want Booklet A?

CHRISTY BOX CAR LOADER CO.
DES MOINES, IOWA

Protect Your Electrical Equipment

with the genuine weather, acid and alkali proof

Weather-Proof Tape
Insulating Compound
Baking and Air Drying Varnishes

THE STANDARD PAINT COMPANY
New York Chicago Denver



A new Electric Hoist for the Mine. Built to handle cars in working places where the grades are heavy. Keeps the Miner satisfied.

Write for our new catalog.

The Pneumelectric Machine Co.
Syracuse, New York

Pneumelectric TRADE MARK.

Take Along Some Air!

Sullivan Portable Motor-Driven Compressors will run a drill or a puncher anywhere you can lay rails and run a feed wire. Capacity, 80 to 180 cu. ft.

Bulletin 58 PC.

Sullivan Machinery Co., 122 South Michigan Ave. CHICAGO

Coal Briquetting Machinery

Capacities of standard equipments 4, 8, 16 and 35 tons of 2 to 3 oz. smokeless and odorless briquettes per hour—complete plants erected.

MASHEK ENGINEERING COMPANY
90 West Street New York, U. S. A.

Keep Your Copies of Coal Age in the Binder

FOR 50 CENTS we will send you, postpaid, the Coal Age Binder—a handsome, heavy board and cloth binder, heavily grained, that holds the reading pages of 6 months' issues. This, with the index, furnishes a bound volume ready for instant reference. We sell the binder at just what it costs us, plus postage—you can have one for 50 cents postpaid. Send for it today.

COAL AGE · *505 Pearl Street* · *New York City*

You should be reducing your repair bills, too!

WM. LECKIE, PRESIDENT, WELCH, W. VA. W. R. GRAHAM, VICE-PRESIDENT, BLUEFIELD, W. VA. A. E. JENNINGS, SEC'Y TREAS., WELCH, W. VA.

Lathrop Coal Company
MINERS AND SHIPPERS OF
PANTHER COAL

Welch, W. Va., January 1, 1914

The Watt Mining Car Wheel Co.
JAN 2 1914
BARNESVILLE, OHIO.

The Watt Mining Car Wheel Company,
Barnesville, Ohio.

Gentlemen:

Replying to your favor of the 29th inst., beg to say that I have been using nothing but solid steel cars for a number of years and find that they are more economical than any car that I have used.

When handled with proper care they require absolutely no repairs and so far we have not had a single car damaged so badly by wrecks or roof-falls that it could not be readily repaired in our shops.

The spring bumpers and outside bearings are very desirable features for mine cars. The spring bumpers save the cars from hard jambs, which have a tendency to shake off considerable coal and they put elasticity into a trip of cars, thereby making them easier to start and keep in motion than the solid bumper cars.

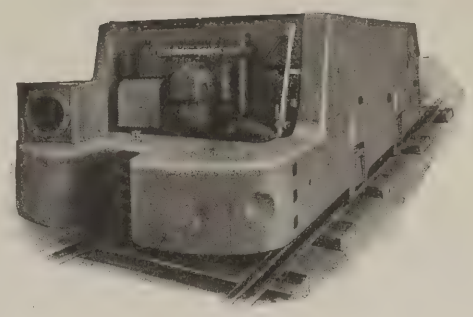
They are lighter and hold more coal than a wooden car of the same outside dimensions.

Trusting this is the information you desire, I am

Yours very truly,

BS. Wm. Leckie

PRESIDENT.



WHITCOMB
Gasoline Mine Motors
Are a Proven Success

They have passed the experimental stage and the successful results obtained from the 150 now in use are your guarantee that they will save for you.

The saving involved varies from ½c. to 50% of the haulage cost per ton and amounts to over $3000 per year per motor in one mine.

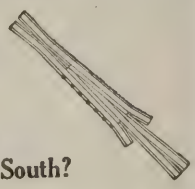
If you are still hauling your coal by mules you are losing money—lots of it—every day.

Want proof? A card from you brings it.

George D. Whitcomb Co.
Box D Rochelle, Ill.



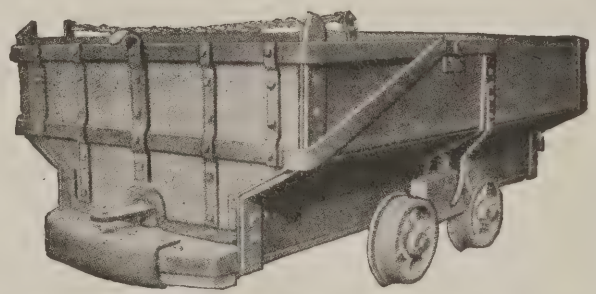
Want Some FROGS



In a Hurry to Finish That New Spur in No. 3 South?

If you do—or if you want any sort of track equipment—get in touch with us by wire. We'll get the stuff to you at once for our stock is large and we can turn out special work in a hurry. **For a ready ordering reference, get the catalog.**

The CINCINNATI FROG & SWITCH COMPANY
MANUFACTURERS OF
TRACK EQUIPMENT
FOR STEAM AND ELECTRIC RAILROADS
MINES AND MILLS
CINCINNATI

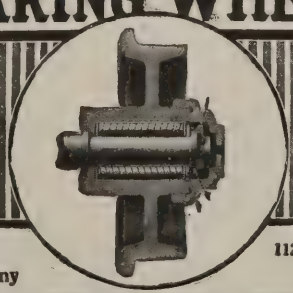


Hockensmith Steel Mine Cars

The above is our special design. Separate plates. Bolted on wood bottoms. Automatic lifting door. Double roller brake. **Get Catalog A.**

HOCKENSMITH WHEEL & MINE CAR COMPANY
Penn Station, Pennsylvania

HYATT ROLLER BEARING WHEELS



Hyatt Roller Bearing Company

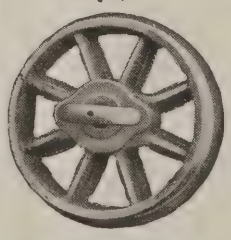
1124 Michigan Ave., Chicago, Ill.

A Different Wheel

Here's a wheel that's easy to oil—that holds a large amount of oil—that is easily put on and taken off.

A wheel that gives real service.

Irwin Mine Car Wheel



In this wheel the oil hole is located on center, the oil chamber is large. Features that mean ease of oiling and long time running on one oiling. The linch pin is always accessible—no trouble to remove wheel.

This wheel means smaller maintenance costs—better service. GET DETAILS TODAY.

Irwin Foundry & Mine Car Co.
Irwin, Pa.

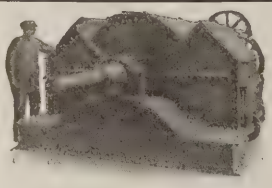
American Blower Company, Detroit

Sirocco
TRADE MARK.

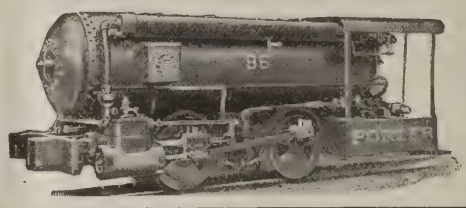
Multi-Blade Ventilating Fans
Catalog No. 30317

Morse Silent Chain
99% Efficiency
Write for Bulletin No. 1120
Morse Chain Company, Ithaca, N. Y.

WILLIAMS CRUSHERS
Williams crushers give more for your money. Get proof. Write
Williams Patent Crusher & Pulverizer Co.
Chicago Old Colony Bldg. Pittsburgh Jenkins Arcade Bldg.


(Patented)

"PENNSYLVANIA"
Hammer Crushers, Bradford Coal Cleaners, Single Roll Crushers, Rock Crushers, Delamater Float Testers.
Specialists in Coal Crushing and Cleaning Machinery for By-Product and Bee Hive Coke plants, Coal Mines and PowerHouses.
PENNSYLVANIA CRUSHER CO.
New York PHILADELPHIA Pittsburgh



Specialist Mine Locomotive
That means—built in a plant where nothing but locomotives are made. That's why PORTERS are best.
H. K. Porter Co.
410 Wood St.
Pittsburgh, Pa.

MINE-A-PHONE
An unfailing system that puts every man in your mine within reach of your voice.
Write for Bulletin 2600.
STROMBERG-CARLSON TELEPHONE MFG. CO., ROCHESTER, N. Y. CHICAGO, ILL.

Get The Man You Want
Get The Job You Want

Why want for something that's within your reach—that's wanting you as much as you want it?

Every week Coal Age reaches thousands of readers having a common interest in what you have to offer in the way of better positions than they are now holding.

On the other hand, there's many a good vacancy filled by the man who was alert enough to let his wants be known through the "Positions Wanted" Columns. A sudden vacancy—a perplexed boss—the Want Columns—and the right man gets it. Try it for the man you want or the job you want.

Positions Wanted, three cents per word, each insertion. Positions Open, five cents per word, each insertion.

COAL AGE, 505 Pearl Street, New York

Built to stand the hard knocks of Everyday Mine Use



The new type

"M" Hubbell Lantern

Capacity 12 hrs. Weight 4¼ lbs.

Write for booklet.

Portable Electric Safety Light Co.
10 Johnson Street, Newark, N. J.

Quality Carbide *for* Miners' Lamps

¶ It's **Acetylene** you buy when purchasing carbide manufactured by the Canada Carbide Co., Ltd.

Standard Sizes.

Fairbanks, Morse & Co
30 Church St., New York, N. Y.

KOEHLER SAFETY LAMP



Simplest—Strongest—Cheapest of Safety Lamps

The "Koehler for Coalers" is a safety lamp of few parts—each part is strong and able to withstand hard knocks.

In price it is below the cost of all other safety lamps of this type.

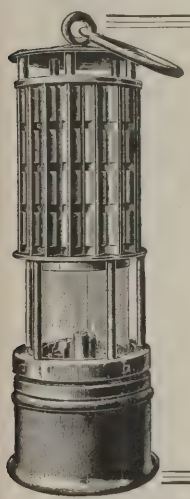


The Koehler is an American Made Lamp for American Mines. The only American made lamp of this type.

Ask for Bulletins and prices.

Koehler Mfg. Company
Marlboro, Mass.

General Agents:
Mine Safety Appliances Co., 451-4th Ave., Pittsburgh, Pa.



These Figures Can't Lie to You—Read Them

The report of the Department of Mines of Pennsylvania shows 43,355 safety lamps of seven different makes in use in bituminous operations in that State and out of that number 34,109 are Wolf Safety Lamps. Those official figures tell their own story as to which lamp is safest. They tell you that by purchasing

WOLF NAPHTHA SAFETY LAMPS

no mistake will be made. Learn just why Wolfs lead, why they light 2,000,000 men safely in their work. Our book tells you. It's free.

Wolf Products

Wolf Naphtha Safety Lamps—Wolf Electric Safety Lamps—Wolf Acetylene Safety Lamps—Wolf Open Acetylene Lamps—Wolf Stationary Acetylene Lamps—Wolf Oil Safety and Open Lamps.

We are also the agents of our Pittsburgh Representatives, The Draeger Oxygen Apparatus Co., Commercial Bldg., Pittsburgh, Pa.

Wolf Safetv Lamp Company of America, Inc.
49 West Street - - - - - New York, N. Y.

Scottdale Machine & Mfg. Co.

Manufacturers and Contracting Engineers
Coal and Coke Handling Equipment

Steel Tipples, Screens and Chutes, Car Hauls, Crushers, Picking Tables, Elevators and Conveyors.

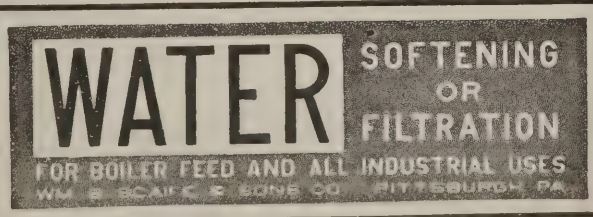
Coke Oven Larries, Pushers, Levellers, Charging Cars and Loaders.

Mine Cages, Electric Hoists, Drums, Sheaves. Castings and Plate Work.

Ask us about your requirements.

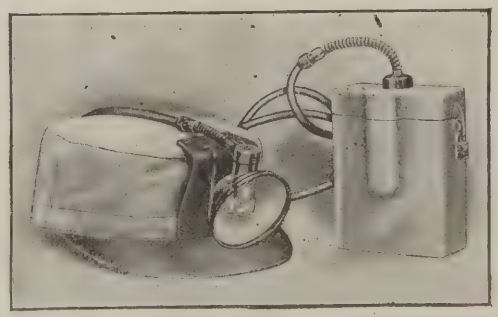
Main Office and Works: Scottdale, Pa.

Branch Offices: Pittsburgh, Bluefield, W. Va. and Chicago, Ill.



Wico Safety Electric Mine Lamp

Practically Indestructible



Approved by U. S. Bureau of Mines

+

Made by Witherbee Igniter Co.

Springfield, Mass.

Directory of Consulting Engineers

Allen & Garcia Company,

Andrews Allen C. E., John A. Garcia, E.M.

Consulting Bridge, Structural and Mining Engineers.

Plans, Specifications and Superintendence for Bridges and Structures in Steel or Concrete. Design and Construction of complete Coal Mining Plants. Examination, Reports and Appraisals of Coal Mining and other Properties.

McCormick Bldg., Chicago.

Beattie, James F.,

Mining Engineer. Specialties: Lignite and Bituminous Coal Mining. Examinations and Reports. Development of coal lands. Surveys and Maps. 30 years' experience. New Bethlehem, Pa.

Chance, H. M. & Co.,

Consulting Mining Engineers.

Coal and Iron.

Drexel Bldg., Philadelphia, Pa.

Cunningham & Conner,

Consulting Mining Engineers and Geologists. Design and Construction Coal Plants. Examination, Valuation, Reports and Surveys of Coal, Oil and Metal Properties. Robson-Prichard Bldg. Huntington, W. Va.

Gould, C. V.,

Consulting Mining Engineer. Reports and Surveys. Development, Equipment and Management of Coal Properties. 505 Newhouse Bldg., Salt Lake City, Utah.

Randolph-Means Co.,

Electrical Mining Engineers. We specialize on the economical and safe production and transportation of materials underground. Oliver Building, Pittsburgh, Pa.

Read, R. G.,

Specialist in design and construction of Tipples, Coal and Coke handling equipment. Special experience in Illinois, West Virginia and Pennsylvania. Webster Bldg., Chicago.

Wilkins Company, W. G.,

Engineers and Architects, Design and Supervision of Construction of Coal Mining and Coke Plants. Westinghouse Building, Pittsburgh, Pa. Robson-Prichard Building, Huntington, W. Va.

Wood, A. H., Mem. A. I. M. E.

Consulting Mining Engineer. Examination and valuation of Coal Properties. Plans prepared to overcome specially difficult problems in coal mining—new or old development. 22 years' active experience. Petros, Tenn.

Directory Rates (Yearly)

1¼ inch Card $52.00.
(In advance $40.00.)
¾ inch Card $31.20.
(In advance $25.00.)
A copy of the paper included.

When Coal Age readers need the services of a Consulting Engineer they want to find him in Coal Age. Your card should be here.



BUFF Mining Transits And Levels

The "Buff" is very difficult to purchase from a second-hand dealer. He will tell you—"None are offered me."

Send for Catalog 19.

Buff & Buff Mfg. Co., Jamaica Plains Station, Mass.



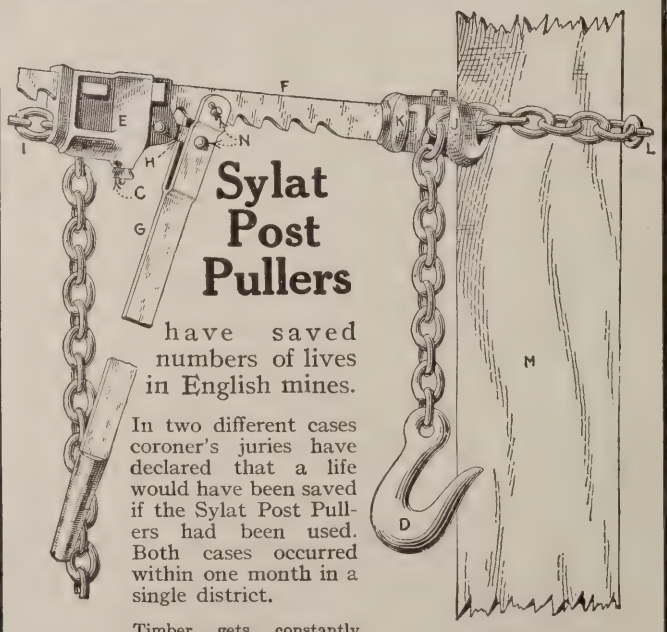
Begin the protection of metal surfaces with DIXON'S SILICA-GRAPHITE PAINT

and repainting will occur less often. **Booklet No. 59-B upon request.**

Made in Jersey City, N. J., by the Joseph Dixon Crucible Company

Established 1827

What is a Man's Life Worth?



Sylat Post Pullers

have saved numbers of lives in English mines.

In two different cases coroner's juries have declared that a life would have been saved if the Sylat Post Pullers had been used. Both cases occurred within one month in a single district.

Timber gets constantly more expensive. One Colliery Manager wrote his mine had saved cost of machine in a single day where a roadway of old posts had to be cleared.

One Month's Free Trial.

Send for Catalog.

The Sylvester Company, Parkersburg, W. Va.

The Averill Stadiagraph

Protractor, straight edge and scale combined.

It plots stadia notes mechanically, swiftly and accurately.

Reduced horizontal distance and difference in vertical height given instantly WITHOUT CALCULATION OF ANY KIND.

Results on the map in less time than taken for calculations by old methods.

Compare with other instruments designed to save time in stadia work and *note difference.*

An eminent coal mining engineer after six weeks' use writes, "It is a great time saver in the plotting of stadia notes, eliminating, as it does, the use of charts and tables, and permitting stadia 'shots' to be plotted as rapidly, or more rapidly, than they could be taken in the field."

Send for Circular CA.

The Averill Stadiagraph Co.
141 Broadway New York

Titles of the Eight Volumes in the Power Plant Library:

Practical Mathematics. (Mathematics Self Taught) by Claude Irwin Palmer.

Power Catechism. (Practical Engine Running) by Fred R. Low.

Valve Setting. (Applies to every type of engine) by Hubert E. Collins.

Boilers, Piping, Pumps. (A Practical treatise) by Hubert E. Collins.

Shafting, Belting, Governors. (Taken from actual practice) by Hubert E. Collins.

Electrical Catechism. (Electricity Simplified) by George D. Shepardson.

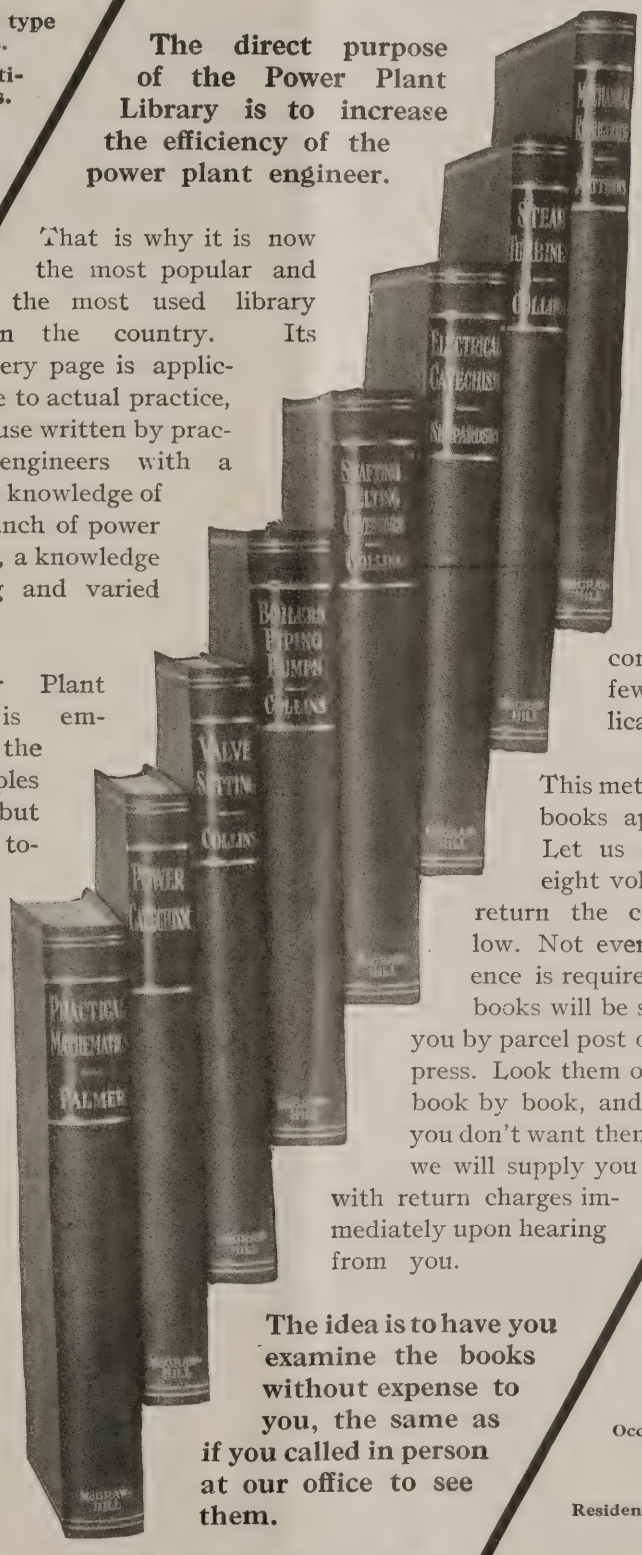
Steam Turbines. (Practical operation of turbines and auxiliaries) by Hubert E. Collins.

Mechanical Refrigeration. (Ice making and cold storage) by Fred E. Matthews.

Are You Efficient?

The direct purpose of the Power Plant Library is to increase the efficiency of the power plant engineer.

That is why it is now the most popular and the most used library in the country. Its every page is applicable to actual practice, because written by practical engineers with a working knowledge of every branch of power plant work, a knowledge born of long and varied experience.



In the Power Plant Library there is embodied not only the rudiments and principles of approved practice, but its general trend is toward advancement for its readers. Its pages are veritably thronged with the very nucleus of power plant efficiency.

You cannot well afford to neglect such an important matter as your personal efficiency. It means everything to you. It means dollars and cents, independence or stagnation. If there is a trace of doubt in your mind as to your personal efficiency it will pay you to investigate the Power Plant Library at once.

Our method of selling the Power Plant Library is approved by engineers everywhere. We ship the eight volumes before even a deposit is made and allow ten days for examination, and twelve months to pay if you are satisfied.

This method of selling the books, and the fact that they have met the requirements of the most exacting, accounts for the exhaustion of two complete printings in a few months after publication.

This method of selling the books applies to you. Let us send you the eight volumes. Just return the coupon below. Not even a reference is required. The books will be sent to you by parcel post or express. Look them over, book by book, and if you don't want them we will supply you with return charges immediately upon hearing from you.

The idea is to have you examine the books without expense to you, the same as if you called in person at our office to see them.

McGraw-Hill Book Co., Inc., 239 W. 39th St., New York

Gentlemen—Ship to me, charges paid, your new Power Plant Library, eight volumes, price $12.00. If satisfactory after examination, I will send $1.00 in ten days and $1.00 per month until paid. If not wanted, I will write for shipping instructions.

Signature.....

Occupation.....

Residence Address.....

Business Address.....

City and State .....CA 10

McGraw-Hill Book Co., Inc.

239 W. 39th St.
New York
Publishers of Books for Coal Age

What and Where to Buy

ALPHABETICAL LIST OF EVERYTHING USED IN COAL MINE EQUIPMENT WITH NAMES OF MAKERS

Anthracite Mine Debris
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulverizer Co.

Architects' Supplies
Buff & Buff Mfg. Co.

Batteries, Shot Firing
Portable Electric Safety Light Co.

Bearings, Ball and Roller
Hess-Bright Mfg. Co.
Irwin Foundry & Mine Car Co.
Jeffrey Mfg. Co.
S. K. F. Ball Bearing Co.
Watt Mining Car Wheel Co.

Belt Dressing
Rhoads & Sons, J. E.

Belting
Goodyear Tire & Rubber Co.
Link-Belt Co.
Rhoads & Sons, J. E.
Webster Mfg. Co.

Bins, Coal and Coke
Fairmont Mining Machinery Co.
Link-Belt Co.

Bit Sharpeners
Mayer Bros. Co.

Blasting Machines
Koehler Mfg. Co.

Blasting Supplies
Keystone National Powder Co.

Blowers
American Blower Co.
Westinghouse Electric & Mfg. Co.

Blowers, Fan
Coppus Engineering & Equipment Co.

Blowers, Steam Jet
McClave-Brooks Co.

Boiler Tube Cleaners
Scaife & Sons Co., Wm. B.

Boiler Tubes
National Tube Co.

Boilers, Steam
Vulcan Iron Works

Books
McGraw-Hill Book Co. Inc.

Boosters
Jeffrey Mfg. Co.
Ridgway Dynamo & Engine Co.

Box Car Loaders
Christy Box Car Loader Co.

Breaker Machinery
Vulcan Iron Works

Briquetting Machinery
Link-Belt Co.
Mashek Engr. Co.

Buckets, Clam and Orange Peel
Mead-Morrison Mfg. Co

Buckets, Elevator
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Webster Mfg. Co.

Cable Grips
Fairmont Mining Machinery Co.

Cages
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Scottdale Machine & Mfg. Co.

Car Hauls
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Webster Mfg. Co.

Car Loaders
Christy Box Car Loader Co.
Link-Belt Co.

Carbide
Fairbanks, Morse & Co.
Simmons Co., John

Carbide Lamps
Simmons Co., John

Cars and Car Wheels
Fairmont Mining Machinery Co.
Hockensmith Wheel & Mine Car Co.
Hyatt Roller Bearing Co.
Irwin Foundry & Mine Car Co.
Lehigh Car, Wheel & Axle Co.
Ottumwa Iron Works
Stine Co., J. C.
Watt Mining Car Wheel Co.

Castings
Hockensmith Wheel & Mine Car Co.
Irwin Foundry & Mine Car Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Watt Mining Car Wheel Co.

Castings, Brass and Iron
Fairmont Mining Machinery Co.
Stine Co., J. C.

Cast-Iron Pipe, Wood Lined
Boyts, Porter & Co.

Chains, Transmission
Link-Belt Co.
Morse Chain Co.
Webster Mfg. Co.

Chutes
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Scottdale Machine & Mfg. Co.
Webster Mfg. Co.

Coal Cleaners
Pennsylvania Crusher Co.

Coal Dock Bridges
Link-Belt Co.
Mead-Morrison Mfg. Co.

Coal-Handling Machinery
Christy Box Car Loader Co.
Mead-Morrison Mfg. Co. Co.

Coal Mining Plants
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.

Coal Storage and Rehandling Machinery
Fairbanks, Morse & Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Coke Ovens
Link-Belt Co.
Scottdale Machine & Mfg. Co.

Compressors, Air
Blake & Knowles Steam Pump Works
Cameron Steam Pump Works, A. S.
General Electric Co.
Goulds Mfg. Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.

Condensers
Alberger Pump & Condenser Co.
Blake & Knowles Steam Pump Works

Construction Engineers
Buffum, F. D.

Controllers
Westinghouse Electric & Mfg. Co.

Conveying Machinery
Scottdale Machine & Mfg. Co.
Vulcan Iron Works

Conveyors, Belt
Fairmont Mining Machinery Co.
Goodyear Tire & Rubber Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smith Co., The T. L.

Conveyors, Chain
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Webster Mfg. Co.

Conveyors, Screw
Jeffrey Mfg. Co.
Link-Belt Co.

Cooling Towers
Alberger Pump & Condenser Co.

Cordage
Waterbury Co.

Couplings
Byers Co., A. M.
Hockensmith Wheel & Mine Car Co.
Watt Mining Car Wheel Co.

Cranes
Link-Belt Co.

Crossings
Cincinnati Frog & Switch Co.

Crushers
Smith Co., T. L.

Crushers, Coal
Link-Belt Co.
Mead-Morrison Mfg. Co.
Pennsylvania Crusher Co.
Scottdale Machine & Mfg. Co.
Webster Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Crushing Machinery
Lehigh Car, Wheel & Axle Co.
Vulcan Iron Works

Crushing Plants, Coke
Jeffrey Mfg. Co.

Cutting and Punching Machines, Coal
Ingersoll-Rand Co.
Jeffrey Mfg. Co.
Pneumelectric Mach. Co.
Sullivan Machinery Co.
Whitcomb Co., Geo. D.

Diamond Core Drill Contracting
Brennan Drilling Co., J. A.
Punxsutawney Drilling & Contracting Co
Sullivan Machinery Co.

Doors, Automatic Mine
American Mine Door Co.

Draft, Mechanical
Coppus Engineering & Equipment Co.

Dredging Machinery
Marion Steam Shovel Co.

Drills, Air
Ingersoll-Rand Co.
Jeffrey Mfg. Co.
Pneumelectric Mach. Co.
Sullivan Machinery Co.
Whitcomb Co., Geo. D.

Drills, Core
Ingersoll-Rand Co.
Punxsutawney Drilling & Contracting Co.
Sullivan Machinery Co.

Drills, Electric
Ingersoll-Rand Co.
Pneumelectric Mach. Co.

Drills, Power
Fairmont Mining Machinery Co.

Drills, Rock
Pneumelectric Mach. Co.

Dumps, Cross-Over
Jeffrey Mfg. Co.
Link-Belt Co.
Sullivan Machinery Co.

Dynamite
Keystone National Powder Co.

Dynamos
General Electric Co.
Ridgway Dynamo & Engine Co.
Westinghouse Electric & Mfg. Co.

Elevators
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Scottdale Machine & Mfg. Co.
Smith Co., T. L.
Webster Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Engineers and Contractors
Buffum, F. D.

Engines, Gas and Gasoline
Webster Mfg. Co.

Engines, Haulage
Mead-Morrison Mfg. Co.
Ottumwa Iron Works

Engines, Steam
Ridgway Dynamo & Engine Co.
Stine Co., J. C.

Excavating Machinery
Marion Steam Shovel Co.

Excavators, Dragline
Marion Steam Shovel Co.

Fans
American Blower Co.
Fairmont Mining Machinery Co.
General Electric Co.
Jeffrey Mfg. Co.
Ottumwa Iron Works
Stine Co., J. C.
Sullivan Machinery Co.
Vulcan Iron Works
Westinghouse Electric & Mfg. Co.

Fans, Exhaust and Ventilating
Coppus Engineering & Equipment Co.

Filters, Water
Scaife & Sons Co., Wm. B.

Fire-Fighting Apparatus
Draeger Oxygen Apparatus Co.

Flanges, Pipe
National Tube Co.

Flywheels
Webster Mfg. Co.

Furnaces, Smokeless
McClave-Brooks Co.

Gaskets
National Tube Co.

Gears
Jeffrey Mfg. Co.
Link-Belt Co.
Webster Mfg. Co.

Generators
Jeffrey Mfg. Co.
Ridgway Dynamo & Engine Co.
Westinghouse Electric & Mg. Co.

Graphite, Lubricating, Boiler and Polishing
Dixon Crucible Co., Jos.

Grates and Grate Bars
Fairmont Mining Machinery Co.
McClave-Brooks Co.

Hammers, Pneumatic
Ingersoll-Rand Co.
Sullivan Machinery Co.

Hangers
See Pulleys

Heaters, Feed Water
Alberger Pump & Condenser Co.
Blake & Knowles Steam Pump Works

High Explosives
Keystone National Powder Co.
Webster Mfg. Co.

Hoisting and Hauling Machinery
Vulcan Iron Works

Hoists, Electric
General Electric Co.
Mead-Morrison Mfg. Co.
Ottumwa Iron Works
Pneumelectric Mach. Co.
Stine Co., J. C.

Hoists, Gasoline
Mead-Morrison Mfg. Co.

Hoists, Steam
Mead-Morrison Mfg. Co.
Ottumwa Iron Works
Sullivan Machinery Co.

Hose and Hose Couplings
Goodyear Tire & Rubber Co.
Ingersoll-Rand Co.
National Tube Co.
Sulivan Machinery Co.

Incline Planers
Stine Co., J. C.

Jigs
Jeffrey Mfg. Co.
Link-Belt Co.

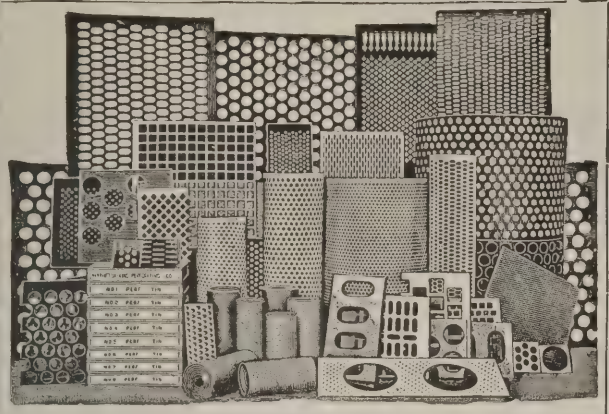
Joint Pipe
National Tube Co.

Lamp Cleaning Machines
Koehler Mfg. Co.

Lamp Filling Apparatus
Koehler Mfg. Co.

Lamp Glasses
Koehler Mfg. Co.

Lamp Igniters
Koehler Mfg. Co.
Wolf Safety Lamp Co.



PERFORATED METALS
Of every description

Perforated Steel Screen Plates

For Coal and Coke, Crushed Stone, Phosphate Rock, Gravel, Sand, etc.

With perforations round, square or oblong of any size to ten inches in diameter and from No. 10 U.S.S. Gauge to ½ inch thick, according to the size of holes.

The Plates are made flat for shaking screens, rolled to radius for cylindrical, or cut into sectors for conical screens, and made for either lap or butt joints with bolt holes as required.

For Bituminous Coal Screens, Coal and Ore Washing Plants, etc., the variation in diameters of round sizes is about as follows: from 1-16″ to ⅜″ dia. by 32nds; ⅜″ to ¾″ by 16ths; ¾″ to 1½″ by ⅛ths; 1½″ to 4″ by ¼ths; and 4″ to 10″ by ½ inches, with many intervening sizes, all standard centers—and the same in a measure with oblongs and squares.

Variations in thickness of metal run from No. 18 U.S.S. Gauge (1-20th in.) to one-half inch, according to size of holes.

Manganese Bronze Screens for Sulphurous Mine Waters.

Please send detail specifications with your order or inquiry.

THE HARRINGTON & KING PERFORATING COMPANY
628 North Union Street, CHICAGO, ILL.
New York Office: 114 Liberty Street

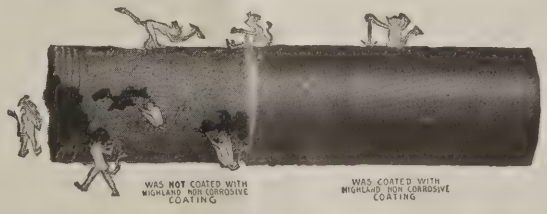
Three Grades of Rust Armor

What is the cost of corrosion?

You know that millions of parasites swarm in acid and alkaline water, damp earth and in the air, eating metal. The damage, you will admit, is countless thousands yearly.

Now figure the value of a shield for metal that prevents this destruction.

Highland Non-Corrosive Coating has already saved mines from wreck and ruin. It has prolonged the life of concrete and structural surfaces, as well as pipe lines, from 10 to 50 times.



This shield comes in three grades to meet all conditions. It may be applied, inside and out, to pipes by dipping the latter in it. Or it may be applied like paint on large surfaces.

Grade No. 1 is a highly efficient protection for surfaces exposed to weather, coke-smoke or other chemical gases.

Grade No. 2 is made specialiy for mine piping or metal similarly exposed to water, acids and damp earth underground.

Grade No. 3 is a cheap coating for weather-exposed surfaces for which the first two grades are not urgently required.

Use of this coating will without fail save you from an enormous expense.

Write to our mining department for free trial offer.

HIGHLAND
CHEMICAL PRODUCTS CO.
CONNELLSVILLE, PA.

Lamp Magnets
Koehler Mfg. Co.

Lamps, Acetylene
Simmons Co., John

Lamps, Electric
Wolf Safety Lamp Co.

Lamps, Safety
Koehler Mfg. Co.
Portable Electric Safety Light Co.
Wolf Safety Lamp Co.

Larries, Coke Oven
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Watt Mining Car Wheel Co.

Lifts, Air
Ingersoll-Rand Co.
Sullivan Machinery Co.

Loaders, Box Car
Christy Box Car Loader Co.
Fairmont Mining Machinery Co.
Link-Belt Co.

Locomotives, Compressed Air
Ingersoll-Rand Co.
Porter Co., H. K.
Vulcan Iron Works

Locomotives, Electric
Baldwin Locomotive Works, The
General Electric Co.
Jeffrey Mfg. Co.
Westinghouse Electric & Mfg. Co.

Locomotives, Gasoline
Jeffrey Mfg. Co.
Vulcan Iron Works
Whitcomb Co., Geo. D.

Locomotives, Rack Rail
Jeffrey Mfg. Co.

Locomotives, Steam
American Locomotive Co.
Baldwin Locomotive Works
Jeffrey Mfg. Co.
Porter Co., H. K.
Vulcan Iron Works

Lubricants, Graphite
Dixon Crucible Co., Jos.

Lubricators
S. K. F. Ball Bearing Co.
Whitcomb Co., Geo. D.

Marline Covered Wire Rope
Waterbury Co.

Mine Doors
American Mine Door Co.

Mixers, Concrete
Smith Co., The T. L.
Webster Mfg. Co.

Motors
General Electric Co.
Jeffrey Mfg. Co.
Ridgway Dynamo & Engine Co.
Stine Co., J. C.
Westinghouse Electric & Mfg. Co.

Oil Well Casings
Byers Co., A. M.

Oxygen Helmets
Draeger Oxygen Apparatus Co.

Packing
Goodyear Tire & Rubber Co.

Paint, Acid Resisting
Highland Chemical Products Co.
Standard Paint Co.

Paints and Oils
Dixon Crucible Co., Jos.
Highland Chemical Products Co.
Standard Paint Co.

Perforated Metals
Harrington & King Perforating Co.

Picking Tables
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Webster Mfg. Co.

Pipe
National Tube Co.

Pipe, Cast-Iron
Hockensmith Wheel & Mine Car Co.

Pipe Covering
Highland Chemical Products Co.
Standard Paint Co.

Pipe Fittings
National Tube Co.

Pipe Preservative
Highland Chemical Products Co.

Pipe, Wrought Iron
Byers Co., A. M.

Post Pullers
Sylvester Co.

Powder, Blasting
Keystone National Powder Co.

Power Hammers
Mayer Bros. Co.

Power Transmitting Machinery
Jeffrey Mfg. Co.
Link-Belt Co.
Morse Chain Co.
Webster Mfg. Co.

Publishers
McGraw-Hill Book Co.

Pulleys, Shafting and Hangers
Hess-Bright Mfg. Co.
Hyatt Roller Bearing Co.
Jeffrey Mfg. Co.
S. K. F. Ball Bearing Co.
Webster Mfg. Co.

Pulmotors
Draeger Oxygen Apparatus Co.

Pulverizers, Coal
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulverizer Co.

Pumping Engines, High Duty
Boyts, Porter & Co.

Pumps, Air
Boyts, Porter & Co.
Cameron Steam Pump Works, A. S.

Pumps, Boiler Feed
Blake & Knowles Steam Pump Works
Boyts, Porter & Co.
Cameron Steam Pump Works, A. S.
Deming Co.
Goulds Mfg. Co.
Vulcan Iron Works

Pumps, Centrifugal
Alberger Pump & Condenser Co.
Cameron Steam Pump Works, A. S.
Deming Co.
Goulds Mfg. Co.

Pumps, Electric
Boyts, Porter & Co.
Cameron Steam Pump Works, A. S.
Deming Co.
Fairmont Mining Machinery Co.
General Electric Co.

Pumps, Mine
Blake & Knowles Steam Pump Works
Boyts, Porter & Co.
Cameron Steam Pump Works, A. S.

Pumps, Power
Blake & Knowles Steam Pump Works
Boyts, Porter & Co.

Pumps, Rotary
Deming Co.
Goulds Mfg. Co.

Pumps, Sinking
Blake & Knowles Steam Pump Works
Boyts, Porter & Co.
Cameron Steam Pump Works, A. S.

Pumps, Triplex
Boyts, Porter & Co.
Goulds Mfg. Co.

Pumps, Turbine
Alberger Pump & Condenser Co.
Cameron Steam Pump Works, A. S.

Pumps, Vacuum
Blake & Knowles Steam Pump Works
Boyts, Porter & Co.
Goulds Mfg. Co.

Purifiers, Feed Water
Scaife & Sons Co., Wm. B.

Rail Benders
Link-Belt Co.

Rail Bonds
General Electric Co.

Regulators, Damper
Coppus Engineering & Equipment Co.

Rescue Apparatus
Draeger Oxygen Apparatus Co.

Rope Drives
Waterbury Co.

Rope, Galvanized
Waterbury Co.

Rope, Manilla and Jute
Waterbury Co.

Rope Transmission
Waterbury Co.

Rope, Wire
Waterbury Co.

Safety Lamp Supplies
Koehler Mfg. Co.
Wolf Safety Lamp Co.

Scrapers, Bucket
Marion Steam Shovel Co.

Screens
Fairmont Mining Machinery Co.
Harrington & King Perforating Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Ottumwa Iron Works
Scottdale Machine & Mfg. Co.
Webster Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Shafting
See Pulleys

Shearing Machines
Ingersoll-Rand Co.

Sheave Wheels
Lehigh Car, Wheel & Axle Co.

Sheaves
Boyts, Porter & Co.
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Ottumwa Iron Works
Webster Mfg. Co.

Shovels, Steam
Marion Steam Shovel Co.

Signals, Mine
Stromberg-Carlson Telephone Mfg. Co.

Sink and Float Testers
Pennsylvania Crusher Co.

Sprocket Wheels
Lehigh Car, Wheel & Axle Co.

Steam Engines, Auxiliary
American Blower Co.

Steam Engines, Stationary
Vulcan Iron Works

Steel Tipples
Scottdale Machine & Mfg. Co.

Stokers, Mechanical
McClave-Brooks Co.

Structural Steel
Scaife & Sons Co., Wm. B.

Surveying Instruments
Averill Stadiagraph Co.
Buff & Buff Mfg. Co.

Switchboards
Westinghouse Electric & Mfg. Co.

Switchboards, Telephone
Stromberg-Carlson Telephone Mfg. Co.

Switches and Frogs
Cincinnati Frog & Switch Co.

Tanks
National Tube Co.
Scaife & Sons Co., Wm. B.

Telephone Equipment
Stromberg-Carlson Telephone Mfg. Co.

Telephones, Mine
Stromberg-Carlson Telephone Mfg. Co.

Tipples
Fairbanks, Morse & Co.
Fairmont Mining Machinery Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Scaife & Sons Co., Wm. B.
Webster Mfg. Co.

Tracks, Portable
Cincinnati Frog & Switch Co.

Tramways, Wire Rope
Waterbury Co.

Transformers
Westinghouse Electric & Mfg. Co.

Transits and Levels
Buff & Buff Mfg. Co.

Traps, Steam
American Blower Co.

Trolley Wires
Westinghouse Electric & Mfg. Co.

Tubing
Byers Co., A. M.
National Tube Co.

Turbines, Steam
Coppus Engineering & Equipment Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Unions
National Tube Co.

Valves
National Tube Co.
Nelson Valve Co.
Whitcomb Co., Geo. D.

Ventilators
Coppus Engineering & Equipment Co.

Washeries, Coal
Fairbanks, Morse & Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Vulcan Iron Works
Webster Mfg. Co.

Water Softening and Purifying Systems
Scaife & Sons Co., Wm. B.

Wheels, Car
See Cars and Car Wheels

Wire and Cable
Stromberg-Carlson Telephone Mfg. Co.
Waterbury Co.

Wire Rope Fittings
Waterbury Co.

When People Want To Find A Telephone Number

they naturally look in the 'phone book—when they want to find who makes machinery or equipment for coal mines they naturally look in the Classified Directory. There's a proper place to find everything and that is the place for things used at mines.

STEEL MINE TIES
CAR HAULS
CAR RETARDERS
SELF OILING WHEELS

FAIRMONT
COAL MINE EQUIPMENT

POWER COAL AUGERS
BOX CAR LOADERS
PORTABLE MINE PUMPS
MINE FANS

Eliminates Spilling and Saves Labor

Irrespective of weather, slippery tracks or bad brakes, the

FAIRMONT Railroad Car Retarder

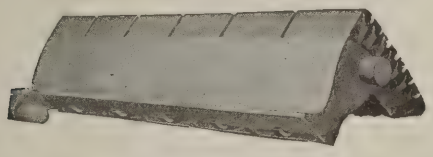
gives the dumper on the tipple com plete control of the cars to be loaded.
Easy to install and operate. Effects saving in labor, often enabling owners to dispense with the services of one man.
Feeds the cars regularly and prevents spilling of coal over tracks. Soon pays for itself.

Write for Bulletin.

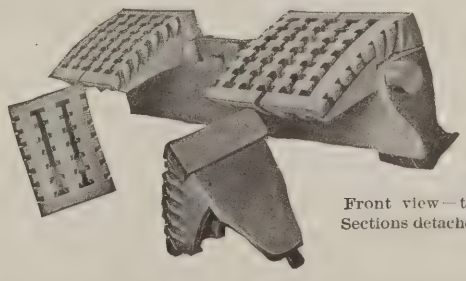


Fairmont Mining Machinery Co., Fairmont. W. Va.

How About Grate Repair Costs At The Mine?



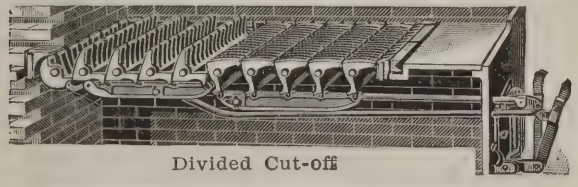
Back view of McClave Removable Sectional - Top Grate Bar No. 2



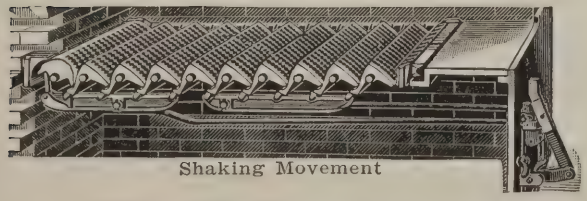
Front view—two Sections detached

McClave Grate No 2

They are probably running high. But by use of this Removable Sectional Top Bar you can reduce them to a minimum. The removable tops fit down securely on each bar, protecting the body from burning or breakage, and any section can be lifted off at any time and a new one substituted at trifling expense. An enormous cutter of repair costs in grate bars undergoing severe usage.



Divided Cut-off



Shaking Movement

The McClave Grates

McCLAVE GRATES
AND
ARGAND BLOWERS

Make a complete combustion System for burning low-grade fuels. Investigation of these will pay you. You can use up ordinarily considered "waste" fuels at the mine plant and sell all your high grade fuel.

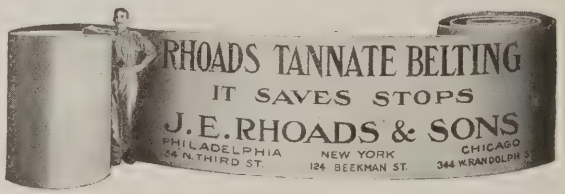
Ask us for complete information and for Catalog "H"

McClave-Brooks Company
Scranton, Pa.

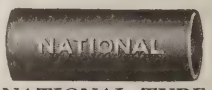
BRANCH OFFICES: 50 Church St., S. C. Smith, N. Y. Manager.
Chicago, 706 Fisher Bldg., F. G. Smith, Manager.

ALPHABETICAL INDEX TO ADVERTISERS

	Page
Alberger Pump & Condenser Co.	12
American Blower Co.	18
American Locomotive Co.	7
American Mine Door Co.	15
Averill Stadiagraph Co.	20
Baldwin Locomotive Wks.,	2d cover
Blake & Knowles Steam Pump Works.	14
Boyts, Porter & Co.	14
Brennan Drilling Co., J. A.	12
Buff & Buff Mfg. Co.	20
Buffum, F. D.	12
Byers Co., A. M.	4
Cameron Steam Pump Works, A. S.	13
Christy Box Car Loader Co.	16
Cincinnati Frog & Switch Co.	17
Consulting Engineers	20
Coppus Engineering & Equipment Co.	16
Deming Co.	13
Dixon Crucible Co., Jos.	20
Draeger Oxygen Apparatus Co.	19
Fairbanks, Morse & Co.	16, 19
Fairmont Mining Machinery Co.	25
General Electric Co.	6, 10
Goodyear Tire & Rubber Co.	26
Goulds Mfg. Co.	13
Harrington & King Perforating Co.	23
Hess-Bright Mfg. Co.	7
Highland Chemical Products Co.	23
Hockensmith Wheel & Mine Car Co.	17
Hoffman Bros.	12
Hyatt Roller Bearing Co.	17
Ingersoll-Rand Co.	9
Irwin Foundry & Mine Car Co.	17
Jeffrey Mfg. Co.	3
Keystone National Powder Co.	12
Koehler Mfg. Co.	19
Lehigh Car, Wheel & Axle Works	17
Link-Belt Co.	4th cover
Marion Steam Shovel Co.	8
Mashek Engineering Co.	16
Mayer Bros. Co.	12
McClave-Brooks Co.	25
McGraw-Hill Book Co., Inc.	21
Mead-Morrison Mfg. Co.	15
Morse Chain Co.	18
National Tube Co.	26
Nelson Valve Co.	12
Ottumwa Iron Works	15
Pennsylvania Crusher Co.	18
Pneumelectric Machine Co.,	16
Portable Electric Safety Light Co.	19
Porter Co., H. K.	18
Punxsutawney Drilling & Contracting Co.	12
Rhoads & Sons, J. E.	21
Ridgway Dynamo & Engine Co.	15
S. K. F. Ball Bearing Co.	8
Scaife & Sons Co., Wm B.	19
Scottdale Machine & Mfg. Co.	19
Simmons Co., John	5
Smith Co., The T. L.	14
Standard Paint Co.	16
Stine Co., J. C.	14
Stromberg-Carlson Telephone Mfg. Co.	18
Sullivan Machinery Co.	16
Sylvester Co., The	20
Virginia Polytechnic Inst.	12
Vulcan Iron Works.	11
Waterbury Co.	8
Watt Mining Car Wheel Co.	17
Webster Mfg. Co.	3d cover
Westinghouse Electric & Mfg. Co.	2d cover
Whitcomb Co., Geo. D.,	17
Williams Patent Crusher & Pulverizer Co.	18
Witherbee Igniter Co.	19
Wolf Safety Lamp Co.	19



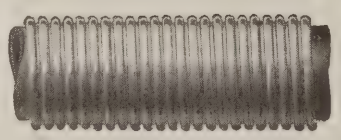
Facts About "National" Pipe That Every Coal Operator Should Know



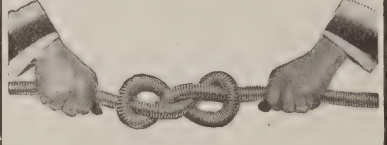
The first of a series under this heading will be published in a two-page announcement to appear in the July 4th issue of Coal Age. Be sure to read the first number!

NATIONAL TUBE COMPANY, Pittsburgh, Pa.

The Master Hose



You Just Can't Kink It



Why?—Bend it. See how it flies back sharp and true. Stand on it. Drop tools on it. Abuse it. Pull it around rough corners. Yank it over jagged surfaces.

You just *can't* kink it. You just can't wear it out. You must do something mighty unusual before anything happens.

That's Kantkink Hose. Made by the Goodyear Company. They call it the Master Hose.

Use it for any pressure. It laughs at a pressure of 1,000 lbs. to the square inch.

The oil-resisting tube and cover of the all-air hose protects it. Vaporized oil from compressors can't affect it.

GOODYEAR AKRON, OHIO
KANTKINK HOSE

Special tube compounds for steam and water purposes. Best duck and rubber throughout.

Armor wires of high carbon steel. The standard of manufacture — "Goodyear."

Where it is Master

In the mine, quarry, boiler room, round-house, shaft, tunnel, machine shop. Use it for compressed air, gas, water or steam.

No Distortion

Won't elongate. Won't get out of shape through expansion and contraction.

Use Goodyear Efficiency Service

Let Goodyear help you solve your hose problems. The Goodyear Efficiency Bureau is at your service. Costs nothing to ask questions. No obligation. Write today—NOW.

The Goodyear Tire & Rubber Company

Hose Dept., AKRON, OHIO

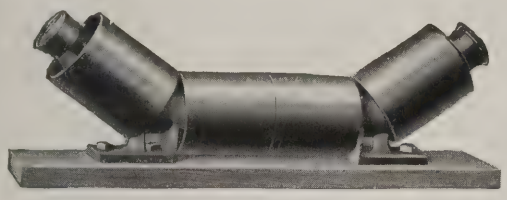
Toronto, Canada **London, England** **Mexico City, Mexico**

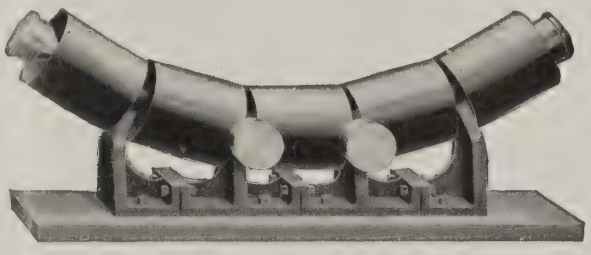
Write Us on Anything You Want in Rubber.

STAND-UP-TO-IT-IVENESS

Is an element of prime importance in equipment for Handling Coal—at Mine, Yard or Dock

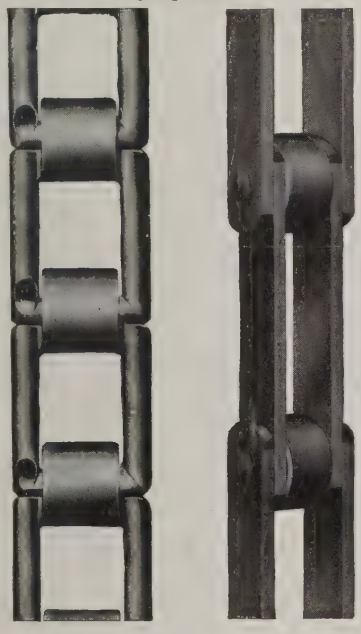
Our manufacturing formulas all include large percentages of this essential ingredient—and that's just one reason why you buy our machinery to get best possible service through the longest period of time.

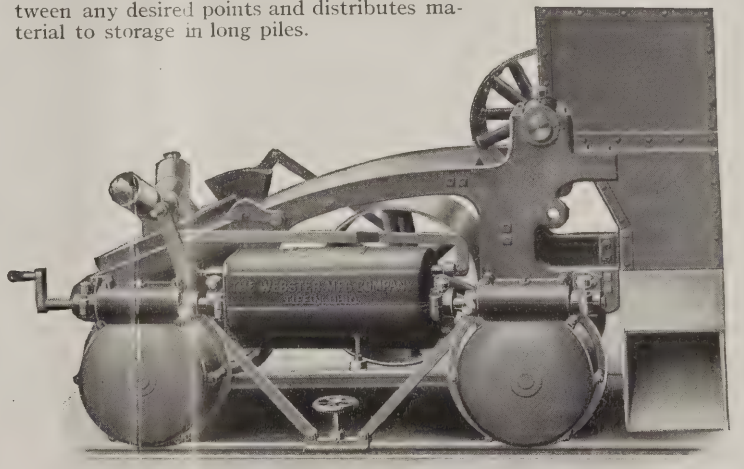




For Belt Conveyors: Improved Troughing Rolls and our Automatic Tripper, which travels back and forth between any desired points and distributes material to storage in long piles.

Chains: All types and sizes, for all purposes.





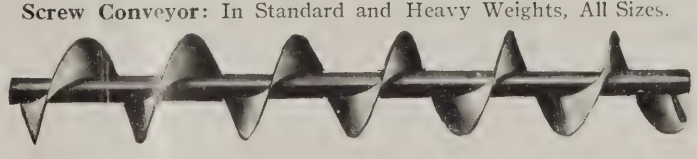
The Perkins Pivoted Bucket Carrier: Best known device for handling coal and ashes in the power house.



Elevator Buckets: In Malleable Iron or Sheet Steel. All Patterns.



Screw Conveyor: In Standard and Heavy Weights, All Sizes.



The Webster M'f'g Company, Tiffin, Ohio

NEW YORK: 90 West St. **CHICAGO: McCormick Building**

Philadelphia, Pa.	Chas. Bond Co., 520 Arch St.
Pittsburgh, Pa	Dempcy-Degener Co., 14 Wood St.
Detroit, Mich	Palmer-Bee Co., Woodward Ave.
Charleston, W.Va	C. L. Miller, 1511 Virginia St.
Middlesborough, Ky	Webster & Co.
Louisville, Ky	E. D. Morton & Co., 516 W. Main St.
Knoxville, Tenn	Webster & Co., Haiston Bank Bldg.
Birmingham, Ala	Carpenter & Hillman, 707 Empire Bldg.
Douglas, Ariz	L. W. Mendenhall, 1019 Avenue G.
Denver, Colo	C. L. Dean, 1718 California St.
Salt Lake City, Utah	Utah Engineering & Machinery Co.
Los Angeles, Calif	California Machy. & Equip. Co., 921 N. Main St.
Seattle, Wash	R. C. Brinkley
Vancouver, B. C	B. C. Equipment Co., Bank of Ottawa Bldg.

LINK-BELT

It's Service, Not Price, That Tells in Buying Conveyors

For twenty-five years and more, we have recommended, manufactured and installed large numbers of Belt Conveyors for uses to which they were best adapted; and from our long experience, manufacturing facilities, design of equipment and quality of belts has resulted the same superority that has always characterized our other products.





Service Brand Conveyor Belts for Dependability

in handling all classes of material. Belts should be purchased of a Company that has had experience in their use, and a reputation for maintaining the *quality* of its product.

Our catalog No. 79 gives some interesting facts about Belt Conveyors.

The Peck Overlapping Pivoted Bucket Carrier

The Most Durable Conveyor for Ore, Stone, Gravel and similar materials.

The recognized Standard Conveyor for coal and ashes in the modern power house.



Our Catalog No. 120 not only illustrates a wide range of Peck Carrier installations but gives the reasons for its superiority over all other types.

Write for any or all of the following Catalogs:

No. 170—Portable Wagon Loaders.
No. 128—Locomotive Cranes.
No. 166—Power Transmission Machinery.
No. 79—Belt Conveyors.
No. 120—Peck Pivoted Bucket Carrier.
No. 90—General Price List Catalog.
No. 189—Conveyors for Sand, Stone, etc.
No. 111—Coal Mining Machinery.
No. 125—Link Belt Silent Chain.

LINK-BELT COMPANY

PHILADELPHIA **CHICAGO** **INDIANAPOLIS**

New York.....299 Broadway
Boston.....131 State Street
Pittsburgh.....1501-3 Park Building
Buffalo.....698 Ellicott Square
Wilkes-Barre.....2nd National Bank Bldg.
Cleveland.....1304 Rockefeller Bldg.
St. Louis.....Central National Bank Bldg.
Seattle.....512½ First Avenue S.
Los Angeles.....204 N. Los Angeles St.
San Francisco.....N. D. Phelps, Sheldon Bldg.
Denver.....Lindrooth, Shubart & Co.
New Orleans.....Whitney Supply Co.
Birmingham.....General Machinery Co.
Minneapolis.....Link-Belt Supply Co.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 070595266